I Year – I SEMESTER

ENGLISH –I

(Common to All Branches)

DETAILED TEXT-I English Essentials: Recommended Topics:

1. IN LONDON: M.K.GANDHI

OBJECTIVE: To apprise the learner how Gandhi spent a period of three years in London as a student.

OUTCOME: The learner will understand how Gandhi grew in introspection and maturity.

2. THE KNOWLEDGE SOCIETY- APJ KALAM

OBJECTIVE: To make the learners rediscover India as a land of Knowledge.

OUTCOME: The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE

OBJECTIVE: This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion

OUTCOME: This develops in the student the scientific attitude to solve many problems which We find difficult to tackle.

4. PRINCIPLES OF GOOD WRITING:

OBJECTIVE: To inform the learners how to write clearly and logically.

OUTCOME: The learner will be able to think clearly and logically and write clearly and . logically

5. MAN'S PERIL

OBJECTIVE: To inform the learner that all men are in peril.

OUTCOME: The learner will understand that all men can come together and avert the peril.

6. THE DYING SUN—SIR JAMES JEANS

OBJECTIVE: This excerpt from the book "The Mysterious Universe" presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind.SirJames Jeans uses a poetic approach to discuss the scientific phenomenasss.

OUTCOME: This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.

7. LUCK—MARK TWAIN

OBJECTIVE: This is a short story about a man's public image and his true nature. The theme of The story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

OUTCOME: The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

Text Book : ' sEnglish Essentials' by Ravindra Publications

NON-DETAILED TEXT:

(From Modern Trailblazers of Orient Blackswan)
(Common single Text book for two semesters)
(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)

1. G.D. Naidu
OBJECTIVE: To inspire the learners by G.D. Naidu's example of inventions and contributions.
OUTCOME: The learner will be in a position to emulate G.D. Naidu and take to practical applications.

2. G.R. Gopinath
OBJECTIVE: To inspire the learners by his example of inventions.
OUTCOME: Like G.R. Gopinath, the learners will be able to achieve much at a low cost and help the common man.

3. Sudhamurthy
OBJECTIVE: To inspire the learners by the unique interests and contributions of Sudha Murthy.
OUTCOME: The learner will take interest in multiple fields of knowledge and make life Worth while through social service.

4. Vijay Bhatkar
OBJECTIVE: To inspire the learner by his work and studies in different fields of engineering and science.
OUTCOME: The learner will emulate him and produce memorable things.

Text Book : 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

I Year – I SEMESTER

MATHEMATICS – I (DIFFERENTIAL EQUATIONS)
(Common to All Branches)

UNIT I: Differential equations of first order and first degree:
Linear-Bernoulli-Exact-Reducible to exact.
Applications : Newton's Law of cooling-Law of natural growth and decay-orthogonal trajectories.
Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT II: Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e *ax* , Sin ax, cos ax, polynomials in x, e *ax* V(x), xV(x).
Applications: LCR circuit, Simple Harmonic motion
Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT III Laplace transforms:
Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).
Application: Solutions of ordinary differential equations using Laplace transforms.
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT IV Partial differentiation:
Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent's series for two variables– Functional dependence-Jacobian.
Applications: Maxima and Minima of functions of two variables with constraints and without constraints.
Subject Category
ABET Learning Objectives a c e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT V First order Partial differential equations:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

UNIT VI Higher order Partial differential equations:

2. Principles of Food Sanitation, Marriott N G 1985. AVI Publishing Co. Inc., Westport, Connecticut.

Solutions of Linear Partial differential equations with constant coefficients- Method of separation of Variables

Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation B E

Books:

1. **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
3. **GREENBERG,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
4. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O'NEIL** advanced Engineering Mathematics, Cengage Learning.

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Remarks
Theory Design Analysis Algorithms Drawing Others	a) Apply knowledge of math, science, & engineering b) Design & conduct experiments, analyze & interpret data c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints d) Function on multidisciplinary teams e) Identify, formulate, & solve engineering problems f) Understand professional & ethical responsibilities g) Communicate effectively h) Understand impact of engineering solutions in global, economic, environmental, & societal context i) Recognize need for & be able to engage in lifelong learning j) Know contemporary issues k) Use techniques, skills, modern tools for engineering practices	1. Objective tests 2. Essay questions tests 3. Peer tutoring based 4. Simulation based 5. Design oriented 6. Problem based 7. Experiential (project based) based 8. Lab work or field work based 9. Presentation based 10. Case Studies based 11. Role-play based 12. Portfolio based	a. Questions should have: b. Definitions, Principle of operation or philosophy of concept. c. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. d. Design oriented problems e. Trouble shooting type of questions f. Applications related questions g. Brain storming questions	

I Year – I SEMESTER

MATHEMATICS – II
(MATHEMATICAL METHODS)
(Common to All Branches)

UNIT I Solution of Algebraic and Transcendental Equations:
Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method (One variable and Simultaneous Equations)
Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT II Interpolation:
Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unevenly spaced points - Lagrange's Interpolation formula
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT III Numerical solution of Ordinary Differential equations:
Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT IV Fourier Series:
Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series
Application: Amplitude, spectrum of a periodic function
Subject Category
ABET Learning Objectives a e d
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT V Fourier Transforms:
Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms
Subject Category
ABET Learning Objectives a d e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT VI Z-transform:

Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse z transform- -Convolution theorem – Solution of difference equation by Z - transforms.
ABET Learning Objectives a b e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

BOOKS:

1. **B.S. GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **DEAN G. DUFFY,** Advanced Engineering Mathematics with MATLAB, CRC Press
3. V.RAVINDRANATH and P. VIJAYALAXMI, Mathematical Methods, Himalaya Publishing House
4. **ERWYN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Remarks
Theory Design Analysis Algorithms Drawing Others	a) Apply knowledge of math, science, & engineering b) Design & conduct experiments, analyze & interpret data c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints d) Function on multidisciplinary teams e) Identify, formulate, & solve engineering problems f) Understand professional & ethical responsibilities g) Communicate effectively h) Understand impact of engineering solutions in global, economic, environmental, & societal context i) Recognize need for & be able to engage in lifelong learning j) Know contemporary issues k) Use techniques, skills, modern tools for engineering practices	1. Objective tests 2. Essay questions tests 3. Peer tutoring based 4. Simulation based 5. Design oriented 6. Problem based 7. Experiential (project based) based 8. Lab work or field work based 9. Presentation based 10. Case Studies based 11. Role-play based 12. Portfolio based	A. Questions should have: B. Definitions, Principle of operation or philosophy of concept. C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. D. Design oriented problems E. Trouble shooting type of questions F. Applications related questions G. Brain storming questions	

I Year – I SEMESTER

ENGINEERING PHYSICS

UNIT-1

PHYSICAL OPTICS FOR INSTRUMENTS

"Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics"

INTERFACE : Introduction – Interference in thin films by reflection – Newton's rings.

DIFFRECTION : Introduction – Fraunhofer diffraction - Fraunhofer diffraction at double slit (qualitative) – Diffraction grating – Grating spectrum – Resolving power of a grating – Rayleigh's criterion for resolving power.

POLARIZATION : Introduction – Types of Polarization – Double refraction – Quarter wave plate ad Half Wave plate.

UNIT-II

COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.

LASERS: Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Three and Four level pumping
schemes – Ruby laser – Helium Neon laser.

FIBER OPTICS : Introduction – Principle of Optical Fiber – Acceptance angle and acceptance cone – Numerical aperture.

CRYSTALLOGRAPHY : Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC

X-RAY DIFRACTION TECHNIQUES: Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg's law.

UNIT-III

MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY

"Objective many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

MAGNETIC PROPERTIES : Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve

DIELECTRIC PROPERTIES : Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius – Mossotti equation – Dielectric loss, Breakdown and Strength.

SUPERCONDUCTIVITY : General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London's equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

UNIT – IV

ACQUSTICS AND EM – FIELDS:

Objective: The utility and nuances of ever pervading SHM and its consequences would be the first and-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.

ACQUSTICS: Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine's formula, Eyring's formula.

ELECTRO-MAGENTIC FIELDS: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell's Electromagnetic Equations (Calculus approach).

UNIT – V

QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT

Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.

QUANTUM MECHANICS: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

FREE ELECTRON THEORY: Classical free electron theory – electrical conductivity – Mean free path – Relaxation time and drifty velocity – Quantum free electron theory – Fermi – Dirac (analytical) and its dependence on temperature – Fermi energy – density of states – derivations for current density.

BAND THEORY OF SOLIDS: Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron - concept of hole.

UNIT – VI

SEMICONDUCTOR PHYSICS:

Objective: In the wake of ever increasing demand for the space and power the watch word "small is beautiful", understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein's equation – Hall Effect – direct & indirect band gap semiconductors – Electronic transport Mechanism for LEDs, Photo conductors and solar cells.

TEXT BOOKS

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd)
2. A text book of Engineering Physics by M.N. Avadhanulu & P.G. Kshirasagar (S. Chand publications)
3. Engineering Physics b;y M.R. Srinivasan (New Age international publishers)

REFERENCE BOOKS

1. 'Introduction to solid state physics' by Charles Kittle (Willey India Pvt.Ltd)
2. 'Applied Physics' by T. Bhimasenkaram (BSP BH Publications)
3. 'Applied Physics' by M.Arumugam (Anuradha Agencies)
4. 'Engineering Physics' by Palanisamy (Scitech Publishers)
5. 'Engineering Physics' by D.K.Bhattacharya (Oxford University press)
6. 'Engineering Physics' by Mani Naidu S (Pearson Publications)
7. 'Engineering Physics' by Sanjay D Jain and Girish G Sahasrabudhe (University Press)
8. 'Engineering Physics' by B.K.Pandey & S. Chaturvedi (Cengage Learning)

I Year – I SEMESTER

Professional Ethics and Human Values

UNIT I: Human Values:
Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for thers – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT II : Engineering Ethics:
The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer – Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics- Types of Inquiry – Engineering and Ethics-Kohlberg's Theory – Gilligan's Argument – Heinz's Dilemma.

UNIT III : Engineering as Social Experimentation:
Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV : Engineers' Responsibility for Safety and Risk:
Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V : Engineers' Responsibilities and Rights:
Collegiality-Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty-misguided Loyalty – professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self-interest, Customs and Religion- Ethical egoism-Collective bargaining-Confidentiality-Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational Crimesindustrial espionage-price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

UNIT VI : Global Issues:
Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

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Text Books:

1. "Engineering Ethics and Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana Maruthi Publications
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications

4. “Professional Ethics and Human Values” by Prof.D.R.Kiran-
5. “Indian Culture, Values and Professional Ethics” by PSR Murthy-BS Publication
6. “Ethics in Engineering” by Mike W. Martin and Roland Schinzinger – Tata McGraw- Hill – 2003.
7. “Engineering Ethics” by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

I Year – I SEMESTER

ENGINEERING DRAWING

Objective: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I
Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them. Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

UNIT II
Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other. Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

UNIT III
Objective: The objective is to make the students draw the projections of the lines inclined to both the planes. Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT IV
Objective: The objective is to make the students draw the projections of the plane inclined to both the planes. Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT V
Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes. Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI
Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa. Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:
1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers

REFERENCE BOOKS:
1. Engineering Graphics for Degree by K.C. John, PHI Publishers

2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

I Year – I SEMESTER

ENGLISH – COMMUNICATION SKILLS LAB – I

Suggested Lab Manuals:

OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

BASIC COMMUNICATION SKILLS

UNIT 1 A. Greeting and Introductions
B. Pure Vowels
UNIT 2 A. Asking for information and Requests
B. Diphthongs
UNIT 3 A. Invitations
B. Consonants
UNIT 4 A. Commands and Instructions
B. Accent and Rhythm
UNIT 5 A. Suggestions and Opinions
B. Intonation

Text Book:

'Strengthen your Communication Skills' Part-A by Maruthi Publications

Reference Books:

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills (Oxford University Press, New Delhi)

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I Year – I SEMESTER

ENGINEERING PHYSICS LAB

List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p.n junction.
15. Hall Effect for semiconductor.

REFERENCE:

1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links)
2. Physics practical manual, Lorven Publications.

I Year – I SEMESTER

Engineering physic Virtual Labs - Assignments

List of Experiments

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster's angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL: WWW.vlab.co.in

I Year – I SEMESTER

ENGINEERING & IT WORKSHOP

ENGINEERING WORKSHOP:

Course Objective: To impart hands-on practice on basic engineering trades and skills.

Note: At least two exercises to be done from each trade.

Trade:

Carpentry	1. T-Lap Joint
	2. Cross Lap Joint
	3. Dovetail Joint
	4. Mortise and Tennon Joint
Fitting	1. Vee Fit
	2. Square Fit
	3. Half Round Fit
	4. Dovetail Fit
Black Smithy	1. Round rod to Square
	2. S-Hook
	3. Round Rod to Flat Ring
	4. Round Rod to Square headed bolt
House Wiring	1. Parallel / Series Connection of three bulbs
	2. Stair Case wiring
	3. Florescent Lamp Fitting
	4. Measurement of Earth Resistance
Tin Smithy	1. Taper Tray
	2. Square Box without lid
	3. Open Scoop
	4. Funnel

IT WORKSHOP:

Objectives: Enabling the student to understand basic hardware and software tools through practical exposure

PC Hardware:

Identification of basic peripherals, assembling a PC, installation of system software like MS indows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.

Internet & World Wide Web:

Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene(protecting the personal computer from getting infected with the viruses), worms and other cyber attacks .

Productivity tools Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

(Note: Student should be thoroughly exposed to minimum of 12 Tasks)

PC Hardware

Task 1: Identification of the peripherals of a computer.

To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

Task 2(Optional) : A practice on disassembling the components of a PC and assembling them to back to working condition.

Task 3: Examples of Operating systems- DOS, MS Windows, Installation of MS windows on a PC.

Task 4: Introduction to Memory and Storage Devices , I/O Port, Device Drivers, Assemblers, Compilers, Interpreters , Linkers, Loaders.

Task 5:

Hardware Troubleshooting (Demonstration):

Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

Software Troubleshooting (Demonstration):. Identification of a problem and fixing the PC for any software issues Internet & Networking Infrastructure

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices-Gateway, Routers, Hub, Bridge, NIC ,Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

Orientation & Connectivity Boot Camp and web browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task 7: Search Engines & Netiquette:

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of microblogging, wiki, collaboration using social networks, participating in online technology forums

Task 8: Cyber Hygiene (Demonstration): Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced Word

Task 9 : MS Word Orientation:

Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving

Task 10: Creating project : Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Excel

Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations

Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

LOOKUP/VLOOKUP

Task 12: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power Point

Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

Task 14: Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week

includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

TEXT BOOK:

Faculty to consolidate the workshop manuals using the following references

1. Computer Fundamentals, Anita Goel, Pearson
2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson,2008
3. Information Technology Workshop,3e, G Praveen Babu, M V Narayana BS Publications.
4. Comdex Information Technology , Vikas Gupta, dreamtech.

REFERENCE BOOK:

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu

I Year – II SEMESTER

ENGLISH –II
(**Common to All Branches)**

DETAILED TEXT-II: Sure Outcomes: English for Engineers and Technologists
Recommended Topics:

1. TECHNOLOGY WITH A HUMAN FACE
OBJECTIVE: To make the learner understand how modern life has been shaped by technology.
OUTCOME: The proposed technology is people's technology. It serves the human person instead of making him the servant of machines.

2. CLIMATE CHANGE AND HUMAN STRATEGY
OBJECTIVE: To make the learner understand how the unequal heating of earth's surface by the Sun, an atmospheric circulation pattern is developed and maintained.
OUTCOME: The learner's understand that climate must be preserved.

3. EMERGING TECHNOLOGIES
OBJECTIVE: To introduce the technologies of the 20th century and 21st centuries to the learners.
OUTCOME: The learner will adopt the applications of modern technologies such as nanotechnology.

4. WATER- THE ELIXIR OF LIFE
OBJECTIVE: To inform the learner of the various advantages and characteristics of water.
OUTCOME: The learners will understand that water is the elixir of life.

5. THE SECRET OF WORK
**OBJECTIVE:: ** In this lesson, Swami Vivekananda highlights the importance of work for any development.
OUTCOME: The students will learn to work hard with devotion and dedication.

6. WORK BRINGS SOLACE
OBJECTIVE: In this lesson Abdul Kalam highlights the advantage of work.
OUTCOME: The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems

Text Book : 'Sure Outcomes' by Orient Black Swan Pvt. Ltd. Publishers
NON-DETAILED TEXT:

(**From Modern Trailblazers of Orient Blackswan)**
(Common single Text book for two semesters)
(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)

5. J.C. Bose
OBJECTIVE: To apprise of J.C. Bose's original contributions.
OUTCOME: The learner will be inspired by Bose's achievements so that he may start his own original work.sss

6. Homi Jehangir Bhaba
OBJECTIVE: To show Bhabha as the originator of nuclear experiments in India.
OUTCOME: The learner will be inspired by Bhabha's achievements so as to make his own experiments.

7. Vikram Sarabhai
OBJECTIVE: To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.
OUTCOME: The learner will realize that development is impossible without scientific research.

8. A Shadow- R.K. Narayan
OBJECTIVE: To expose the reader to the pleasure of the humorous story
OUTCOME: The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

Text Book: 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers
1.Principles of Food Sanitation, Marriott N G 1985. AVI Publishing Co. Inc., Westport, Connecticut.

I Year – II SEMESTER

MATHEMATICS – III
(LINEAR ALGEBRA & VECTOR CALCULUS)
(Common to All Branches)

UNIT I Linear systems of equations:
Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.
Application: Finding the current in a electrical circuit.
Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6 4
JNTUK External Evaluation A B E

UNIT II Eigen values - Eigen vectors and Quadratic forms:
Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.
Application: Free vibration of a two-mass system.
Subject Category
ABET Learning Objectives a d e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

UNIT III Multiple integrals:
Review concepts of Curve tracing (Cartesian - Polar and Parametric curves)- Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates. Multiple integrals - double and triple integrals – change of variables – Change of order of Integration
Application: Moments of inertia
Subject Category
ABET Learning Objectives a e d
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT IV Special functions:
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integral.
Application: Evaluation of integrals
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

UNIT V Vector Differentiation:
Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities
Application: Equation of continuity, potential surfaces
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

UNIT VI Vector Integration:

Line integral – work done – Potential function – area- surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

application: work done, Force

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

BOOKS:

1. **GREENBERG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
2. **B.V. RAMANA,** Higher Engineering Mathematics, Tata McGraw Hill
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
4. **PETER O'NEIL,** Advanced Engineering Mathematics, Cengage Learning
5. **D.W. JORDAN AND T. SMITH,** Mathematical Techniques, Oxford University

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Remarks
Theory Design Analysis Algorithms Drawing Others	a) Apply knowledge of math, science, & engineering b) Design & conduct experiments, analyze & interpret data c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints d) Function on multidisciplinary teams e) Identify, formulate, & solve engineering problems f) Understand professional & ethical responsibilities g) Communicate effectively h) Understand impact of engineering solutions in global, economic, environmental, & societal context i) Recognize need for & be able to engage in lifelong learning j) Know contemporary issues k) Use techniques, skills, modern tools for engineering practices	1. Objective tests 2. Essay questions tests 3. Peer tutoring based 4. Simulation based 5. Design oriented 6. Problem based 7. Experiential (project based) based 8. Lab work or field work based 9. Presentation based 10. Case Studies based 11. Role-play based 12. Portfolio based	A. Questions should have: B. Definitions, Principle of operation or philosophy of concept. C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. D. Design oriented problems E. Trouble shooting type of questions F. Applications related questions G. Brain storming questions	

I Year – II SEMESTER

ENGINEERING CHEMISTRY

UNIT-I: WATER TECHNOLOGY

Hard Water – Estimation of hardness by EDTA method – Potable water- Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and foaming , scale formation, corrosion, caustic embrittlement, turbine deposits – Softening of water – Lime soda, Zeolite processes – Reverse osmosis – Electro Dialysis, Ion exchange process

Objectives : For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.

UNIT-II : ELECTROCHEMISTRY

Concept of Ionic conductance – Ionic Mobilities – Applications of Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode potentials – Nernst equation – Electrochemical series – Potentiometric titrations – Concentration cells – Ion selective electrode – Glass electrodes – Fluoride electrode; Batteries and Fuel cells Objectives: Knowledge of galvanic cells, electrode potentials, concentration cells is necessary for engineers to understand corrosion problem and its control ; also this knowledge helps in understanding modern bio-sensors, fuel cells and improve them.

UNIT-III: CORROSION

Causes and effects of corrosion – theories of corrosion (dry, chemical and electrochemical corrosion) – Factors affecting corrosion – Corrosion control methods – Cathodic protection – Sacrificial Anodic, Impressed current methods – Surface coatings – Methods of application on metals (Hot dipping, Galvanizing, tinning , Cladding, Electroplating, Electroless plating) – Organic surface coatings – Paints – Their constituents and their functions.

Objectives : the problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them

UNIT-IV : HIGH POLYMERS

Types of Polymerization – Stereo regular Polymers – Physical and Mechanical properties of polymers – Plastics – Thermoplastics and thermo setting plastics – Compounding and Fabrication of plastics – Preparation and properties of Polyethylene, PVC and Bakelite – Elastomers – Rubber and Vulcanization – Synthetic rubbers – Styrene butadiene rubber – Thiokol – applications.

Objectives : Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

UNIT-V : FUELS

Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific vaule – HCV and LCV – Problems based on calorific values; petroleum – Refining – Cracking – Petrol – Diesel knocking; Gaseous fuels – Natural gas – LPG, CNG – Combustion – Problems on air requirements.

Objectives : A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

UNIT-VI : CHEMISTRY OF ADVANCED MATERIALS

Nanometerials (Preparation of carbon nanotubes and fullerenes – Properties of nanomaterials – Engineering applications) – Liquid crystals (Types – Application in LCD and Engineering Applications) – Fiber reinforced plastics – Biodegradable polymers – Conducting polymers – Solar cells (Solar heaters – Photo voltaic cells – Solar reflectors – Green house concepts – Green chemistry (Methods for green synthesis and Applications) – Cement – Hardening and setting – Deterioration of cement concrete

Objectives: With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

TEXT BOOKSS2wwww5

1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd,
2. N.Y.S.Murthy, V.Anuradha, KRamaRao “A Text Book of Engineering Chemistry”, Maruthi Publications
3. C.Parameswara Murthy, C.V.Agarwal, Adhra Naidu (2006) Text Book of Engineering Chemistry, B.S.Publications
4. B. Sivasankar (2010), Engineering Chemistry, McGraw-Hill companies.
5. Ch.Venkata Ramana Reddy and Ramadevi (2013) , Engineering Chemistry, Cengage Learning

REFERENCES

1. S.S. Dara (2013) Text Book of Engineering Chemistry, S.Chand Technical Series
2. K. Sesha Maheswaramma and Mridula Chugh (2013), Engineering Chemistry, Pearson Publications.
3. R. Gopalan, D. Venkatappayya, Sulochana Nagarajan (2011), Text Book of Engineering Chemistry, Vikas Publications.
4. B.Viswanathan and M.Aulice Scibioh (2009), Fuel Cells, Principals and applications, University

I Year – II SEMESTER

ENGINEERING MECHANICS

Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes ,resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work – energy method.

UNIT – I
Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.
Introduction to Engg. Mechanics – Basic Concepts.
Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

UNIT II
Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
Equilibrium of Systems of Forces : Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

UNIT – III
Objectives : The students are to be exposed to concepts of centre of gravity.
Centroid : Centroids of simple figures (from basic principles) – Centroids of Composite Figures
Centre of Gravity : Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

UNIT IV
Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia :** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V
Objectives : The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.

Kinematics : Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics :** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VI

Objectives: The students are to be exposed to concepts of work, energy and particle motion

Work – Energy Method : Equations for Translation, Work-Energy Applications to Particle Motion, connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

TEXT BOOKS:

1. Engg. Mechanics - S. Timoshenko & D.H.Young., 4th Edn., Mc-Graw Hill publications.
2. Engineering Mechanics: Statics and Dynamics 3rd edition, Andrew Pytel and Jaan Kiusalaas; Cengage Learning publishers.

REFERENCES:

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics , statics – J.L. Meriam, 6th Edn – Wiley India Pvt Ltd.
3. Engineering Mechanics , dynamics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
4. Engineering Mechanics , statics and dynamics – I.H.Shames, – Pearson Publ.
5. Mechanics For Engineers , statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
6. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
7. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
8. Engineering Mechanics , Fedinand . L. Singer , Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson, Mc Graw Hill publications
10. Engineering Mechanics, Tayal. Umesh Publ.

I Year – II SEMESTER

ENVIRONMENTAL STUDIES

Course Learning Objectives:

The objectives of the course is to impart

1. Overall understanding of the natural resources
2. Basic understanding of the ecosystem and its diversity
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
4. An understanding of the environmental impact of developmental activities
5. Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:

The student should have knowledge on

1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
5. Social issues both rural and urban environment and the possible means to combat the challenges
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit

Syllabus:

UNIT - I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

Ecosystems: 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 Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT - II

Natural Resources: Natural resources and associated problems Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining,dams and other effects on forest 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 Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity Energy resources: Growing energy needs,

renewable and non-renewable energy sources use of alternate energy sources. Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversityclassification

- Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT - IV

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT - V

Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act –Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT - VI

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:

1. Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

Reference:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning, New Delhi

I Year – II SEMESTER

COMPUTER PROGRAMMING

Objectives: Formulating algorithmic solutions to problems and implementing algorithms in C

UNIT I:
Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux
Introduction: Computer systems, Hardware and Software Concepts**,**
Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling(gcc), Linking and Executing in under Linux.
BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:
Unit objective: understanding branching, iteration and data representation using arrays
SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples**.**
ITERATIVE: loops- while, do-while and for statements , break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix**.STRINGS: concepts, c strings.**

UNIT III:
Objective: Modular programming and recursive solution formulation
FUNCTIONS- MODULAR PROGRAMMING: functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for Fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT IV:
Objective: Understanding pointers and dynamic memory allocation
POINTERS: pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT V:
Objective: Understanding miscellaneous aspects of C
ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structuresdeclaration, definition and initialization of structures, accessing structures, nested structures, arrays of

structures, structures and functions, pointers to structures, self referential structures, unions, type def, bit-fields, program applications
BIT-WISE OPERATORS: logical, shift, rotation, masks.

UNIT VI:
Objective: Comprehension of file operations
FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

Text Books:
1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PERSON
2. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Richie and Brian Kernighan
5. Programming in C, B. L. Juneja, Anith Seth, Cengage Learning.

Reference Books and web links:
1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge

I Year – II SEMESTER

ENGINEERING CHEMISTRY LABORATORY

List of Experiments

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCI using standard Na2co3 solutions
3. Estimation of KMnO4 using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard K2Cr2O7 solution.
5. Estimation of Copper using standard K2Cr2O7 solution.
6. Estimation of Total Hardness water using standard EDTA solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimatinog of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

TEXT BOOKS

1. Dr. Jyotsna Cherukuis (2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. Chemistry Practical Manual, Lorven Publications
3. K. Mukkanti (2009) Practical Engineering Chemistry, B.S.Publication

I Year – II SEMESTER

ENGLISH – COMMUNICATION SKILLS LAB – II

Suggested Lab Manuals:

OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

ADVANCED COMMUNICATION SKILLS

UNIT 6	Body language
UNIT 7	Dialogues
UNIT 8	Interviews and Telephonic Interviews
UNIT 9	Group Discussions
UNIT 10	Presentation Skills
UNIT 11	Debates

Text Book:

'Strengthen your Communication Skills' Part-B by Maruthi Publications

Reference Books:

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills (Oxford University Press, New Delhi)

I Year – II SEMESTER

COMPUTER PROGRAMMING LAB

Exercise l

a) Write a C Program to calculate the area of triangle using the formula area = (s (s-a) (s-b)(s-c))1/2 where s= (a+b+c)/2

b) Write a C program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

b) Write a C program to find the roots of a quadratic equation.

c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value

Exercise 4

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5

a) Write a C program to interchange the largest and smallest numbers in the array.

b) Write a C program to implement a liner search.

c) Write a C program to implement binary search

Exercise 6

a) Write a C program to implement sorting of an array of elements .

b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them

Exercise 7

Write a C program that uses functions to perform the following operations:

i. To insert a sub-string in to given main string from a given position.

ii. To delete n Characters from a given position in a given string.

iii. To replace a character of string either from beginning or ending or at a specified location

Exercise 8

Write a C program that uses functions to perform the following operations using Structure:

i) Reading a complex number ii) Writing a complex number

iii) Addition of two complex numbers iv) Multiplication of two complex numbers

Exercise 9

Write C Programs for the following string operations without using the built in functions

- to concatenate two strings
- to append a string to another string
- to compare two strings

Exercise 10

Write C Programs for the following string operations without using the built in functions

- to find t he length of a string
- to find whether a given string is palindrome or not

Exercise 11

a) Write a C functions to find both the largest and smallest number of an array of integers.

b) Write C programs illustrating call by value and call by reference cncepts.

Exercise 12

Write C programs that use both recursive and non-recursive functions for the following

i) To find the factorial of a given integer.

ii) To find the GCD (greatest common divisor) of two given integers.

iii) To find Fibonacci sequence

Exercise 13

a) Write C Program to reverse a string using pointers

b) Write a C Program to compare two arrays using pointers

Exercise 14

a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

b) Write a C program to swap two numbers using pointers

Exercise 15

Examples which explores the use of structures, union and other user defined variables

Exercise 16

a) Write a C program which copies one file to another.

b) Write a C program to count the number of characters and number of lines in a file

c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguguments

II Year B.Tech. Ag. Engg I Sem.

FLUID MECHANICS AND OPEN CHANNEL HYDRAULICS

Objective: To enable the students to design efficient water conveyance systems like canals, channels and pipes from places of origin to delivery points by acquiring knowledge on the principles of mechanics of fluids, water measurement and regulation and open channel hydraulic principles.

Unit – I:
Fluids-definitions-classification-properties, dimensions. Fluid pressure–introduction– Measurement of fluid pressure–peizometer tube manometry–types of manometers. Mechanical gauges-Bourdon's tube pressure gauge-Diaphragm pressure gauge–Dead weight pressure gauge. Fluid Static force on submerged surfaces– Total force on horizontal, vertical and inclined surfaces. Center of pressure of an inclined immersed surface- Centre of pressure of a composite section. Pressure on a curved surface and its applications. Kinematics of fluid flow– introduction – continuity of fluid flow – Types of flow lines.

Unit –II:
Boundary layer theory- Thickness of Boundary layer, Thickness of Boundary layer in a laminar flow, Thickness of Boundary layer in a turbulent flow, Prandtl's Experiment of Boundary Layer separation. Dynamics of fluid flow – Various forms of energy in fluid flow, frictional loss, general equation. Bernoulli's theorem, Euler's equation of motion. Practical applications of Bernoulli's theorem, Verturimeter, pitot tube, Orifice meter.

Unit – III:
Buoyancy of flotation – metacentric height. Flow through orifices (Measurement of Discharge) – Types of orifices, Jet of water, vena contracta, Hydraulic coefficients, Experimental Method for Hydraulic Coefficients, Discharge through a rectangular orifice. Flow through Orifices (Measurement of Time) – Time of Emptying a square, rectangular or circular tank through an orifice at its bottom, time of emptying a hemispherical tank through an orifice at its bottom. Time of emptying a circular horizontal tank through an orifice at its bottom. Time of emptying a tank of variable cross-section through an orifice. Flow through Mouthpieces – Types of Mouthpieces – Loss of Head of a liquid flowing in a pipe, Discharge through a Mouthpiece. Flow over Notches-Types of notches, Discharge over a Rectangular Notch, Triangular Notch, Stepped Notch. Time of emptying a tank over a Rectangular Notch, Triangular Notch. Flow over weirs – Types of weirs, Discharge over a weir, Francis's formula for Discharge over a Rectangular weir (Effect of End Contractions), Bazin's formula for Discharge over a rectangular weir, velocity of approach, Determination of Velocity of Approach.

Unit – IV:
Flow through simple pipes – Loss of head in pipes, Darcy's formula for loss of Head in pipes, Chezy's formula for loss of head in pipes. Transmission of power through pipes, Time of emptying a tank through a long pipe, Time of flow from one tank into another through a long pipe. Flow through compound pipes – Discharge through a compound pipe (Pipes in series)-Discharge through pipes in parallel, Equivalent size of a pipe, Discharge through branded pipes from one reservoir to another.

Unit – V:

Dimensional analysis and similitude – Rayleigh's method & Buckingham's pi theorem. Types of similarities, Dimensional analysis, dimensionless numbers, introduction to fluid machinery. Open channel hydraulicsclassification of open channel and definitions. Chezy's formula for discharge through an open channel.

Unit – VI:

Bazin's formula for discharge through open channel, Numerical Problems on design through open channel, Kutter's formula for discharge, Problems on design. Manning's formula for discharge through an open channel. Channels of most economical cross sections – Conditions for maximum discharge through a channel of rectangular section, trapezoidal section, circular section. Specific energy concept-Specific energy of a following fluid, specific energy diagram, critical depth, Type of flows, critical velocity. Velocity and Pressure profiles in open channels. Hydraulic jump, Types of Hydraulic Jumps, Depth of Hydraulic Jump, Loss of Head due to Hydraulic Jump.

TEXT BOOKS:

1. Hydraulics and Fluid Mechanics, Modi P M and Seth S. M. 1973. Standard Book House, Delhi.
2. Open Channel Hydraulics, Chow V T, 1983, McGraw Hill Book Co., New Delhi.

REFERENCES:

1. A Text book of Hydraulics, Fluid Mechanics and Hydraulic Machines, Khurmi, R. S. 1970. S. Chand & Company Ltd., New Delhi

II Year B.Tech. Ag. Engg I Sem.

RENEWABLE ENERGY SOURCES

UNIT – I

PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data. Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT-II

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion. Wind Energy Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

UNIT-III

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-IV

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT-V

OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-VI

DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, seebeck, peltier and Joule-Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy Sources /G.D. Rai

REFERENCES:

1. Renewable Energy Sources /Twidell & Weir
2. Solar Energy /Sukhatme
3. Solar Power Engineering / B.S Magal Frank Kreith & J.F Kreith.
4. Principles of Solar Energy / Frank Krieth & John F Kreider.
5. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.

6. Non-Conventional Energy Systems / K Mittal /Wheeler
7. Renewable Energy Technologies /Ramesh & Kumar /Narosa

II Year B.Tech. Ag. Engg I Sem.

GROUND WATER HYDROLOGY, WELLS AND PUMPS

Objective: To enable the students to acquire knowledge on aquifers and estimation of their different properties like hydraulic conductivity, transmissibility, storage coefficient, specific yield, leakage factor, hydraulic resistance under steady and unsteady state conditions in wells dug under different aquifers, well drilling and development methods and equipment design of gravel pack in bore well. Further to make the students to acquire knowledge on various pumps available commercially, their selection, operation and maintenance with due importance to find out the cost of operation.

Unit – I: Water Resources status of India-Occurrence and Movement of ground water and Aquifers – Types of Water bearing formations – unconfined, confined, semi confined aquifers – perched water table condition – diagramatic representation.

Unit – II: Classification of wells – Design of open wells – Ground water replenishment – Ground water exploration –Methods of drilling of wells – Common well drilling difficulties – Gravel packing – well screens – Development of well -

Unit – III: Aquifer characteristics influencing yield of wells - Determination of aquifer parameters – Steady state and unsteady state conditions – Well interference and multiple well point systems in coastal areas.

Unit – IV: Surface and subsurface exploitation and estimation of ground water potential – Artificial ground water recharge – Ground water project formulation – Classification of indigenous pumps – Wind powered water lifts – Solar powered and biogas operated water lifts – Reciprocating pumps -

Unit – V: centrifugal pumps – Terminology on Horse Power – Selection of pump-installation and trouble shooting of pumps – performance characteristic curves – Effect of change of impeller dimensions on performance characteristics.

Unit – VI: Hydraulic Ram – Propeller pumps - Mixed flow pumps - Air lift pumps – Priming – Vertical Turbine pumps – Submersible pumps – Cost economics.

REFERENCES:

1. Ground water and tube wells - Garg S P 1985. Oxford and IBH publish in company limited, New Delhi.
2. Water Well land Pump Engineering – Michael A M and Khepar S T 1989 Tata Mc-Graw Hill Publishing company limited, New Delhi.
3. Irrigation Theory and Practice – Michael A M 2008 Vikas Publishing House Pvt. Ltd, New Delhi.

II Year B.Tech. Ag. Engg I Sem.

PROPERTIES AND STRENGTH OF MATERIALS

Objective: To enable the students to know about different materials used for engineering constructions like buildings, roads, farm structures and metals and other materials for manufacturing farm equipment, implements, dairy and food processing equipment.

Unit- I:
Properties of Engineering Materials, Classifications of Rocks, Sources of Stones and Natural bed of Stones, Properties, Varieties and uses of stones, Properties, Composition and uses of Bricks, Classification and tests of bricks, Properties, varieties and uses of Tiles, Properties, varieties and uses of Lime, Properties, varieties and uses of Cement, Properties, varieties and uses of Cement Mortar, Properties,

Unit – II:
Varieties and uses of Concrete, Properties, varieties and uses of Sand, Properties, varieties and uses of Paints, Properties, varieties and uses of Varnishes, Properties, varieties and uses of Distempers. Characteristics and uses of Glass, Characteristics and uses of Rubber, Characteristics and uses of Plywood, Characteristics and uses of Plastics,

Unit-III:
Characteristics and uses of Wrought Iron, Characteristics and uses of Cast Iron, Characteristics and uses of Steel, Characteristics and uses of Aluminium, Characteristics and uses of Copper, Characteristics and uses of Nickel, Alloys of Aluminium and its properties, Alloys of Copper and its properties, Alloys of Nickel and its properties, Definition and Types of Timber, Seasoning of Timber, Industrial Timber and uses of Timber, Methods of heat treatment of Steel.

Unit-IV:
Introduction – Stresses, Tensile, Compressive and Shear-strains, Units-Elastic Curve- Elastic Limit – Poisons Ratio, Stresses in uniformity tapered circular sections- Stresses in bars of composite , Sections, Thermal Stresses and Strains in simple bars and composite bars, Elastic Constants- Young's Modulus (E), Bulk Modulus 9K0 and shear Modulus (G)- Relation between them, Stresses on oblique planes, Mohr's Circle method- Direct stresses in one plane, Direct Stresses in two planes- accompanied by shear stress. Deflection of beams, Relation between slope, deflection and radios of curvature. Methods of finding out slopes & deflections of beams, Double integration method. Slope and Deflection equations off a simply supported beam with a central point load, simply supported beam with eccentric point load. Simply supported beam with a uniformly distributed load, Columns and Struts

Unit-V:
Euler's column theory. Assumptions of Euler's column theory, Buckling load-derivations, Types of end conditions of columns; both ends hinged, both ends fixed, one end fixed and other hinged, Expression for buckling load of a column with one end fixed other free- with one end fixed and other hinged Expression for buckling load of a column with both ends hinged- with both ends. Fixed Types of end conditions of columns; both ends hinged, both ends fixed, one end fixed and other is hinged & one end fixed and other end is free. Types of end conditions of columns; both

ends hinged, both ends fixed, one end fixed and other is hinged & one end fixed and other end is free. Limitations of euler's formula- Rankine's formula for columns.

Unit-VI:

Riveted joints, types of joints- strength of a rivet and riveted joint-efficiency of a riveted joint Design of riveted joints, Eccentric riveted connections, Welded joist, types of welded joints, Strength of welded joints, technical terms. Design of welded joints, eccentric welded joints. Design of welded joints, eccentric welded joints. Dams, forces acting, stressed at the base of dam. Stability of dams, design of base width of dams. Propped cantilever and beams – Deflection and slope Equations, Fixed and continuous beams – Deflection and Slope Equations, Super position theorem – claypeyron's theorem of three moments, Application of Clayperon's theorem of three moments, Moment distribution methods. Analysis of statistically indeterminate beams.

TEXT BOOKS:

1. Engineering Materials, Rangwala, S.C.1994. Charotar Publishing House, Anand.
2. Strength of Materials by Ramamrutham S. 2003. Dhanapathrai & Sons, Nai Sarak, New Delhi.

REFERENCES:

1. Material of constructions Deshpande R S 1977. United Book Corporation, Poona.
2. Manufacturing Process. Hazra Choudhury 1985. Media Promoters and Publishers Private Limited,
Bombay.
3. Workshop Technology (Part-I) Chapman W.A.J. 1994. Aronold Publishers, New Delhi.
4. Engineering Materials. Rangwala S.C. 1994. Charotar Publishing House, Anand.
5. Mechanics of Structures (Vol.I) Junarkar S.B. 2001 - Charotar Publishing House, Anand.

II Year B.Tech. Ag. Engg I Sem.

ELECTRICAL SYSTEMS

Unit- I:

Independent, Dependent Sources and Kirchoff's Laws, Maxwell's Loop current method and its problems, Nodal Voltage Method and its problems, Thevenin's Theorem and its problems, Norton's Theorem and its problems, Superposition Theorem and its problems, Reciprocity and Maximum power Transfer, Star-Delta Conversion Method and its problems. Solution of DC circuit by Network Theorems, Sinusoidal steady state response of circuits, Instantaneous and Average Methods, Concept of Power Factor, Reactive and Apparent Poser, Concept and Analysis of Balanced Polyphase circuits, Laplace Transform method of finding step response of DC circuits, Series and Parallel Resonance.

Unit-II:

Electromotive force, Reluctance, Magnetic circuit, Determination of Ampere Turn Hysteretic losses and eddy current losses, Transformer-working principle, Construction of single phase transformer, EMF equation of transfer, Core type transformer, shall type and difference between shell and core type transformer, Electric circuit, dielectric insulation, leakage reactance in transformer.

Unit III:

Voltage regulation, transformer test, open circuit and short circuit tests, Losses in a transformer efficiency of transformer, condition for maximum efficiency, Equivalent circuit of transformer, theory of an ideal transformer, Phaser diagram of an ideal transformer, transformer on non load, Phaser diagram of transformer on load, problems solved. DC Generator, Principle of working construction, field system, armature, Commentator, other accessories of DC generator, EMF equation of DC generator, Torque equation, DC armature winding, lap winding wave winding terms used in armature winding, Armature reaction, Demagnetizing & Cross magnetizing ampere turns, methods of compensating armature reaction.

Unit – IV

Excitation of DC generator-shunt generator, series generator, compound generator, Commutation-Resistance commutation, EMF commutation, Characteristics of DC generator-separately exited, shunt, series, compound generator, DC Motor-working principle, value of back EMF, voltage equation of DC motor, Characteristics of DC motor–Characteristics of series, shunt, compound motor, Torque of DC motor, Armature Torque, shaft Torqueefficiency of DC motor.

Unit-V:

Factors controlling the speed, Flux control and armature control of shunt motors, Motors starters and their necessity, shunt motor and series motor starter, Principle of operation of single phase induction motor, double field revolving theory Equivalent circuit of single phase induction motor without core loss and with core loss, Single phase – split induction motor, shaded pole, motor, Power factor, disadvantage low power factor, power factor improvement.

Unit – VI

Measurement of power in three phase system, single watt meter, two watt meter method, Measurement of power in single phase system, using current transformer and voltage transformer, Three phase induction motor – working principle, producstion of rotation field, Construction – Starter, rotor, operation, Torque equation, Starting (DOL, Autotransformer, Star delta starter) and speed control methods.

TEXT BOOKS:

1. A text book of Electrical Technology Vol. II -Theraja BL & Theraja A K 2005. S. Chand & Company Ltd., New Delhi.

REFERENCES:

1. Basic Electrical Engineering, ANWANI M L 1997. Dhanpat Rai & Co. (P) Ltd. New Delhi.
2. Electrical Engineering Fundamentals, Vincent DelToro 2000. Prentice – Hall of India (P) Ltd., New Delhi

II Year B.Tech. Ag. Engg I Sem.

SURVEYING

UNIT – I

INTRODUCTION: Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications. Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

UNIT – II

LEVELING AND CONTOURING: Concept and Terminology, Temporary and permanent adjustments- method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

UNIT – III

COMPUTATION OF AREAS AND VOLUMES: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

UNIT - IV

THEODOLITE: Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite. Trigonometrical leveling, Traversing.

UNIT – V

TACHEOMETRIC SURVEYING:

Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position. Types of curves, design and setting out – simple and compound curves.

UNIT - VI

INDTRODUCTION TO ADVANCED SURVEYING : Introduction to geodetic surveying, Total Station and Global positioning system, Introduction to Geographic information system (GIS).

TEXT BOOKS:

1. “Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
2. Duggal S K, “Surveying (Vol – 1 & 2), Tata Mc-Graw Hill Publishing Co. Ltd. New Delhi, 2004.
3. Text book of surveying by C. Venkataramaiah, University Press

REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000
2. Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004

3. Chandra A M, “Plane Surveying”, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
4. Chandra A M, “Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
5. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
II Year B.Tech. Ag. Engg I Sem.

FLUID MECHANICS AND OPEN CHANNEL HYDRAULICS LAB

Practical:

1. Determination of metacentric height
2. Verification of Bernouli's theorem
3. Measurement of discharge with a venturimeter
4. Measurement of velocity with a pilot tube
5. Determination of coefficient of discharge of rectangular weir
6. Determination of coefficient of discharge of triangular weir
7. Determination of coefficient of discharge of trapezoidal weir
8. Determination of hydraulic coefficient of orifices
9. Experiment on broad crested weir
10. Determination of head losses in pipes
11. Experiments on open channels
12. Determination of roughness coefficients of open channels
13. Measurement of velocity and pressure profiles in open channels
14. Construction of flownet
15. Problems on construction of flownet

II Year B.Tech. Ag. Engg I Sem.

SURVEYING LAB

LIST OF EXERCISES:

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Determination of distance between two inaccessible points with compass.
3. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
4. Radiation method, intersection methods by plane Table survey
5. Two point and three point problems in plane table survey
6. Fly leveling (differential leveling)
7. An exercise of L.S and C.S and plotting
8. One exercise on contouring.
9. Study of theodolite in detail - practice for measurement of horizontal and vertical angles.
10. Measurement of horizontal angles by method of repetition and reiteration.
11. Trigonometric Leveling - Heights and distance problem (Two Exercises)
12. Heights and distance using Principles of tacheometric surveying (Two Exercises)
13. Area determination, traversing contouring using total station
14. Determination of remote height and state out using total station
15. Distance, gradient, Difference in height between two inaccessible points using total station

List of Major Equipment:

1. Chains, tapes, Ranging rods, cross staff, arrows
2. Compasses and Tripods, Optical square.
3. Plane tables, Alidade, Plumbing fork, trough compasses
4. Leveling instruments and leveling staves
5. Box sextants, planimeter.
6. Theodolites, and leveling staffs.
7. Tachometers.
8. Total station.

II Year B.Tech. Ag. Engg II Sem.

PRINCIPLES OF SOIL SCIENCE AND AGRONOMY

Objective:- To impart Knowledge on Soil genesis, properties etc, so as to enable students to design implements in related to soil, soil conservation, irrigation and drainage applications. Also to enable students to understand farming principles, to grow agricultural field and orchard crop and farming practices.

Unit –I:

Soil: Definition –soil as a three phase four component system-branches of Soil science difference between surface and sub surface soil, Rocks: Definition – classification of rocks based on mode of formationigneous sedimentary and metamorphic rocks, Minerals: Definition, classification, primary, secondary, essential, accessory, silicate, non silicate minerals, light and heavy minerals primary silicate minerals; quartz, feldsparsmicas pyroxenes amphiboles secondary silicate; secondary minerals, Ca, Mg, S and Micronutrient containing minerals-chemical formulate, Weathering:- Definition-types of weathering physical weathering of rocks, agents of physical weathering, temperature, water, wind and glaciers, Chemical weathering, solution, hydration, hydrolysis carbonation-oxidation-reduction biological weathering role of plants and animals in weathering. Soil formation: Soil forming factors –active and passive soil factors and their role in soil formation, Soil forming processes: Elluviation, illuviation, humification, calcification, laterization, podzolozation, salinization, alkalization and gleization, Soil Profile, Detailed description of theoretical soil profile, Soil physical properties:- Soil separates and their properties. Specific surface, soil texture-definition-textural classes-methods of determination of soil texture, importance of soil structure,

Unit:- II

Soil structure; Definition-classification based on type, class and grade, factors influencing formation of aggregates-importance and management of soil structure, Soil structure; Definition-classification based on type, class and grade-factors influencing formation of aggregates-importance and management of soil structure, Soil consistency; Definition-forms of consistency and importance of soil consistency, Bulk density and particle density; factors influencing and their importance; porosity –types-calculation-importance, Soil water; structure o f water and the effect of H-bonding on properties of water retention of water in soils-soil moisture tension-soil moisture potential –soil moisture constants. Soil water movement; saturated, unsaturated and vapour flows, laws governing water flow-Darcy's and poiseuille's law- Infiltration; Factors-importance. Evaporation; Factors influencing evaporation- Ways to minimize it-soil mulch-organic mulch etc, Soil air; Composition of soil air-processes of gaseous exchange –soil aeration indices –and their importance (oxygen content-ODR-aeration porosity-redox potential) management of soil air, Soil temperature; influence of soil temperature on plant growth-factors influencing soil temperature-management of soil temperature. Soil color determination importance, Soil colloids:- Definition-general properties-inorganic and organic colloids origin of charge on colloids (positive & negative).

Unit-III:

Secondary silicate clay minerals (inorganic soil colloids) Kaolinite montmoriloniteillite their tructures and properties, Ion exchange, Cation and anion exchange –factors influencing ion exchange capacity of soils importance of ion exchange calculation of base saturation and exchangeable acidity, Soil organic matter: importance of organic matter CN ration of organic matter and its importance, Soil biology;- Soil flora and fauna their characteristics role of

beneficial organisms mineralization–immobilization, nitrogen fixation, nitrification, denitrification, solubilization of phosphorus and sulphur, Soil fertility:- Concepts of soil fertility and soil productivity:- definitions and differences Arnon's criteria of essentiality-essential and beneficial elements-factors influencing availability of nutrients. Problem Soils:- Definition – Physical problems soil depth slope soil crust soil compaction drainage submergence (formation-adverse effects-effect on soil properties and plant growth management), Chemical problems – classification acid, saline, saline saline-sodic and calcareous soilscharacteristics- nutrient availability in problem soils and their reclamation.

Unit-IV:

Irrigation water:- Quality of irrigation water-classification based on EC, SAR,RSC and Boron content-use of saline waters in agriculture, Soil taxonomy:- New comprehensive system of soil classification (7^{th} approximation) soil orders and their characteristics, Important soil groups of India:- Alluvial soils-black soils –red soils laterite soils and coastal soils. Meaning and scope of agronomy, History of agricultural development in ancient India, Agriculture in civilization era, National and International Agricultural Research Institutes in India, Classification of crops, Classification of field crops, According to Origin, Botanical Commercial, Economical, seasonal, Ontogeny, Agronomic, Lead Morphology and Special Purpose crops, Definition of climate and weather, Definition of meteorology, Climatology, Agri-meteorology, Introduction, scope and practical utility of Agricultural meteorology, composition and structure of atmosphere, Influence of weather on crop grain development, essential Resources for crop production, factors influencing plant growth, Biotic and Abiotic factors, Crop seasons, Kharif, Rabi and summer seasons in A.P.-Agro climatic zones of A.P. and India.

Unit-V:

Tillage and tilth, Objective of tillage, characteristic of good seed bed, effect of tillage on soil properties (Pore space, texture, structure, bulk density, colour of the soil), Types of Tillage, preparatory cultivation, inter cultivation, after cultivation and preparatory cultivation for lowland rice pudding, implement used for seed bed preparation, sowing, inter-cultivation and special operation, Sowing, Methods of sowing, time and depth of sowing of major agricultural crops, Methods and time of application of manure and fertilizers.

Unit – VI:

Weeds- Influence of weeds on crop production, principles and practices of weed management, Basics on soil plant-water relationship, Types of Soil Erosion, Factors influencing soil erosion, Soil conservation, erosion preventive measures, Agronomic measures for soil and water conservation, Dry land Agriculture, Problems of Crop production in dry farming, Agronomic measure in reducing evapo-transpiration losses, Watershed management, aims and Objectives, Organic farming-Sustainable Agriculture, Definition, Principles and importance.

TEXT BOOKS:

1. Principles of Agronomy, Yella Manda Reddy T & Shankar Reddy, Publications.
2. Nature and Properties of soils. Brady Nyle C and Ray R Well 2002. Pearson Education Inc., New Delhi.
3. Fundamental of Soil Science. Indian Society of Soil Science 1988. IARI, New Delhi.

REFERENCES:

1. Meteorology, William L Donn, 1965, McGraw-Hill Book. Co. New York.
2. Crop Production in Dry Regions, Arnon L 1972, Leonard Hill Publishing Co., London.
3. Manures and Fertilizers, Yawalkar K S and Agrawal J P, 1977, Agricultural Horticultural PublishingHouse, Nagpur.
4. Principle of Weed Science, Rao V S, 1992, Oxford and IBH Publishing Co. Ltd., New Delhi.
5. Soil Fertility and Fertilizers, Tisdale S L, Nelson W L, Beaton J D and Havlin J L 1995. Prentice-Hall of India, New Delhi.
6. Introduction to Soil Physics, Hillel D 1982. Academic Press, London.

II Year B.Tech. Ag. Engg II Sem.

HEAT AND MASS TRANSFER

Objective: To enable the students to know about the transport phenomenon in materials through heat and mass transfer for applications in unit operations of dairy and food engineering.

Unit – I:
Introductory concepts, application of Heat and mass transfer-modes of heat transfer examples, Fourier's law of heat transport, Introduction to steady state heat transfer –one dimensional steady state heat conduction equation. Thermal conductivity of different materials – measurement-Insulation Materials, One dimensional steady state conduction through plane and composite walls, Conduction through tubes and spheres with and without heat generation, Conduction through multilayer tubes.

Unit – II:
Electrical analogy-conduction through materials in parallel, Combined convection and conduction and overall heat transfer coefficients-problem solving, Concept of critical thickness of insulation for a cylinder-problem solving,

Unit III:
Radiation heat transfer-Introduction. Absorptivity, reflectivity and transmissivity. Black body and monochromatic radiation, Plank's law, Stefan-Boltzman law, Kichoff's law, grey bodies and emissive power, solid angle intensity of radiation, Radiation exchange between black surfaces, geometric configuration factor. Heat transfer analysis involving conduction, convection and radiation by networks.

Unit IV:
Unsteady state heat transfer-unsteady state system with negligible internal thermal resistance-equation for different geometries, Fins-heat transfer from extended surfaces-types of fins-numiricals, Free and force convection. Newton's law of cooling, heat transfer coefficient in convection. Dimensional analysis of free and forced convection. Useful non dimensional numbers and empirical relationships for free and forced convection,

Unit V:
Equation of laminar boundary layer on flat plate and a tube, Laminar forced convection on a flat plate and in a tube, Combined free and forced convection, Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger performance, transfer units, Heat exchanger analysis restricted to parallel and counter flow heat exchangers.

Unit – VI:
Steady state molecular diffusion in fluids at rest and in laminar flow-Flick's law mass transfer coefficients- Reynold's analogy.

REFERENCES:

1. Transport processes and Unit Operations, Geankoplis C.J. 1992. Allyn and Bacon Inc., Newton, Massachusetts.
2. Heat Transfer, Holman JP 1989. McGraw Hill Book Co., New Delhi.
3. Fundamentals of Heat and Mass Transfer, Incropera F P and De Witt D P 1980 John Wiley and Sons. New York.
4. Engineering Heat Transfer, Gupta CP and Prakash R 1994. Nem Chand and Bros., Roorkee.
5. Heat transfer, Rajput S. Chand & Co, New Delhi.

II Year B.Tech. Ag. Engg II Sem.

THEORY OF MACHINES

Objective: To educate the students about the kinematics of machine elements, links and pairs and other systems in different machines for applications in the manufacturing of machines and their elements.

Unit–I:
Introduction, Element, Link, Pairs. Kinematics Chains and Pairs- Types, lower and higher pairs. Mechanism – types and inversions. Lower and higher pairs. Four bar chain, slider crank chain and their inversions - Determination of velocity and acceleration using graphical (relative velocity and acceleration) methods. Instantaneous center – Lindring.

Unit II
Types of gears, Law of gearing. Velocity of sliding between two teeth in mesh Involute and cucloidal profile for gear teeth. Spur gear, nomenclature, interference and undercutting. Introduction to helical, spiral, bevel and worm gear. Simple, compound, reverted and epicyclical gear trains - Determining the velocity ratio by tabular method. Turning moment Diagrams, Coefficient of fluctuation of speed and energy.

Unit-III:
Weight of fly wheel, flywheel applications. Belt drives, types of drives. Belt materials, Length of belt, Power transmitted, Velocity ratio, Belt size for flat and v-belts.

Units-IV:
Effect of centrifugal tension, creep and slop on power transmission, chain drives Types of friction, Laws of dry fiction, Friction of pivots and collars. Single disc, Multiple disc and cone clutches. Rolling friction, Anti-friction bearings.

Unit -V
Types of Governors, Constructional details and analysis of Watt, Porter and Proell governors – Spread of governors. Effect of friction, controlling force, curves, sensitiveness, stability, hunting, Isochronism's, power and effort of a governor,

Unit-VI:
Static and dynamic balancing, Balancing of rotating masses in one and different planes, Partial primary balancing of reciprocating masses. Cams and Foversees.

TEXT BOOK:
1. Theory of Mechanisms and MachinesJgdish Lal 1991. Metropolitan Book Co. Pvt. Ltd., 1 Netaji Subash Marg, New Delhi.
2. Theory of Machines, Khurmi R S and Gupta JK 1994. Eurasia Publishing House Pvt. Ltd., Ram Nagar, New Delhi.

REFERENCES:
1 Theory of Machines, Thomas Bevan 1984. CBS Publishers

2 Theory of Machines, Ballaney P L 1985 Khanna Publishers, 2- B Nath Market, Nai Sarak, New Delhi
3. Mechanisms and Machine Theory, Rao J S and Dukkipatti R V 1990. Wiley Astern Ltd., New Delhi
4. Theory of Machines, Rattan S B 1993. Tata McGraw Hill Publishing Co. Ltd., 12/4 Asf Ali Road, New Delhi

II Year B.Tech. Ag. Engg II Sem.

SOIL MECHANICS

Objective: Students will be trained on concepts and analysis of soil properties, stress conditions of loaded soil, consolidation and soil failure theories. The knowledge imparted will be used in higher level design considerations for construction of soil and water conservation structures, irrigation and drainage structures.

Unit–I:
Introduction of soil mechanics – Field of Soil Mechanics. Soil on three phase systems – Physical and index properties of soil. Classification of soils - General, Particle size classification. Classification of soils – textural classification, I.S. classification. Stress condition in soils – Effective and neutral stress.

Unit-II:
Concept on Bousinesq's analysis – Vertical pressure distribution on vertical line, vertical pressure under a uniformly loaded circular area, vertical pressure due to a line load. Concept on Bousinesq's analysis – Vertical pressure under strip load, vertical pressure under a uniformly loaded rectangular area, equivalent point load method. Concept on Westerguard's analysis – Point load pressure distribution, uniformly loaded circular area. Westerguard's analysis – Uniformly loaded rectangular area, comparisons between Bousinesq's andWesterguard's solutions. Newmark's influence chart – Preparation, problems.

Unit-III:
Shear strength – Introduction, Mohr's stress circle, stress systems with principal planes parallel to the coordinate axes. Shear strength – Introduction, Mohr's stress circle, stress systems with principal planes parallel to the coordinate axes. Shear strength – Mohr – Coulomb failure theory, effective stress principle. Measurement of shear strength – Introduction, direct shear test, tri-axial compression test, stress conditions in soil specimen during tri-axial testing. Measurement of Shear strength – Advantages of tri-axial test, graphical solutions, unconfined compression test, vane shear test. Problems on shear strength.

Unit-IV:
Compaction of Soils – Standard test and Modified proctor test. Abbot Compaction test. Jodhpur mini compaction test. Field compaction method and control.

Unit – V:
Consolidation of soil – one dimensional analysis spring analogy–Terzaghi's theory. Laboratory consolidation test. Calculation of coefficient of volume change – Coefficient of consolidation.

Unit-VI:
Earth pressure – Plastic equilibrium in soils. Active and Passive states of earth pressure. Rankine's theory of earth pressure. Earth pressure for cohesive soils. Simple numerical Exercises on earth pressure. Stability of slopes – infinite and finite slopes. Friction Circle method. Taylor's stability number.

TEXT BOOK:
1. Soil Mechanics and Foundations, Punmia B C, Jain A K and Jain A K, 2005. Laxmi Publications (p) LTD. New Delhi

REFERENCES:

1. Basic and Applied Soil Mechanics, Gopal Ranjan and Rao A S R 1993. Willey Eastern Ltd., New Delhi.
2. Soil Engineering Vol.1, Alam Singh 1994. CBS Publishers, and Distributions, Delhi.

II Year B.Tech. Ag. Engg II Sem.

SURFACE WATER HYDROLOGY

Objective : To enable the students to acquire knowledge and skills on hydrological (rainfall and runoff) measurements in watersheds, hydrological design of structures, prediction of volume and rates of runoff with tools like hydrographs and unit hydrographs, reservoir planning with flood routing techniques for application in natural resources management.

Unit-I:
Hydrology-definition, hydrology cycle and its components. Forms of Precipitation Rainfall, Characteristics of rainfall in India (types of monsoon). Measurement of Rainfall – Recording and Non-Recording Rain gauges- Rain gauge network density for different topographic conditions – Point rainfall analysis - Presentation of Rainfall data – Mass Curve and hyetograph, Mean Precipitation over an area – Arithmetic Mean, Thiessen Polygon, Isohyetal methods, DAD Relationships and curves. Probability Analysis of Rainfall – Return Period, Plotting position by Weibull's method – Rainfall events at different probability levels (20% , 40%, 60%, 80%)

Unit-II:
Intensity-Duration-Frequency-Relationship (i= ((KTx)/(D+A)n)Determination of net effective rainfall-infiltration indices- Phi index. Runoff-definition-components of runoff-direct runoff and base flow, overload flow and interflows, pictorial representation of different routes of runoff. Runoff characteristics of streams – perennial, intermittent and ephemeral streams, Measurement of stream flows.

Unit-III:
Measurement of stage and velocities, staff gauge, wire gauge, automatic stage recorders, current meters (horizontal and vertical axis meters), calibration (V= a Ns + b). Rainfall-Runoff relations (R=a P + b), curve fitting and determination of 'a' and 'b' and (correlation coefficient), factors affecting runoff. Definition and Estimation of peak runoff and design peak runoff rate, rational method and curve number techniques.

Unit-IV:
Hydrographs-definitions and components, factors affecting flood hydrographs, hydrograph separation for simple and complex storms – Method I (straight line method, N=b A0.2), other Methods II and III. Unit Hydrographsconcept and the three implications of the definitions and the two basic assumptions (linear response and time invariance). Effects of the characteristics of storms(duration of rain, time-intensity pattern, areal distribution of runoff and amount of runoff) on the shape of the resulting hydrographs .Derivation of Unit hydrographs, average unit hydrographs from several storms of the same duration (proper procedure of computing average perk flow
and time to peak). Derivation of unit hydrographs for complex storms.

Unit-V:

The conversion of unit hydrograph duration, methods for unit hydrographs of different durations, (1) method of superposition and (2) S-curve. S-curve method, explanation of concept and application. conversion of unit graph duration by S-curve method, determination of lower duration graph from the given higher duration graph and viceversa. Synthetic unit hydrograph, Concept, Snyder' synthetic unit hydrograph, formulas relating hydrograph features (basin lag, Peak flow and time base of the unit hydrograph). Instantaneous unit hydrograph, Concept and application, SCS Triangular Hydrograph - Application of Hydrology - Flood control and Regulation, Flood mitigation, Floodplain mapping, Retards.

Unit VI : Flood Routing-introduction, two broad categories of flood routing and channel routing, hydrologic routing and hydraulic routing, basic equations. Hydrologic storage routing, Schematic representation of storage routing, modified Pul's method (semi-graphical method). Explanation of the features of the modified Pul's method. Flood routing through a reservoir by modified Pul's method. Applications of Hydrology in land and water management, watershed management.

TEXT BOOKS:

1. Engineering Hydrology. Raghunath H.M. 1986. Willey Eastern Limited, New Delhi.
2. Watershed Hydrology, Suresh R. 1997. Standard Publisher and Distributors, New Delhi.

REFERENCES:

1. Engineering Hydrology. Subramanyam K. 1984. Tata Mc. Graw – Hill Publishing Co., Limited, New Delhi.
2. Hydrology for Engineers Linsley R.K. Kholer A. & Paul Hus J.L.H. 1988, Mc-Graw Hill Book Co. New Delhi.
3. Watershed Management. Dhruvanarayana, VV. 1990. ICAR Publication, New Delhi.

II Year B.Tech. Ag. Engg II Sem.

FARM POWER AND TRACTOR SYSTEMS

Objective: To enable the students for acquiring the knowledge pertaining to systems like transmission system clutch, types of clutches, types of Gear, sliding, constant mesh type tractor power out lets like P. T.O, belt pulley, drawbar, traction theory rolling, resistance, rim pull, crawler tractor.

Unit-I:
Source of Farm Power – Conventional & Non Conventional Energy Sources - Classification of Tractor and I.C Engines – Study of I.C Engine components and their construction, operating principles and functions – Engine systems and their construction details and adjustment.

Unit-II:
Valves and valve mechanism – Fuel and air supply stems – Cooling and lubricating systems – Electrical & ignition systems – I.C Engine fuels – their properties – Detonation and knocking in IC engines – Study of properties of coolants, antifreeze and anti corrosion materials – Lubricant types & study of their properties – Engine governing systems. Introduction to transmission system – Power transmission system of Tractor – Functions of a power transmission system. Clutch – Necessity of clutch in a tractor – Essential features of good clutch – Principal working of clutch – Clutch repairs and maintenance.

Unit-III:
Types of Clutch – Friction clutch, Dog clutch and Fluid coupling – Friction clutch – Single Plate clutch or single disc clutch, Multiple plate clutch or multiple disc clutch, cone clutch. Single Plate clutch or single disc clutch – constructional details and principle of working mechanism. Multiple plate clutch, splinted sleeve clutch type – constructional details and principle of working mechanism Ratchet & Pawl arrangement mechanism – constructional details and principle of working mechanism. Gears – Necessity for providing gear box – selective sliding type & constant mesh type – Mechanical advantage in gears – Torque ratio in Gears – working of Gear box. Differential unit and Final drive – Differential – Functions of crown wheel – Differential lock – functions – Final drive – functions of Final drive.

Unit-IV:
Fluid coupling and torque connector – Brake mechanism – Requirements of good braking systems –
classification of brakes – Mechanical brake and Hydraulic brake – working mechanism. Steering mechanism – Qualities of Steering mechanism, Main parts of steering mechanism Types of steering boxes – working of hydraulic steering. Hydraulic control system – working principals – Basic components of Hydraulic system – Types of hydraulic system – Position control –Draft control – Mixed control – Precautions for hydraulic system.

Unit-V:

Tractor power out lets – P.T.O. Construction details, Tractor power out let – Belt pulley constructional details, Tractor power out let – Draw bar – construction details. Traction-Traction efficiency – Method for improving traction – Coefficient of traction – Rolling resistance – Wheel Slip or Track slip – Rimpull – crawler tractor.

Unit-VI:

Tractor testing – Preparation of tests – Types of tests – Test at the main power take off – Test at varying speeds at full load – Test at varying load-Belt or pulley shaft test – Drawbar test-Tractor engine performance. Determination of centre of Gravity – Suspension method – Balancing method – Weighing method. Tractor chassis machines – Functions of chassis frame – Tractor chassis – Mechanics of Tractor chassis.

TEXT BOOKS:

1. Farm Tractor Maintenance and Repair. Jain. S.C. and Roy C.R. 1984. TMH Publishing Co. Ltd., New Delhi.
2. Tractors and their power units. Lijedhal J.B. Carleton W.M. Turnquist P. K. and Smith D.W. 1984. AVI Publishing Co. Inc., Westport, Connecticut.

REFERENCES:

1. Elements of Agricultural Engineering. Jagadeshwar Sahay. 1992. Agro Book Agency, Patna.
2. Farm Gas Engines and Tractors. Fred J.R. 1963. Allied Publisher Pvt. Ltd., Bombay.
3. Farm Machines and their Equipment. Nakra C.P., 1986. Dhanpet Rai and Sons. 1982 Nai Sarak, New Delhi.

II Year B.Tech. Ag. Engg II Sem.

SOIL SCIENCE AND AGRONOMY FIELD LAB

PART-A

1. Study of soil profile and collection of soil samples.
2. Determination of bulk density ad particle density of soils.
3. Determination of soil texture.
4. Determination of Proctor moisture content.
5. Determination of soil moisture at different tensions.
6. Determination of hydraulic conductivity of soil. Choose any six labs
7. Determination of infiltration rate soil.
8. Determination of soil strength and soil colour.
9. Determination of pH and EC of soils.
10. Determination of organic carbon content in soils.
11. Estimation of available P & K of soils.
12. Determination of anions and cations in irrigation water.

PART-B

1. Visit to college farm.
2. Study of meteorological instruments.
3. Measurement of rainfall and evaporation.
4. Practice of Ploughing.
5. Practice of pudding.
6. Identification of crops and seeds.
7. Identification of manures and fertilizers. Choose any six labs
8. Seed bed preparation for nursery.
9. Practice of sowing.
10. Soil moisture estimation by direct method.
11. Practice of fertilizer application.
12. Practice of inter cultivation.
13. Practice of weeding.
14. Practice of harvesting.
15. Practical examination.

II Year B.Tech. Ag. Engg II Sem.

MACHINE DRAWING AND COMPUTER GRAPHICS LAB

1. Preparation of manual drawings with dimensions from Model and Isometric drawings of objects and machine components.
2. Assembly drawings of machine components – Screw jack, knuckle joint, stuffing box and cotter joint
3. Drawing of missing views.
4. Dimensioning methods and principles of dimensioning

5. Concept of sectioning, Revolved and oblique section. Explanation of full sectioning and half sectioning concepts.
6. Sectional drawing of simple machine parts – foot step bearing, shaft support, stuffing box
7. Types of rivet heads and riveted joints. Processes for producing leak proof joints. Symbols for different types of welded joints.
8. Square headed and hexagonal nuts and bolts.
9. Different types of lock nuts, studs, machine screws
10. Application of computers for design. Definition of CAD, benefits of CAD.
11. CAD System components & computer hardware for CAD.
12. Explanation of draw tool bar commands in Auto CAD software
13. Drawing of riveted joints and thread fasteners.
14. Computer Graphics for agricultural engineering applications.
15. Practice in the use of basic and drawing commands on AutoCAD.
16. Generating simple2-D drawings with dimensions using AutoCAD.
17. Small projects using CAD.

REFERENCES:

1. Elementary Engineering Drawing. Bhat. N.D. 1995. Charotar Publishing House, Anand.
2. Machine Drawing. Bhatt N.D and Panchal V.M. 1995. Charotar Publishing House, Anand.
3. Machine Drawing. Narayana K.L. Kannaiah P. and Venkata Reddy K. 1996. New Age International Ltd., New Delhi.
4. Mastering CAD / CAM with Engineering Subscription Card. Ibhrahim Zeid, McGraw-Hill Science /
Engineering / Math; 1st Edition (May 21, 2004).
5. Principals of CAD / CAM / CAE/ Systems. Kunwoo Lee, Addison – Wesley.

III Year B.Tech. Ag. Engg I Sem.

THERMODYNAMICS AND REFRIGERATION SYSTEMS

Objective To enable the students to know about the thermodynamic laws and principles, gas laws and different cycles and their efficiencies for efficient designs of heat engines, Refrigerator systems in general and Farm engines and cold storages in particular.

Unit – I:

Introduction to thermodynamic Thermodynamic system, boundary, surroundings, Classification of Thermodynamic system, Closed system-open system-isolated system, Laws of conservation of energy, heat, work, Definition of thermodynamic work and example of work, Thermodynamic properties, classification of thermodynamic systems. Laws of thermodynamic – first law, second law and zeroth law, Gas laws-Boyless' law Charles law Guy–Iussac law, Thermodynamic properties of perfect gases. Application of first law in heating and expansion of gases, Cycles-introduction-Applications, Carnot theorem-Carnot cycle,

Unit – II:

Entropy-introduction-physical concept of entropy, Change of entropy of gases in thermodynamics. Heat engines, Classification, Components, Working principles- Working cycle of 4-stoke and 2-stroke diesel and Petrol Engines, Comparison between 4 stroke and 2-stroke Diesel and Petrol Engines, Air standard cycleefficiencies, Explanation of other engine efficiencies and terms, Explanation of Otto cycle-thermal efficiency equations, Explanation of diesel cycle and dual cycle, Calculation of efficiencies, Mean effective pressure and their comparison, Measurement of indicated horse power, brake horse power, Heat balance calculations, Problems on IP, BP, Engine efficiencies and performances

Unit-III:

Principles of refrigeration- Definition of refrigeration, second law of thermodynamics, background, major uses and applications, Principles of refrigeration – Room air conditioner, domestic refrigerator, working substances in refrigeration machines, unit of refrigerating capacity, coefficient of performance, problems on refrigeration capacity, Production low temperatures-Expansion of a liquid with flashing, reversible adiabatic expansion of a gas, irreversible adiabatic expansion (throttling) of a real gas, thermoelectric cooling, adiabatic demagnetization.

Unit – IV:

Refrigeration machine, heat engines, Air refrigerators working on reverse Carnot cycle- Carnot cycle, reversed Carnot cycle, selection of operating temperatures, Problems on reverse Carnot cycle and selection of operating temperatures, Air refrigerators working on Bell Coleman cycle-Reversed Brayton or joule or Bell Coleman Cycle, Analysis of gas cycle, polytropic and multistage compression, Problems on Bell Coleman cycle, Vapour refrigeration – Vapor as a refrigerant in reversed Carnot cycle with P-V. and T-s diagrams, problems on reversed Carnot cycle with vapour, gas as a refrigerant in reversed Carnot cycle, limitations of reversed Carnot cycle.

Unit –V:

Vapour compression systems –Modifications in reverse Carnot cycle with vapour as refrigerant

(dry vs. wet compression, throttling Vs isentropic expansion), Vapor compression cycle, vapor compression system calculations, Vapor compression cycle – Representation of vapor compression cycle on pressure- enthalpy diagram, super heating, sub cooling, problems on vapour compression cycle, Liquid-vapour regenerative heat exchanger for vapour compression system, effect of suction vapour super heating, sub cooling, problems on vapour compression cycle, Vapour-absorption refrigeration system – Process, calculation, maximum coefficient of performance of a heat operated refrigerating machine, problems on vapour absorption refrigerating system, common, refrigerant-absorbent systems.

Unit-VI: Common refrigeration and their properties, Cold storage- Cold storage, controlled atmosphere storage, factor affecting refrigerated cold storage, hypobaric storage, Thermodynamic properties of moist air, perfect gas relationship for approximate calculation, adiabatic saturation process, ideal gas law, Amagat's law, Dalton's law, Psychometric chart –Saturation pressure, absolute humidity, percentage humidity, humid volume, total heat, enthalpy, adiabatic processes, wet bulb temperature and its measurement, psychometric chart and its use. Psychometric processes- state factor, cooling, heating, mixtures, dehumidifying, drying, air conditioning.

TEXT BOOKS:

1. Engineering Thermodynamics, Nag PK 1995, Tata Mc Graw Hill Publishing Co., Ltd., 12/4 Asaf Ali
Road, New Delhi.
2. Refrigeration and Air conditioning, C P Arora.

REFERENCES:

1 A Course in Thermodynamics and Heat Engines, Kothandaraman C.P Khajuria PR and Arora SC 1992. Dhanpat Rai and Sons, 1682 Nai Sarak, New Delhi
2 Engineering Thermodynamics, Khurmi R S 1992 S Chand and Co. Ltd Ram Nagar, New Delhi.
3 Thermodynamics and Heat Power Engineering, Mathur ML and Mehata fs 1992 Dhanpat Rai and Sons 1682 Nai Sarak, New Delhi
4 Thermal Engineering, Ballaney PL 1994, Khanna Publishers, New Delhi
5 A text book of Refrigeration and Air Conditioning, R. S. Khurmi and J.K. Gupta – 2008, S. Chand & Company Ltd, New Delhi

III Year B.Tech. Ag. Engg I Sem.

SOIL AND WATER CONSERVATION ENGINEERING

Objective: To enable the students to acquire knowledge on different soil laws estimation models, run off estimation by rational, curve number, cook's etc. Land use, capability classification, Land treatment works like contour bunding, terracing, bench terraces, contour trenches and their types and complete design calculations. Also to enrich the students and familiarize the students in the design of various gully control structures, temporary and permanent, their designs with a due importance to hydrologic, hydraulic and structural phases of design.

Unit- I:
Introduction – Soil and Water conservation research centre–Its sub-centers in India–Soil Erosion–Geologic, Accelerated types. Causes and agents of erosion – Factors affecting erosion – Different stages of erosion – Rill – Sheet – Gully and Ravines-Water Erosion–Forms of water erosion–Mechanics of Erosion – Gullies and their classification, stages of gully development. Soil Loss estimation–Universal Soil Loss equation and modified soil loss equation, expansion of various terms – Estimation of their various parameters.

Unit–II:
Wind Erosion – Factors affecting wind erosion, mechanics of wind erosion, soil loss estimation, wind erosion control measures – Vegetative, mechanical measures, wind blades and shelter belts, sand dunes stabilization – Wind erosion and its control.

Unit – III
Runoff – Factors affecting runoff – Runoff – Peak Runoff and design peak runoff – its estimation – Rational method – Time of concentration estimation – Curve number method – Cook's method. Land use capability classification based on different criteria with a special reference to slope – Erosion control measures – Agronomic and mechanical or engineering measures.

Unit-IV:
Contour bunds – Design of contour bunds – Horizontal interval – Vertical interval – Cross Section of the contour bunds – Seepage line consideration. Determination Height of Bund – Loss of Area due to bunding. Design of waste weir – Construction of contour bunds in fields. Graded bunds – Design of graded bunds. Introduction to Conservation Ditching. Terraces – Classification of Terraces-Design of narrow based and broad based terraces. Bench Terraces – Types of Bench Terraces Derivation for an equation for finding of vertical interval –Design of bench terraces. Contour trenching – Staggered and continuous trenche – Adaptability and types.

Unit V :
Vegetated water ways – Types of water ways based on shapes – Expression for wetted perimeters –

Areas – Hydraulic radii – types of vegetation – roughness of different grasses – Design of vegetated water ways. Sedimentation – Sedimentation in reservoirs in streams, estimation and measurement, sediment delivery ratio, trap efficiency – Estimation of useful life of reservoir based on sedimentation. Characteristics of contours and preparation of contour maps – Analysis of toposheets.

Unit –VI : Introduction to water harvesting techniques – Estimation of Earth work Design of farm ponds – Introduction to Stream water quality and pollution. Temporary gully control structures – Design – Types like Brush wood dams – Wire Mesh – Dams etc. – Introduction to permanent gully control structures – Design phases – Components of permanent structures.

TEXT BOOKS:

1. Soil and Water Conservation Engineering. Scwab G.O. Frevert R.K. Edminster T.W. and Barnes K.K. 1981 John Wiley and Sons New York.
2. Manual of Soil and Water Conservation Practicals. Gurmel Singh. Venkataramanam C. Sastry G and Joshi BP. 1994.Oxford and IBH Publishing Co. Ltd., New Delhi.

REFERENCES:

1. Land and Water Management Engineering. Murthy VVN 2004. Kalyani Publishers, New Delhi.
2. Introduction to Soil and Water Conservation Engineering. Mal B.S. 1995 Kalyani Publishers, Rajinder Nagar, Ludhiana.

III Year B.Tech. Ag. Engg I Sem.

AGRICULTURAL PROCESS ENGINEERING

Objective: To train students on unit operations of agricultural process engineering to acquainewith preliminary operations such as clearing, size reduction, mixing, separation, filtration and materials handling equipment.

Unit-I:
Scope and importance crop processing – principles and methods of food processing cleaning and grading of cereals. pulses & oilseeds – Principles. Size reduction –principle of comminution/ size reduction, mechanisms of comminution of food, particle shape, average particle size, Characteristics of comminuted products, crushing efficiency. determination and designation of the fineness of ground material, screen analysis, Empirical relationships (Rittinger's Kick's and Bond's equations), Work index, energy utilization, methods of operating crushers, classification based on particle size, nature of the material to be crushed, Size reduction equipment – Principal types, crushers (jaw crushers, gyratory, smooth roll), hammer mills and impactors, attrition mills, burr mill, tumbling mills, action in tumbling mills, Size reduction equipment –Ultra fine grinders (classification hammer mills, colloid mill), cutting machines (slicing, dicing, shredding, pulping), energy requirement of size deduction.

Unit –II:
Mixing –Introduction, theory of solids mixing, criteria of mixer effectiveness and mixing index for granular solids, mixing indices, criteria of mixer effectiveness and mixing index for pastes and semi solid masses, mixing index at zero time, rate of mixing, theory of liquid mixing, power requirement for liquids mixing. Mixing equipment – Mixers for low or medium viscosity liquids (paddle agitators, impeller agitators, powder-liquid contacting devices), mixers for high viscosity liquids and pastes, mixers for dry powders and particulate solids.

Unit-III:
Aerodynamics of agricultural products – drag coefficient – frictional drag and profile drag or pressure drag – and terminal velocity. Theory of separation, types of separators, cyclone separators, size of screens applications, Separator based on length, width, and shape of the grains, specific gravity, density. Air-screen grain cleanerprinciple and types, Design considerations of air-screen grain cleaners, Sieve analysis-particle size determination, Ideal screen and actual screen– effectiveness of separation and related problems, Pneumatic separator, Threshing, Winnowing, cleaning and separation equipment,

Unit –IV:
Moisture content and methods for determination, moisture content representation, wet basis, dry basis, direct and indirect methods of moisture content determination, problems, Importance of EMC and method of determination, static-dynamic methods, EMC curve and EMC models, hysteresis effect, bound, unbound and free moisture. Principles of drying, theory of diffusion, mechanism of drying, falling rate, constant rate period, Thin layer, deep bed dying methods, Effect of different factors on the drying process, different types of dryers, LSU dryer, flat bed batch dryer, fluidized bed dryer, rotary dryer.

Unit –V:

Rice milling, principles and equipments, paddy parboiling methods and equipment, wheat milling, milling of pulses and oilseeds. Theory of filtration, rate of filtration, pressure drop during filtration, applications, Constantrate filtration and constant–pressure filtration derivation of equation, Filtration equipment; plate and frame filter press, rotary filters, centrifugal filters and air filters

Unit-VI:

Scope and importance of material handling devices, study of different material handling systems– Classification, principles of operation, conveyor systems selection/design. Belt Conveyor– Inclined belt conveyors, idler spacing, belt tension, drive tension, belt tripper, Chain conveyor– Principle of operation, advantages, disadvantages, capacity and speed, conveying chain, Screw conveyor – Principle of operation, capacity, power, troughs, loading and discharge, inclined and vertical screw conveyors. Bucket elevator–Principle, classification, operation, advantages, disadvantages, capacity, speed, Bucket discharge, relationship between belt speed, pickup and bucket discharge, bucket types, Pneumatic conveying system- capacity and power requirement, types, selection of pneumatic conveying system, Gravity conveyor design considerations – capacity and power requirement.

REFERENCES:

1 Transport Processes and separation Process Principle, Geankoplis C J 2003 Prentice-Hall Inc., New Jersey.

2 Unit operations in Food processing, Earle R L 1983. Pergamon Press, New York

3 Post Harvest Technology of Cereals, Pulses and oil seeds, Chakraverty A 1988. Oxford and IBH Publishing Co. Ltd., Calcutta.

4 Unit Operations of Chemical Engineering, McCabe WL, Smith JC and Harriott P 1993 Mc Graw-Hill Book Co., Boston.

5 Unit Operations of Agricultural Processing, Sahay KM and Singh KK 1994, Vikas Publishing House Pvt. Ltd., New Delhi.

III Year B.Tech. Ag. Engg I Sem.

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Unit I:
Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights – Compliance and Liability Issues.

Unit II:
Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers **–** Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip Protection Act.

Unit III:
Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

Unit IV :
Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law

Unit V :
Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

Unit VI:
Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime.

REFERENCE BOOKS:

1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
4. Prabhuddha Ganguli: ‘ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi 5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.6. R. Radha Krishnan, S. Mohd.Iqbal Ali: “Intellectual Property Right” Serials Pub.

III Year B.Tech. Ag. Engg I Sem.

ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS AND FOOD QUALITY

Objective: To enable the students to understand the principles and concepts of various properties of biological materials to design various processing equipment to insure food quality and safety. They are the basis for measuring instruments and sensors.

Unit –I:

Physical characteristics of different food grains, fruits and vegetables – importance. Shape and size – criteria for describing shape and size. Roundness and sphericity – Volume and density – Specific gravity – Bulk density Porosity – surface area – measurement of the same. Rheology – basic concepts – ASTM standard definition ofbterms. Rheological Properties – Force deformation behavior, stress and strain behavior. Visco – elasticity – time effects –

Unit –II:

Rheological models. Kelvin and Maxwell models – electrical equivalence of mechanical models. Rheological equations – Maxwell model and generalized Maxwell model. Kelvin model – generalized Kelvin model creep – stress relaxation. Friction – basic concepts – effect of load sliding velocity. Friction in agricultural materials – measurement – rolling resistance – angle of internal friction and angle of repose.

Unit-III:

Aerodynamics of agricultural products – drag coefficient – frictional drag and profit drag or pressure drag –and terminal velocity. Electrical properties – Di electrical properties. Thermal Properties – specific heat – thermal conductivity-thermal diffusivity. Application of engineering properties in handling and processing equipment and also storage structures.

Unit-IV:

Food quality – Concept, objectives and importance. Food quality, control – methods of quality control sampling – purpose. Quality control – sampling techniques. Sampling procedures for liquid, powdered and granular materials. Sensory evaluation or organoleptic evaluation of food quality, methods. Interpretation of sensory results in statistical quality control.

Unit-V:

Total quality management (TQM – parameters of quality management. The evolution of total quality
management – total quality management (TQM). Total quality control principles of quality control – consumer preference and acceptance.

Unit –VI:

Food laws and regulations in India. Food grade and standards – BIS, AGMARK, PFA, FPO, CAC (Codex
alimantarious Commission). Sanitation in food industry – GMP. ISO 9000 series of standards. Hazard analysis and critical control point (HACCP) – objectives – principles – Steps involved in implementation of HACCP. Application of HACCP concept to milk and milk products – problems in implementing HACCP.

TEXT BOOKS:

Physical properties of plant and animal materials, Mohsenin N N 1986. Gordon and Breach Science Publishers, New York.

REFERENCES:

1 Food and Process Engineering Technology, Wilhelm LR, Suler W A and Brusewitz, G H 2004. American
Society of Agricultural Engineers (ASAE), St. Joseph, Ml.
2 Engineering Properties of Foods, Rao M A, Syed S H Rizvi and Ashim K Datta 2005. CRC Press – Taylor & Francis Group, Boca Raton, FL.

III Year B.Tech. Ag. Engg I Sem.

AGRICULTURAL EXTENSION TECHNIQUES AND BUSINESS MANAGEMENT

Unit-I:
Describe the meaning of communication, explain models of communication process along with elements and their characteristics. Classify the methods and explain the meaning, objectives, procedure involved in carrying out various individual, group and mass contact methods and describe the factors influencing selection of extension methods. Discuss about the various information tools and sources like internet, cyber cafes, kiosks, video and teleconferencing, Parishkaram (Farmers call Center) in A.P. and kisan call centers and agri-clinics including agricultural journalism.

Unit-II:
Discuss about the adoption and diffusion process and explain the models of adoption process and innovationdecision process, classify adopter categories and enlist the characteristics and explain the factors affecting adoption process. Describe the importance of capacity building of extension personnel and farmers and explain the meaning of training and discuss different types of training to farmers and enumerate the objectives of Farmer's Training Centre (FTC), mandate of Krishi Vignan Kendra (KVK) and objectives of District Agricultural Advisory and Transfer of Technology Centres (DAATTC).

Unit-III:
Management – Definition, decision management, importance of management, concepts, functions of management. Management – Management cycle, planning, organization, direction, control, co – ordination, communication. Agri – business management – Meaning, definition, concept, distinctive features of agribusiness management, application of management principles in agri – business.

Unit-IV:
Agro – based industries – Importance, need, procedure to be followed to setup agro – based industries, constraints in establishing agro – based industries. Project analysis – Project meaning, project cycle, identification, formulation, appraisal, Implementation, monitoring and evaluation. Project appraisal techniques – Undisounted techniques, pay back method, rate of return/return on investment, etc. Discounted techniques – NPV, BCR, IRR, sensitivity analysis.

Unit-V:
International trade – Definition, comparison between international trade and interregional trade, free trade vs. protectionism, methods of protectionism. India's contribution to international trade in food and agricultural commodities, share of agricultural products in total imports/exports of India, export – import policy. General agreement on trade and tariff (GATT), WTO, objectives, functions and structure of WTO, why WTO, ten benefits of WTO.

Unit-VI:

Principles of WTO trading systems, MFN, national treatment, predictability, promoting fair competition, encouraging development and economic reform. WTO agreements – Provisions relate to agreements in agricultural and food commodities. Agreements on agriculture (AOA) – Domestic supply, market access, export subsidies agreements on sanitary and phyto – sanitary (SPS) measures, Trade related intellectual propert5y rights (TRIPS).

References:

1. Education and Communication for Development, Dahama O.P. and Bhatnagar O.P 1980 – Ofxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Reaching the Unreached – Basics of Extension Education, Ganesh R., Mohammad Iqbal I. and Anandaraja N., Associated Publishing Company, New Delhi.
3. Essentials of Management, Joseph L Massie 1995. Prentice – Hall of India, New Delhi.
4. Agricultural Economics and Agri–business, Omri Rawlins N 1980. Prentice – Hall Inc., New Jersey.

III Year B.Tech. Ag. Engg I Sem.

FARM MACHINERY LAB

1. Study of various Farm Machinery, equipment.
2. Visit to machinery Production industry and ICAR, SAU'S research station. Determination of Field capacity and Field efficiency of primary tillage implements.
3. Draft and Fuel consumption measurement for different implements.
4. Study of different types of plough bottoms and shares of M.B. Plough.
5. Determination of disc angle, tilt angle, concavity of a disc plough.
6. Calculation of draft and horse power.
7. Study of seed-cum-ferti drill and seed metering mechanisms.
8. Calibration of seed drill and problems.
9. Study of sprayers, dusters and measurement of nozzle discharge and field capacity.
10. Study of earth moving equipment through exposure Visit. .
11. Construction and working of rotovators and weeding equipment
12. Practical Examination.

Text Books:

1. Principles of Farm Machinery. Kepner R.A., Bainer, R and Barger E.L., 1987. CBS Publishers and Distributors, Delhi.

2. Elements of Agricultural Engineering. Jagadeshwar Sahay. 1992. Agro Book Agency, Patna.

References:

1. Farm Machinery. Stone A.A. 1958. John Wiley and Sons. New York.
2. Farm Machinery and Equipment. Smith H.P. 1971. Tata Mc Graw-Hills. Publishing Co. Ltd., New
Delhi.
3. Principals of Agricultural Engineering, Vol. I. Michael A.M. and Ohja T.P. 1985. Jain Brothers, New Delhi.
4. Land Reclamation Machinery. Borshahov Mansurov Sergecv 1988 Mir Publishers, Moscow.

III Year B.Tech. Ag. Engg I Sem.

ADVANCED ENGLISH COMMUNICATION SKILLS (ACS) LAB

1. Introduction:

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be an integrated theory and lab course to enable students to use 'good' English and perform the following:

Gather ideas and information, to organise ideas relevantly and coherently.

Engage in debates.

Participate in group discussions.

- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice versa.
- To take part in social and professional communication.

2. Objectives:

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.

Vocabulary Building – synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.

Reading Comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, Critical reading.

Writing Skills – structure and presentation of different types of writing – *Resume writing* / e-correspondence/Technical report writing/Portfolio writing – planning for writing – research abilities/data collection/organizing data/tools/analysis – improving one's writing.

Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice,

body language, relevance, fluency and coherence.

Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars and written presentations through posters/projects/reports/PPTs/e-mails/assignments etc.

Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.

4. Minimum Requirement:

The English Language Lab shall have two parts:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a

digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

P – IV Processor
Speed – 2.8 GHZ
RAM – 512 MB Minimum
Hard Disk – 80 GB
Headphones of High quality

5. Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

- Clarity Pronunciation Power – part II
- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from 'train2success.com'
  - _ Preparing for being Interviewed,
  - _ Positive Thinking,
  - _ Interviewing Skills,
  - _ Telephone Skills,
  - _ Time Management
  - _ Team Building,
  - _ Decision making
- **English in Mind**, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

6. Books Recommended:

Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.

Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011. **English Language Communication** : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.

English Vocabulary in Use series, Cambridge University Press 2008.

Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.

Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.

Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.

Job Hunting by Colm Downes, Cambridge University Press 2008.

Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw- Hil 2009.
Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/Cambridge University Press. **International English for Call Centres** by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

DISTRIBUTION AND WEIGHTAGE OF MARKS:
Advanced Communication Skills Lab Practicals:
1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

III Year B. Tech. Ag. Engg II Sem.

IRRIGATION AND DRAINAGE ENGINEERING

Unit –I:

Introduction Irrigation Engineering, advantages of irrigation, necessity and development of irrigation in India and AP and classification if irrigation projects, Irrigation terminology-GCA,CCA, Base period, crop period, Delta, Duty, Relationship between Duty and Delta (Delta= (864B) / Duty cm), Introduction soil-water plant relationships, soil physical properties such as soil texture, soil structure, capillary conductivity, soil consistency-volume-mass relationships of soil constituents, Water relations of soil, kinds of soil water-Hygroscopic, Capillary and Gravitational movement of water into soils, Infiltration, factors affecting infiltration, procedure for measurement of infiltration rate and development of infiltration equations (Kostia-Kov equations-curve fitting) Ic=KTn+b), Soil moisture characteristic curves, difference between soil moisture stress and soil moisture tension, soil moisture constants such as saturation capacity, field capacity moisture equivalent and permanent wilting point. Terminology related with movement of water within soils-water intake, percolation, interflow, seepage, permeability, hydraulic conductivity and hydraulic gradient- Measurement soil moisture by different methods, Evaporation, transpiration and evapo-transpiration-Estimation by Blaney-Criddle, Thornthwaite, penman and modified Penman equations only-Potential ET. Water requirements of crops-Importance of water in plant growth, procedures of working out the net irrigation requirement (depth of irrigation) gross irrigation requirement, irrigation frequency and Irrigation efficiency (conveyance, application, storage, distribution, water use efficiency) with few numerical examples,

Unit-II:

Water application methods-classification, border irrigation, components of border irrigation-Width, Length and Slope for different soils for different soils, Hydraulics of border irrigation (Advance curve, Recession Curve and Opportunity time through Time and Distance Curve) design of border irrigation. Derivation of Israelson's equation for the width of the border (X= (Q/W.I) (1-eity), Furrow irrigation system-advantages and disadvantages, determination of infiltration depth in furrows by inflow-outflow method (Steam size, Distance Advance time, CS area and Wetted Perimeter data problem on computation of infiltration depth), Check basin irrigation–advantages and disadvantages, estimation of infiltration under check basin conditions, adaptability and design considerations.

Unit-III:

Methods of conveyance of irrigation water-assessment of design capacity of irrigation channels. Design of irrigation canals using Lacey's and Kennedy's theories and problems, Measurement of irrigation water-units of measurements, methods of measurement, direct and indirect methods, measurement of velocity using current meter-indirect methods such as area velocity method and coordinate method for measuring discharges form pipes-dethridge meter, tracer method, Direct methods of measurement of discharges-different devices such as weirs flumes and notches and their installation procedures – Equations for Rectangular Triangular and Trapezoidal notches, Explanation on RBC flumes (critical flow flumes). Underground pipe lines for irrigation water distribution-types of pipes used for underground pipe lines, testing of pipes for its water absorption and pressure requirements, estimating the discharge capacity of pipe lines, Installation

procedures of underground pipe lines and study of different structures associated with underground pipe lines.

Unit-IV:

Drainage-definition, objective and types, familiarization with the drainage problems (twin problems of water logging and salinity) and extent of areas in irrigated areas in the state, Surface drainage, effects of poor drainage, areas requiring drainage, factors affecting drainage requirement, drainage coefficient, determination of drainage coefficient based on different criteria, Types of surface drainage-random field drain system, bedding system, parallel field drain, parallel lateral open ditch, cross slope drain system interception system, design of open drainage channels using Manning's equation and alignment of open ditches (radius of curvature), Investigations on design parameters, hydraulic conductivity, drainable porosity fluctuations of depts. To water table in the areas, methods of determining hydraulic conductivity-single auger hole method and derivation of Hooghoudt's equation for 'K' with assumptions and inverse auger hole, Sub-surface drainage systems purpose and benefits, types of sub surface systems tile drains, mole drains, drainage wells, deep open drains and combinations and their suitability for different conditions and limitations.

Unit-V:

Components of Sub-surface drainage system Layouts and types –Random type herring bone, grid iron cutoff or interceptor drains, depth and spacing of drains, size of the pipe drains using Manning's equation, drain materials of burnt clay. Perforated corrugated and solid PVC and cement concrete, slope/grade for the drains, Envelope materials for sub-surface drains and selection criteria for uniform soils and graded soils, geo-textile and nylon mesh, outlets for sub surface drainage, gravity, gravity and pumped outlets.

Unit-VI:

Design of sub surface drains under steady state (equilibrium) conditions and derivation of Hooghoudt's equation for spacing, The Ernst's derivation for drain spacing, The Ernst's derivation for drain spacing. Glover-Dumm equation (only) for spacing under non-steady state conditions of water table to drop from 'm0' to 'm' in time 't', Drainage structures, Loads on conduits, ditch conduit conditions and projecting conduit conditions, construction and installation of drains, Bio-drainage, vertical drainage and drainage of irrigated and humid areas, Salt balance, classification and reclamation of saline and alkaline soils, soil amendments, leaching requirement-leaching ratio, Economic aspects of drainage with a typical example for total cost estimation SSD system and benefit – cost ratio.

TEXT BOOKS:

1. Irrigation Engineering, Muzumdar S K, 1983, Tat-McGraw Hill Publishing's. Co. Ltd., New Delhi.
2. Irrigation Theory & Practice, Michael A M, 2008, Vikas Publishing House, New Delhi.
3. Drainage Engineering, Luthin J M, 1970, Wiley Eastern Ltd., New Delhi.
4. Soil and Water Conservation Engineering, Schwab G O, Frevert R K, Edminister T w and Barner K K,1981, John-Wiley and Sons, New Delhi.

REFERENCES:

Land & Water management Engineering, Murthy V V N, 2004, Kalyani Publishers, New Delhi.

III Year B.Tech. Ag. Engg II Sem.

FARM MACHINERY AND EQUIPMENT –I

Objective: Primary and Secondary tillage implements along with earth moving machinery, seeding and plant protection equipment will be discussed to get awareness on the mechanical area of the agricultural engineering.

Unit – I:
Objectives of Farm Mechanization, sources of farm power, classification of farm machines. Materials of construction and heat treatment. Principles of operation and selection of machines used for production of crops - Field capacities of different implements and their economics. Problems on field capacities and cost of cultivation.

Unit – II:
Classification and types of tillage, Primary tillage implements-Mould board plough and its parts, Disc plough, and other ploughs, Secondary tillage equipments- Disc harrows, implements-Cultivators, and intercultural implements.

Unit – III:
Forces acting on tillage tools, Problems on forces analysis, Draft measurement of tillage equipments, Draft and unit draft related problems.

Unit – IV:
Earth moving equipment-terminology, Earth moving equipments, construction and their working principles, Earth moving equipment- shovels, Bulldozers, Earth moving equipments- Trenches and elevators.

Unit-V:
Seeding methods, Different types of seed metering mechanism, different types of furrow openers. Calibration of Seed drills. Adjustment of Seed Drills - Objectives and uses of plant protection equipment. Types of sprayers and dusters. Sprayers calibration and selection. Constructional features of different components of sprayers and dusters and their adjustments.

Unit-VI:
Transplanting methods, different types of Transplanting machinery and their working principle, adjustments in Transplanting equipment. Fertilizer application equipment – fertilizer meeting mechanism calibration of fertilizer equipment.

REFERENCES:
1. Farm Machinery, Stone A A 1958. John wiley and sons, New York.
2. Farm Machinery and Equipment, Smith H P 1971. Tata McGraw Hill Publishing Co. Ltd., New Delhi.

3. Principals of Agricultural Engineering, Michael A M and OJha T P 1985 Vol.I, Jain Brothers, New Delhi.
4. Principals of Farm Machinery, Kepner R A, Bainer R and Barger E L 1987. CBS Publishers and Distributors, Delhi.
5. Elements of Agricultural Engineering, Jagadeshwar Sahay 1992. Agro Book Agency, Patna.
6. Land Reclamation Machinery, Borshahov Mansurov Sergecv 1988. Mir Publishers, Moscow.

III Year B.Tech. Ag. Engg II Sem.

DESIGN OF SOIL, WATER CONSERVATION AND FARM STRUCTURES

Objective: To enable the students to design and execute the structures for controlling soil erosion, water erosion and irrigation in fields and prepare cost estimates for the structures.

Unit-I:
Introduction, Classification of structures, land treatment structures, gully control structures, functions of soil erosion control structures. Flow in open channels – types of flow, state of flow, regimes of flow, energy and momentum – principles, specific energy and specific force – critical depth concept–stage discharge relationship– sequent depths. Hydraulic jump and its application, type of hydraulic jump, energy dissipation due to jump, jump efficiency, relative loss of energy – Froude number and its significance in the design of hydraulic structures.

Unit-II:
Runoff measuring structures–Parshall flume, H-Flume and weirs, Water stage recorders. Straight drop spill waygeneral description, functional use, advantages and disadvantages, structural parts and functions, components of spillway. Three design phases – hydrologic and hydraulic design, free board and wave free board, aeration of weirs, concept of free and submerged flow. Structural design of a drop spillway–loads on headwall, variables affecting equivalent fluid pressure. Determination of saturation line for different flow conditions, seepage under the structure, equivalent fluid pressure of triangular load diagram for various flow conditions. Creep line theory, uplift pressure estimation, safety against sliding, overturning, crushing and tension.

Unit III :
Chute spillway- general description and its components, hydraulic design, energy dissipaters – uplift pressure diagram – analysis of various forces etc. Design criteria of a SAF stilling basic and its limitations. Drop inlet spillway – General description, types of possible flow conditions, pipe flow, orifice flow, functional use, design criteria. Design of diversions, small earth embankments – their types and design principles, farm ponds and reservoirs. Estimation of volume of earthwork of farm ponds by various methods. Irrigation Engineering structures – Various types and their purposes. Differences between soil conservation and irrigation structures.

Unit-IV:
Canal Falls – types of canal falls with line diagrams (elevations). Design of trapezoidal notch fall. Design of syphon well drop type of canal falls. Cross drainage works – Locations needing cross drainage works – aqueduct – super passage – inverted siphon aqueduct – inlets and outlets – different types of cross drainage works with line diagrams. Design principles of various cross drainage works – Design of an aqueduct.

Unit–V:
Irrigation outlets – non modular, semi modular rigid modular outlets battle sluice irrigation modules. Diversion head works – Different components of diversions head works – head regulator and cross regulator. Different types of weirs and barrages – Difference between a weir and barrage with example locations. Operation of gates in controlling water in irrigation structures.

Unit-VI:

Planning and layout of farmstead-location – Design and construction of farm fences, type of farm fences – Requirements of farm work shop and implement shed. Problems and layout - Design and construction of threshing and drying yards. Design of different barns – Barn for cows, Buffalo, poultry - Design and construction of rural grain storage structures such as Bhukari, Morai, Kothari – requirements of good storage structures. Design and construction of Silo – Types of Silos- Good silo requirements – Problems on size and capacity of Silos

TEXT BOOKS:

1. Soil and Water Conservation Engineering. Schwab G.O., Frevert R.K. Edminister T.W. and Barnes K.K. 1981. John Wiley and Sons, New York.
2. Irrigation Engineering and Hydraulic Structures. Garg S.K. 1986. Khanna Publications. New Delhi.

REFERENCES:

1. Irrigation Engineering. Mazumdar. S.K. 1983. TMH Publishing Co. Ltd., New Delhi.
2. Irrigation Water Resources. Modi P.N. 1990. Standard Book House. Post Box No. 1074. New Delhi.
3. Hydrology and Soil Conservation Engineering. Ghanshyam Das 2009 PHI Learning Private Limited,New Delhi.

III Year B.Tech. Ag. Engg II Sem.

DAIRY AND FOOD ENGINEERING

Objective Knowledge on milk and food processing unit operations offer strength to students to handle pasteurization, sterilization, packaging, etc. of dairy products and control spoilage of food through process operations such as evaporation, freezing, membrane processing etc.,

Unit – I:

Dairy development in India and dairy technology- Indian dairy industry products Concentrated whole mile products, – Composition of milk, physic-chemical properties of milk, water content, acidity, pH, developed acidity, natural acidity, total acidity, density, specific gravity, freezing point of milk colour of milk, flavor, Unit operations of various diary and food processing systems- Centrifugation, separation, separation by cyclone (Application of separation in the dairy industry, velocity of particles in a gravitational field, distribution of fat globule diameters in milk, velocity of particles in a centrifugal field, strength of centrifugal bowl, disc bowl centrifuge, design of centrifuges and methods of application, decanting centrifuge for lactose and casein, cyclones for separation from gas phase).

Unit – II:

Milk receiving – Quantity determination, quality evaluation, clearing and disinfection of transport facilities, milk returns, procedures for reception and returns, Process flow charts for product manufacture – Pasteurized milk, flow chart, process steps, person method and mass balance method for making balances of cream and fat in making whole milk, butter, cheese, ice cream manufacture, process steps, over run. Pasteurization- Purpose, microorganisms and enzymes and their reaction to temperature and other influences, bacteria in milk, effect of temperature, Pasteurization – Methods of heating, design and mode of operation heating equipment (Vat, tubular
heat exchanger, plate heat exchanger), Sterilization – UHT method (Direct and indirect heating), sterilization in the package (temperature and pressure patterns), equipment for sterilizing goods in the package (Batch autoclaves, continuously operating sterilizers).

Unit – III:

Homogenization – Emulsifying, types of emulsions, emulsifiers, homogenizing (Application, mode of operation, technical execution, effect of the product), Filling and packaging – Packaging of milk, cultured milk, cheese, butter, concentrated milk, products, dried milk products, and packaging materials of them, filling and metering, packaging methods, Butter manufacture – Principle, treatment of cream, churning, overrun, factors affecting churn ability, methods (Butter churn, continuous butter making), butter oil and special butter products (Composition, methods of manufacturing ,direct evaporation method, decantation, centrifugal separation, vacuum method).
Dairy plant design and layout – factors in planning, importance of site selection. Location of building, size and type of dairy building, advantages of good plant layout, functional design, Dairy plant design and layout – Operating schedule and layout, process selection, floor space, walls and ceiling ventilation, doors, windows and lighting, flooring, drainage.

Unit-IV:

Composition and proximate analysis of food products- Carbohydrates, protein, lipids, minerals, vitamins, Deterioration in products and their controls – Food as a substitute to microorganisms, food preservation methods, principles of food preservation, causes of food spoilage and classification of food with respect to spoilage and consumption, Principles of food preservation, effects of pH and water content on growth of microorganisms, methods of controlling water content, effect of water activity, methods of measuring a oxidationreduction potential effect on microorganisms, effect of nutrient content and effect of inhibitory substances,biological structures, Physical, chemical, and biological methods of food preservation, Change undergone by food components during processing –Changes during heating, evaporation, drying, freezing, juice extraction, filtration and separation.

Unit – V:

Evaporation – Applications, functions, factors affecting rate of evaporation, basic evaporator construction, factors affecting liquid boiling point, thermodynamics of evaporation (phase change, boiling point elevation, Duhring plot, factor influencing the overall heat transfer coefficient, influence of feed liquor properties on evaporation, factors influencing the economy of evaporation, Types of evaporation equipment. Natural circulation evaporators – Batch type, horizontal short tube, vertical short tube, natural circulation with external calendria, long tube, forced circulation (General forced circulation, plate, expanding flow, mechanical /agitated thin film), Drying – Drying
methods (radiation, dielectric, spray, foam, spray, roller, fluidized bed, freeze).

Unit – VI:

Freezing – Introduction, freezing point curve for food and water, freezing points of common food materials, freezing time calculation by using Plank's equation, types of freezing equipment, Juice extraction – Single stage liquid –liquid extraction processes Types of equipment design for liquid-liquid extraction, continuous multistage countercurrent extraction, Juice extraction – Liquid solid leaching (process, preparation of solids. rate of leaching types of equipment of leaching. Filtration - ultra-filtration, processing variables, applications or ultra-filtration in milk processing, reverse osmosis, Membrane separation – Membrane separation methods, gel filtration and on exchange, Thermal processing - Thermal death time curve, reaction kinetics of the heat treatment of milk and its
use for the assessment of UHT treatment methods, change in milk produced by heating, Plant utilities
requirement – Electricity, water, power.

REFERENCES:

1 Food Engineering and Dairy Technology, Kessler H G 1981. Veriag A. Kessler, Freising.
2 Outlines of Dairy Technology, Sukumar De 2005. Oxford University Press, New Delhi
3 Principles of Food Science, Fennema O R 2006. Marcel Dekkar Inc., New York.
4 Food Science, Chemistry and Experimental Foods, Swaminathan M 2006. The Bangalore Printing & Publishing Co., Ltd., Bangalore

III Year B.Tech. Ag. Engg II Sem.

THEORY OF STRUCTURES

Objective The Students will have acquired knowledge on the design principles of beams, slabs, columns, foundations and RCC structures, retaining walls and silos and other structures by the end of the course.

Unit-I:
Introduction to loads and BIS codes
Analysis and designing of single reinforced sections – Properties of reinforced concrete, advantages, assumptions, modular ratio, equivalent area of R.C.C., Stress and strain diagram, neutral axis, moment of resistance, design of rectangular section.

Unit-II:
Analysis of balanced over reinforced and under reinforced sections – Under reinforced sections, over reinforced sections, problems. Analysis and designing of double reinforced sections – Modular ratio for compression shell equivalent area of steel in compression, neutral axis, moment of resistance, steel beam theory, problems. Shear stresses in beams – Shear stress induced in homogeneous and R.C. beams, nominal shear stress, varying depth, effect of shear in R.C. beams, failures, shear resistance of concrete without shear reinforcement.

Unit- III:
Design of shear reinforcement, problems. Vertical stirrups and inclined bars – Development of length, development of stress in R.C.C. Anchorage for reinforced bars–Anchorage for reinforced bars, anchorage bars in tension, anchorage bars in compression. Curtailment of bars – Decision on the curtailment of bars, design considerations for bond, general concept of bond.

Unit- IV:
Design of flanges beams (CT and I beams). Design of one way slabs – Loading on slabs, arrangement of reinforcement, design of one way slab. Design of one way slabs – Problems on design of one way slabs. Design of one way slabs – Design of reinforced brick slabs, problems. Design of one way slabs – Rankine – Grashoff theory, shear force on the edges, design, problems, Merco's method.

Unit-V:
Design of two way slabs – Torsion reinforcement, load and bending moment, problems, slabs with edges fixed. Design of two way slabs – Provision of torsion reinforcement, Marcor's method, problems. Axially loaded columns – Types of columns, effective length of columns, long and short columns, composite columns.

Unit- VI:
Axially loaded columns – Basic rules for design of columns, arrangement of transverse reinforcement, problems. Foundations – Types of foundations, design criteria. Foundations – Problems on design criteria. Retaining walls – Earth pressure on a retaining wall, active earth pressure, passive earth pressure. Stability of walls – Conditions for stability of retaining walls, problems.

TEXT BOOKS:

1. Mechanics of Structures Vol. I, Junarkar,S.B. 2001 – Charotar Publishing Home, Anand.
2. Mechanics of Materials, Dr. B.C. Punmia, Laxmi Publications.
3. Strength of Materials by , Basavarajaiah and Maha devazpa, University Press.

REFERENCES:

1 Strength of materials, R.S. Khumi 2001 – S. Chand & Company Ltd., 7361, Ram Nagar, New Delhi – 110055.
2 Treasure of R.C.C. Design, Sushil Kumar 2003 – R.K.Jain – 1705-A, Nai Sarak, Delhi.

III Year B.Tech. Ag. Engg II Sem.

OPERATIONS RESEARCH
(Open Elective)

UNIT – I

Introduction: Development – Definition– Characteristics and Phases – Types of operation Research models – applications. **Allocation :** Linear Programming - Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

UNIT – II

Transportation Problem: Formulation – Optimal solution - unbalanced transportation problem – Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem- Traveling Salesman problem.

UNIT – III

Sequencing: Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.
Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.

UNIT – IV

Theory Of Games: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – dominance principle – m X 2 & 2 X n games - graphical method.

UNIT – V

Waiting Lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

UNIT – VI

Inventory: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost- Single period model.

UNIT – VII

Dynamic Programming: Introduction –Terminology- Bellman's Principle of optimality – Applications of dynamic programming- shortest path problem – linear programming problem.

UNIT – VIII

Simulation: Definition – Types of simulation models – phases of simulation– applications of simulation –
Inventory and Queuing problems – Advantages and Disadvantages – Brief Introduction of Simulation Languages.

TEXT BOOKS:

1. Operations Research /J.K.Sharma 4e. /MacMilan

2. Operations Research / R.Pannerselvam 2e.,PHI Publications

REFERENCES :

1. Operations Research /A.M.Natarajan, P.Balasubramani, A. Tamilarasi/ Pearson Education.
2. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman
3. Introduction to O.R /Taha 8e/PHI
4. Operations Research / Wagner/ PHI Publications.
5. Operations Research / S.D.Sharma-Kedarnath
6. O.R/Wayne L.Winston/Thomson Brooks/cole
7. Introduction to O.R/Hiller & Libermann (TMH).

III Year B.Tech. Ag. Engg II Sem.

AGRICULTURAL PROCESS ENGINEERING LAB

Practical:

1 Preparation of flow charts and layout of a food processing plant
2 Determination of fineness modulus and uniformity index
3 Determination of mixing index of a feed mixer
4 Determination of the efficiency of cyclone separator
5 Tutorial on extraction by McCabe and Thiele plot
6 Tutorial on use of psychrometry chart
7 Tutorial Problems on distillation
8 Tutorial on power requirement in size reduction of grain using Rittinger's law, Kick's law and Bond's law
9 Performance evaluation of hammer mill and attribution mill.
10 Separation behavior in pneumatic separation
11 Evaluation of performance of indented cylinder and screen pre cleaner
12 Mixing index and study of mixers

III Year B.Tech. Ag. Engg II Sem.

SOIL AND WATER ENGINEERING LAB

1. Estimation of Soil Loss from using Cushocton Silt sampler and multi slot divisor.
2. Determination of sediment concentration through Oven Dry method.
3. Soil loss estimation using erosivity index and erodibility index.
4. Determination of rate of sedimentation and storage loss in reservoir.
5. Field planning for implantation of soil conservation measures.
6. Field visit to study different soil conservation structures
7. Field visit to study different gully control structures
8. Determination in filtration characteristics of soils.
9. Measurement of irrigation water with H-Flume.
10. Measurement of evapo-transpiration.
11. Visit to nearby irrigation projects
12. Use of current meter and water meter.

IV Year B.Tech. Ag. Engg I Sem.

MICRO IRRIGATION ENGINEERING

Objective: To impart knowledge and skills to students to design sprinkler and drip irrigation systems to improve water productivity of different crops and to perform economic analysis and to prepare project proposals and cost estimates of Micro – Irrigation Systems.

Unit – I:
Sprinkler Irrigation Historical development, Scenario in the World, Country and State, adoptability and limitations, Components of the sprinkler system, pump set, (Centrifugal, turbines and Submersible), Main lines, Lateral lines, Sprinkler heads, Debris screens, Desilting basins, booster pumps, Take-off valves, Flow control valves (individual sprinkler).

Unit-II:
Sprinkler heads, fertigation Equipment, Types of sprinkler Irrigation systems: A. Based on mechanism: i) Rotating head system, ii) Perforated pipe system, B. Based on portability: i) Portable systems, ii) Semi-portable systems, iii) Semi-permanent systems, iv) Permanent systems and v) Solid set systems. Precipitation profiles and Moisture distribution patterns, Recommended sprinkler spacings, Effects of wind speed on working of the system, Importance of distribution uniformity, Christiansen Uniformity coefficient,

Unit-III:
Design of Sprinkler system, layout, laterals and mains: i) Inventory of Resources and Conditions, ii) Types of system and Layout, iii)Sprinkler Selection and Spacing, iv) Capacity of Sprinkler Systems, v) Hydraulic Design of Sprinkler Systems, vi) Selection of pump, Operation and maintenance of system, Field evaluation of the system, Cost analysis.

Unit – IV :
Drip Irrigation, Historical development, Scenario in the World, Country and State, Advantages and Limitations, Components of drip irrigation: A. Head Control- Non return valve, Air release & Vacuum breaker, Filter, Fertigation Tank, Throttle valve, Pressure gauge, other fittings, B. Wayer carrier systems- PVC pipeline, Control valve, Flush valve, other fittings, C. Water distribution systems- Drip lateral, Drippers, Emitting pie, Grommet, Start connector, Nipple, End cap, Micro tube, Barbed connector, Drip Hydraulics, Pipe section, Water flow in pipes, Velocity recommended pressure, Pressure and Hydrostatic, Pressure due to gravity, Friction and pressure losses, Coefficient of friction.

Unit –V:
Types of Emitters: A) Based on Floe regime (Reynolds number): i) Laminar Flow, ii)Partially turbulent flow, iii) Fully turbulent flow and B) Based on Lateral connection: i) in-line and ii)on-line, Emitter flow equation, Emitter constants, Pressure variations (%) for different emitter flow variations and x-values, Emission uniformity (EU), Distribution Uniformity and Irrigation efficiency.

Unit-VI:

Planning and design of drip system- Collection of primary data, Layout, crop water requirements, hydraulic design, selection of components, Economic pipe size selection, Pressure variation Along drip Irrigation and design criteria of lateral, sub-main and mail lines, Pai-wu I design charts. Installation, operation and Maintenance of drip irrigation systems, testing and field evaluation of the system, Computer Software programs for design of drip irrigation systems, Automation of drip irrigation systems – i) Volume based, ii) time based and iii) Soil moisture bases systems.

TEXTBOOKS:

1. Drip Irrigation & Sprinkler Irrigation, Sivanappan R K Padma Kumari O and Kumar V 1997, Keerthi Publishing House Pvt. Ltd., Coimbatore.

REFERENCES:

1. Micro-Irrigation for Crop Production, Design, Operation and Management, Freddie R. Lamm, James E. Ayars and Francis S, Nakayama, 2006, Elsevier Publications, Singapore.
2. Land and Water Management Principles, R. Suresh, 2008, Standard Publishers Distributors, Delhi.

IV Year B.Tech. Ag. Engg I Sem.

FARM MACHINERY AND EQUIPMENT – II

Objective: To enable the students to understand the basic principles of cutting mechanisms and to know the various available harvesting machines. To know the working principle and functions of various machine parts of mowers, reapers, windrowers, forage harvesters, threshers, combine harvesters, cotton strippers, cotton pickers, groundnut and potato and sugarcane harvesters. Students can also understand the importance of testing and evaluation of agricultural machines and different standard codes (BIS cides) available in India for testing of machinery..

Unit – I:

Harvesting – Crop harvesting machinery, history of development, manual harvesting and its classification. Principles and types of cutting mechanisms – principle of cutting mechanism, impact cutting, types of impact cutting, shear cutting Construction and adjustments of shear and impact type cutting mechanisms. Mowers – history and development, tractor mounted mowers, Trail behind tractor mower, integral Rear mounted mowers, side or central mounted tractor mower, semi-mounted mowers, safety precautions in operation and adjustments of mowers, Knife drives, cutter bar and its parts – inside and outside shoes. Cutter Bar – Guards, Ledger plates, wearing plates, knife clips, grass board and various parts of cutter bar assembly, alignment and registration of cutter bar. Windrowing – Methods of windrowing, Self propelled windrows, effects on yields and quality of Reapers, Animal drawn reaper, Tractor mounted Vertical conveyer reaper Repairs & maintenance of Harvesting equipment.

Unit-II:

Power operated vertical conveyer reapers – Reaper binders – Care and maintenance, types Forage harvesting equipment – row forage harvesting equipment, field forage harvesters, types of field forage harvesters. Field chopper harvesters, forage wagons and boxes, field flail forage harvesters, the self propelled forage harvester, silo forage blowers, silo un loaders.

Unit – III:

Thresting – Principal of threshing, threshing methods, threshing by manual, threshing by animals, threshing by machines, olpad threshers, Power thresher – types of power threshers, hammer mill type, rasp bar, spike tooth, syndicator, Classification threshers based on feeding type, components of power thresher. Cleaning unit- Aspirator, blower, winnower, winnowing fan, cylinder adjustment, wheat thresher, groundnut thresher, terminology connected with power thresher. development of the binder, development of the combine.

Unit – IV:

Harvester, advantages and disadvantages of combines, types of combines – Tractor drawn and self propelled combines. Functions performed by a combine, cutting mechanism, threshing mechanism, separating mechanism, cleaning mechanism, attachments for combine. Corn harvesting equipment- types of corn pickers, snappers, picker husker, Picker Sheller, power transmission, gathering and snapping mechanism, conveying and elevating mechanism. Husking mechanism, shelling mechanism, factors affecting performance of corn pickers, safety rules for operating corn pickers - Root crop harvesting equipment – groundnut harvester, groundnut diggers, digger operation and adjustments – groundnut shakers, groundnut threshers and pickers, groundnut combines, different units and its operation. Potato harvesters – harvesting methods and

equipment, one row harvester, two rowharvester, digging and soil separation, vine removal by harvesters, separation of stones and clods.

Unit-V:

Cotton harvesting equipment – cotton stripper, types of cotton strippers, factors affecting the performance of the cotton strippers, plant characteristics – thickness of plants – conveying system. Cotton pickers – types of pickers, drum type and chain belt spindle arrangements in cotton pickers, methods of mounting spindles, doffing of the cotton, conveying systems, working, factors affecting performance of cotton pickers. Sugar cane harvesters – self propelled sugar cane harvester, cleaning and special sugar cane wagon. Sugar cane harvesters – Self propelled sugar cane harvester, conveying and special sugar cane wagon.

Unit-VI:

Principles of fruit harvesting tools and machines – Harvesting methods – manual harvesters – hold on and twist type – Horticultural tools and gadgets. Testing of farm machine- Introduction, Standardization efforts, Testing programme and Procedure, Type of testing systems, national testing, prototype testing, testing for quality marketing.

TEXT BOOKS:

1. Principals of Farm Machinery. Kepner R.A., Bainer R and Barger E.L, 1987. CBS Publishers and
Distributors, Delhi.
2. Engineering principles of Agricultural machines, Ajith k Srivatsava, Carrol E. Goering, Roger P.
Rohrbach, 1993, ASAE Publishers.
3. Pesticide Application Equipment. Bindra O S and Hari Charan singh 1971. Oxford and IBH Publishing Co. Ltd., New Delhi.

REFERENCE BOOKS:

1. Farm Machinery and Equipment. Smith H.P. 1971. Tata McGraw-Hills Publishing Co., Ltd., New
Delhi.
2. Testing and Evaluation of Agricultural Machinery. Mehta M.L., Verma S.R. Misra S.K. and Sharma
V.K. Daya Publishing House, New Delhi.

IV Year B.Tech. Ag. Engg I Sem.

POST HARVEST ENGINEERING AND HORTICULTURAL PRODUCE

Unit – I:

Factors affecting fruit and vegetable quality, pre-harvest factors, Environmental Factors, Cultural factors, Post Harvest Factors, Engineering properties of Fruits and vegetables, Physical properties, Shape, Size, density, porosity, surface area, colour, serilynamie properties, dry coefficient terminal velocity Rheological properties, screen stain, Mechanical Properties, comprehension strength, tensile strength, shear resistance, Electrical properties, conductive, resistance dielectric properties, Optical properties, dielectric properties-optical properties, light transmittance, light reflectance,

Unit-II:

Handling and transportation of fruits and vegetables. Harvesting indices of different fruits and vegetables, determination of Maturity standards for fruits and Vegetable- Size, shapes, aroma, Fruit ripening, leaf charges, firmness, Juice content, sugar content, skin colour, total soluble solid, modern techniques for determination of harvesting indices/ and grading of fruits, Electrical property, Near Infrared Reflectance (NIR), Radiation, Optical method, Light reflectance, Machine vision.Cleaning of fruits & Vegetables, soaking, rinsing, Cleaning & Washingby agitator, by spraying water, wet and dry brushing, chemical washing, factors affecting effectiveness of a sprayer, Peeling of fruits and vegetables, Hand peeling, Mechanical peeling, peeling by heat treatment, Lye peeling, Grading of fruits & vegetables, Factors affecting grading, Types of graders, screen grader, roller grader, rope and cable type grader and weight grader.

Unit – III:

Canning of fruits & Vegetables, Grading, washing, peeling, cutting, Blanching, cooling, filling, Syruping or brining, Exhausting, sealing, Heat processing, cooling to room temp, Storage, Labeling, Making of cans for canning, causes of spoilage of canned foods, Hydrogen swell, Flipper, Springer, soft swell, hard swell, Buckling, Principles of preservation of Fruits & Vegetables, Asepsis packaging, preservation by high temperature. Pasteurization, Flash Pasteurization, Sterilization, Chemical preservation with sulphur dioxide, advantages, disadvantages, Preservation with Benzoic acid, Concentration and reverse osmosis technique applied to fruits & vegetables, Drying and dehydration of fruits & vegetables (Flow chart), types of dryers, cabinet dryer, tray dryers, tunnel dryer, Reconstitution test and rehydration, Ratio of Rehydration coefficient, Freeze drying, methods of freezing, slow freezing, quick freezing method, advantages and disadvantages, direct immersion, indirect contact with refrigerant, Air blast freezing, cryogenic freezing, De-hydro freezing, Freeze-Drying (Flow chart).

Unit – IV:

Post harvest management of Fruits and vegetables, procurement centers, Washing & grading, pre-cooling, room cooling, hydro cooling, Transportation by refrigerated trucks, Centralized cold storage centers etc, Controlled atmospheric storage, effects of CA, additional benefits, Limitations, Maintaining CA system, modified atmosphere storage/Packaging, Maintenance of MAP, active modification, passive modification, Requirements of fresh fruits package under CAS or MAS.

Unit-V:

Packaging of fruits and vegetables, packaging of fresh fruits, advantages of fresh packaging, Packaging materials, Cello pave, Poly vinyl chloride, polyethylene, Ethyl vinyl alcohol, Packaging of apples, Oranges, Mangoes, Bananas etc, Preparation of preservation of unfermented fruit beverages, selection of fruit, sorting and washing, Juice extraction, Deaeration, Filtration, Clarification, addition of sugar, fortification, preservation, Baffling, Unfermented beverages, Apple juice, grape juice, Pineapple juice, Citrus juice, Mango juice, with all flow sheets.

Unit – VI:

Fermented beverages, Wine, Flow sheet for processing of grape wine, Selection of fruit, crushing, Addition of sugar, adjustment of PH, addition of preservative addition of wine yeast, Fermentation, Firing & filtration, aging, packaging, Preparation of Vinegar, Alcoholic fermentation, Acetic acid fermentation, quality characteristics of fruits and vegetable for processing, Sensory, Hidden and quantitative characteristics, Oleoresin and essential oil extraction, turmeric oleoresin, extraction of chilli oleoresin, factors responsible, Solvents used for oleoresin extraction, advantages and disadvantages, Extraction of essential oil from spices by steam distillation, flow chart.

TEXT BOOKS:

1. Food Science by Potter, N. CBS Publishers.
2. Fruits and Vegetable Preservation. Principles and practices by srivastava R P & Kumar S International book distributy C.

REFERENCE BOOK:

1. Fruits: Tropical and subtropical by Bose T. K & Mitre, SK Naya Prakash.
2. Fruits and Vegetable processing by Bhatti, S and varma U CBS Publishers.
3. Technology of food preservation by Defroshier and Defrossier CBS Publications.

IV Year B.Tech. Ag. Engg I Sem

MECHANICAL MEASUREMENTS AND INSTRUMENTATION

Objective To enable the students to understand the principles and to acquire the knowledge on measuring systems, different types of instruments used for measuring the parameters like pressure, force, strain, temperature, sound, acceleration and displacement etc. and also to study practically using instruments for carrying out the experiments related to the concerned fields.

Unit- I:
Measurement and its significance, methods of measurement – direct methods and indirect methods and classification of measurements – primary measurements, secondary measurements and tertiary measurements. Instruments and measuring systems, their classification – according to history of instruments, according to mode of measurement and according to the functional requirement and principles of operation. Their principles of operation. Functional elements of a generalized measurement system–basic functional elements – transducer element, signal conditioning element and data precision elements and auxiliary elements. Examples of instruments for identification of basic and auxiliary elements – bourdon tube pressure gauge with out and with electrical read out, spring balance and proving ring etc. Inaccuracy in measurement and it analysis – types of errors or limiting errors – propagation of error or uncertainty.

Unit-II:
Detector transducer elements – introduction, classification and their principles – primary and secondary transducers, mechanical transducer, pressure transducers and active, passive transducers, analogue transducers and digital transducers. Signal conditioning elements and their principles of operation, data presentation elements and types – visual display type, graphical recording type, magnetic type and digital type. Static performance characteristics of instruments: static sensitivity, independent and proportional linearity, hysteresis, threshold, resolution and drift – zero and sensitivity drifts.

Unit- III:
Measurement of pressure: Introduction, types of pressure – atmospheric pressure, gauge pressure and absolute pressure, units of measurement and conversion of units form one system or another system. Types of pressure measuring devices with examples–mechanical devices, electromechanical devices. Manometers – types: simple U tube manometer. Well type manometer and inclined well manometer – ranges and their application – fluids used in manometer – desirable properties of manometric fluids – micro manometer for measuring very low pressures. Low pressure measurement devices – basic methods of measuring low pressures –study of McLeod pressure gauge used for measuring vacuum pressures: principles, construction, range and limitations. Electrical methods of measuring pressure – pressure sensitivity of resistance gauge – study of Bridgman pressure gauge used for measuring very high pressures: construction, principle, range and applications.

Unit- IV:
Measurement of strain – introduction, strain gauge principle, metals used for manufacturing strain gauges – strain gauge theory and gauge factor. Strain gauge circuits – Wheatstone bridge circuit and
unbalanced bridge. Measurement of change of resistance. Cross sensitivity and temperature compensation using dummy gauge and more than one active gauge – advantages and applications

of strain gauges. Strain gauge arrangements – measurement of axial force applied to simple beams by the arrangement of one active gauge, using two active gauges and suing of active gauges. Measurement of force applied to a cantilever by using four active gauges–simple arrangement method and Poisson arrangement method. Measurement of pressure using strain gauges – diaphragm type strain gauge pressure transducer.

Unit- V:

Measurement of temperature – introduction and classification of temperature measuring gases along
with examples – bimetallic thermometer, mercury thermometer and vapor pressure thermometer. Bimetallic thermometers – principles – types: strip type and cantilever type – materials of construction – types based on shape – advantages, ranges of measurement and applications. Liquid in glass thermometers – type of liquids used – desirable properties of liquids used in thermometer – complete immersion type measurement and partial immersion type measurement – ranges – disadvantages. Liquid in metal thermometer. Thermometers based on expansion of gases – vapor pressure thermometer; construction, principles, gases used , range, merits and limitations.

Unit-VI:

Electrical methods of measuring pressure – electrical resistance thermometers – conductor type and
semiconductors type – metals used – platinum resistance thermometer. Thermister – principle – metals used – types based on shape – range of measurement – advantages – limitations. Comparison between thermometer and thermister. Thermometer – principle – thermocouple laws – base metal type and rear metal type thermocouples – thermocouple materials and characteristics. Comparison between resistance thermometer and thermocouple. Thermopile – principle. Measurement of sound – introduction – noise and loudness, sound pressure level, sound power level,variation of intensity of sound with distance and combination of sounds. Sound measuring system. Microphone – principle, types: capacitor type, carbon granule type, piezo electrical crystal type and electrodynamics type-fields of application. Study of speed measuring instruments-stroboscope and tachometer-principles-constructionrange. Study of proving ring for force measurement and study of linear variable differentiation transformer (LVDT) for displacement measurement-principles and construction.

TEXT BOOKS:

1 Mechanical Measurements, Sirohi RS and Radhakrishna HC 1983, Wiley Eastern Ltd., 4835/24 Ansari Road, New Delhi
2 Instrumentation, Measurement and Analysis Nakra BC and choudhary KK 1987. Tata McGraw Hill
publishing co Ltd., 12/ 4 Asaf Ali Road, New Delhi
3 A course in Mechanical Measurements and Instrumentation, Shawhney A K, 1989, Dhanpat Rai and Sons, 1682, Nai Sarak, New Delhi.

REFERENCES:

1. Engineering Measurements and Instrumentation, Adams L F,1981, The English Language Book Society and Hodder and Stoughton, London.
2. Mechanical Measurements, Thomas G B and Buck N L,1969, Oxford and IBH Publishing Co. Ltd., 66, Janpath, New Delhi.

IV Year B.Tech. Ag. Engg I Sem.

SEED PROCESSING AND STORAGE ENGINEERING
(Elective-I)

Objective: To enable the students to understand the principles and acquire the knowledge on moisture content determination methods, EMC models, principles and methods of drying and their analysis, study of different driers, dehydration and functional requirements, storage of grains, CAP storage, MAP storage, and study the conveying equipment.

Unit-I:
Moisture contents and methods for determination: Moisture content representation, wet basis, dry basis, direct and indirect methods of moisture content determination, problems. Importance of EMC and methods of its determination: static method, dynamic methods: desortation method and isotenoscopic method. EMC curve and EMC model: Henderson equation, hysteresis effect, bound moisture, unbound moisture, free moisture. Deep bed drying and their analysis, time of advance of drying front, decreasing rate period – remarks on the deep bed, problems on drying. Critical moisture content, drying models, rate of drying curves for constant drying conditions, calculation methods for falling rate drying period.

Unit-II:
Calculation of drying air temperature and air flow rate, air pressure within the grain bed, Shred's and Hukill's curve. Different methods of drying: convective drying, radiation drying, dielectric drying, chemical drying, sack drying, puff drying, foam mat drying, freeze drying etc. Study of different types of dryers: unheated air driers: air distribution systems, heated air driers: flat bed type batch dryers, reciprocating batch drier. Study of LSU dryer, baffle dryer, rotary dryer, performance, energy utilization pattern and efficiency.

Unit – III:
Types and causes of spoilage in storage. Functional requirements of seed storage, control of temperature and relative humidity inside storage. Calculation of refrigeration load, control of its environment, air movement inside the storage. Storage of grains: destructive agents, respiration of grains, moisture and temperature changes in stored grains. Conditioning of environment inside storage through natural ventilation. Conditioning of environment inside storage through mechanical ventilation, artificial drying.

Unit-IV:
Design and control of environment. Storage of cereal grains and their products. Storage of seeds – terminology and treatments. Principles of grain storage – parameters – effecting the grain storage. Changes occurring during storage, nutritive changes, minerals, carbohydrates, proteins and vitamins. Moisture migration, storage insects, pests and their control.

Unit-V:
Grain storage structures – bag storage of grains: different types of storage, classification planning for a bag storage complex, constructional features and basic specifications of typical bag storage structures, design aspects of bag storage structures. Bulk storage of grains: advantages of bulk handling system, types of bulk storage traditional storage structures, moral, bhukari, kothari type storage structures. Bulk storage of grains, pusa bin, brick and cement bin, bunker storage, vertical silos.

Unit-VI:

Grain handling equipment-bucket elevator: types of bucket elevators, components of bucket elevators, head section, boot section, elevator legs, elevator belt, buckets, drive mechanism and power requirement problems. Belt conveyors: Salient features, design considerations, belt tension, power, design problems. Screw Conveyors: Salient features, Conveyor elements, selection of screw conveyors and power requirements–problems. Pneumatic conveyor, essential components, description of typical plant, limitations of pneumatic conveyor. Hermetically sealed and air cooled storage. Controlled Atmosphere storage of grains. Modified Atmosphere storage of grains. Tutorial problems on drying.

TEXT BOOKS:

1. Unit Operations of Agricultural Processing Sahay K M and Singh K K 1994 Vikas Publishing House Pvt. Ltd., New Delhi.
2. Grain Storage Engineering and Technology, Vijaya Raghavan, S. 1993. Batre Bale Service New Delhi.
3. Drying and Storage of Grains and Oilseeds CBS Publishers & distributions, New Delhi.

REFERENCES:

1. Transport Processes and Unit Operations, Geankoplis C J 1978. Aliyn and Bacon Inc., Newton, Massachusetts.
2. Unit operations in Food Processing, Earle R L 1983. Pergamon Press, New York.
3. Post Harvest Technology of Cereals, Pulses and Oil seeds, Chakravarthy A. 1988 Oxford and IBH
Publishing Co. Ltd., Calcutta.
4. Unit Operations of Chemical Engineering, McCabe W L and Smith J C 1993 McGraw Hill Book Co., New Delhi.

IV Year B.Tech. Ag. Engg I Sem.

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Elective-I)

Unit I Introduction to Managerial Economics:
Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Unit II *Elasticity of Demand*: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

Unit III Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

Unit IV Introduction to Markets & Pricing Policies:
Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.
Objectives and Policies of Pricing- Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

Unit V Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

Unit VI Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.
Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

Unit VII Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Unit VIII Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Profit Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2009.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.

REFERENCES:

1. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech, 2009.
2. V.Rajasekarn & R.Lalitha, Financial Accounting, Pearson Education, New Delhi, 2010.
3. Suma Damodaran, Managerial Economics, Oxford University Press, 2009.
4. Domnick Salvatore: Managerial Economics in a Global Economy, 4th Edition, Cengage, 2009.
5. Subhash Sharma & M P Vittal, Financial Accounting for Management, Text & Cases, Machmillan, 2008.
6. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2008.
7. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley, 2009.
8. Dwivedi:Managerial Economics, Vikas, 2009.
9. M.Kasi Reddy, S.Saraswathi: Managerial Economics and Financial Accounting, PHI, 2007.
10. Erich A. Helfert: Techniques of Financial Analysis, Jaico, 2007.

Prerequisites: Nil

Objective: To explain the basic principles of managerial economics, accounting and current business
environment underlying business decision making.

Codes/Tables: Present Value Tables need to be permitted into the examinations Hall.

Question Paper Pattern: 5 Questions to be answered out of 8 questions .Out of eight questions 4 questions will be theory questions and 4 questions should be problems.
Each question should not have more than 3 bits.

IV Year B.Tech. Ag. Engg I Sem.

FOOD PROCESSING PLANT DESIGN AND LAYOUT
(Elective-I)

Objective: Students will be trained in organization of food and agricultural processing plant machinery as per process flow. Also, site selection, layout procedures, project design concepts, etc. Will be explained for bringing the talent to establish an engineering industry.

Unit –I:

Plant layout – Definition, meaning, objectives, principles. Plant layout – Factors in planning layouts. Methods of layout planning – Unit areas concept, two – dimensional layouts, scale models. Principles of plant layout – Storage layout, equipment layout, safety, plant expansion, floor space, utilities servicing, building, materials handling equipment, rail roads and roads.

Unit-II:

Types of plant layout – fruit processing plant. Salient features of rice processing plant. Salient features of maize processing plant. Salient features of pulses – processing plants. Salient features of oilseeds processing plants. Salient features of horticulture processing plants. Salient features of processing plants of vegetable crops.

Unit-III:

Salient features of processing of poultry plants. Salient features of processing of fish processing plant. Salient features of processing of meat processing plant. Salient features of milk and milk products processing plants. Salient features of milk and milk products processing plants.
Location selection criteria – Plant location, factors in selecting a plant, selection of the plant site, preparation of the layout. Selection of processes – Comparison of different processes, batch versus continuous operation. Plant capacity – Equipment design and specifications, scale – up in design, safety factors, specifications, materials of construction.

Unit-IV:

Project design – Process design development, general overall design considerations, cost estimation, factors affecting profitability of investments, optimum design (economic and operation). Project design – Practical considerations in design, approach. Project design – Types of designs, feasibility survey, process development, design, construction and operation, design information from the literature.

Unit –V:

Flow diagrams-Qualitative and quantitative flow diagrams. Selection of equipments - Preliminary design, problem statement, literature survey, material and energy balance, equipment design and selection, problems, economics. Process and controls-Control systems, instrumentation control, maintenance, computer aided design. Handling equipments - Selection, factors, pumps, piping, fittings, solid feeders, plant layout. Plant elevation –Requirement of plant building and its components, foundation for equipment and dynamic loading, flooring, walls, roof, illumination, air-conditioning. Labor requirement for processing plant - Labor costs, maintenance and repairs, common denominator, Plant installation, Power and power transmission - Systems.

Unit –VI:

Food plant sanitation-Environmental protection, regulations, pollution control, air pollution abatement, particulate removal, noxious gas removal, thermal pollution control, recycling, CIP. Cost analysis - Cash flow for industrial operations, factors affecting investment and production

costs, capital investment, estimation of capital investment. Cost analysis - Cost indexes, cost factors in capital investment, estimation of total product cost. Preparation of feasibility report - Types of repots, organization of reports, organization of a design report, preparing the report, rhetoric, checklist for the final report.

TEXT BOOK:

Dairy and Food Engineering, Farall F W 1992. John Wiley & Sons, New York.

REFERENCES:

1. Plant Layout and Design, James M Moor, Macmillan, New York.
2. Milk Plant Layout, Hall H S and Y. Rosen, FAO publications, Rome.
3. Principles of Food Sanitation, Marriott N G 1985. Van Nostrand Reinhold Company, New York.
4. Food Technology Processing and Aylward F 2001. Allied Scientific Publishers, Bikaner. Laboratory Control.

IV Year B.Tech. Ag. Engg I Sem.

WATERSHED MANAGEMENT
(Elective-II)

UNIT-I

INTRODUCTION: Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

UNIT-II

Characteristics of Watershed. size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds. Watershed delineation – Runoff Computations from a watershed – Flood Frequency Analysis – Gumbell, Log Pearson and Weibull Methods of Analysis.

UNIT-III

PRINCIPLES OF EROSION: Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation.

MEASURES TO CONTROL EROSION: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rockfill dams, brushwood dam, Gabion.

UNIT-IV

WATER HARVESTING: Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

UNIT-V

FOREST AND GRASS LAND MANAGEMENT: Interpretation of Satellite Imageries- Land use and Land Cover. Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

UNIT-VI

ECOSYSTEM MANAGEMENT: Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation. Planning of watershed management activities, peoples participation, preparation of action plan, administrative requirements- Reservoir Routing..

TEXT BOOKS:

1. Watershed Management by JVS Murthy, - New Age International Publishers.
2. Water Resource Engineering by R.Awurbs and WP James, - Prentice Hall Publishers.

REFERENCE:

1. Land and Water Management by VVN Murthy, - Kalyani Publications.
2. Irrigation and Water Management by D.K. Majumdar, Prentice Hall of India. Food Packaging Technology To be included

IV Year B.Tech. Ag. Engg I Sem.

COMPUTATIONAL FLUID DYNAMICS
(Elective-II)

UNIT-I

Elementary details in numerical techniques: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition for instability, computational methods for error estimation, convergence of sequences.

UNIT - II

Applied Numerical Methods: Solution of a system of simultaneous Linear Algebraic Equations, iterative schemes of Matrix Inversion, Direct Methods for Matrix inversion, Direct Methods for banded matrices.

UNIT - III

Finite Difference Applications in Heat conduction and Convection – Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT - IV

Finite Differences, discretization, consistency, stability, and Fundamentals of fluid flow modeling: Introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT - V

Introduction to first order wave equation; stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme. Review of Equations Governing Fluid Flow and Heat Transfer: Introduction, conservation of mass, Newton's second law of motion, expanded forms of Navier-stokes equations, conservation of energy principle, special forms of the Navier-stokes equations.

UNIT - VI

Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function - Vorticity formulation. Finite volume method: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.

TEXT BOOKS:

1. Numerical heat transfer and fluid flow / Suhas V. Patankar Hema shava Publishers corporation & Mc Graw Hill.
2. Computational Fluid Flow and Heat Transfer/ Muralidaran- Narosa Publications

REFERENCES:

1. Computational Fluid Dynamics: Basics with applications –John D. Anderson/ Mc Graw Hill.
2. Fundamentals of Computational Fluid Dynamics – Tapan K. Sengupta / Universities Press.

IV Year B.Tech. Ag. Engg I Sem.

FIELD OPERATION AND MAINTENANCE OF TRACTORS AND FARM MACHINERY LAB

Objectives: To enable the students for acquiring the knowledge pertaining to maintenance of tractors like periodical maintenance (50 to 100 hours, 200 to 250 hours, 480 to 500 engine working hours, 960 to 1000 hours) and trouble shooting of all systems like fuel system, lubrication system, cooling system and ignition system and remedial measures for above system.

1. Tractor Systems - Maintenance of air fuel system – cleaning of air cleaners – Frequent troubles and Remedies – Process to remove air lock in the diesel engine – Precautions in handling diesel fuels in diesel engine.
2. Maintenance of lubrication system – Frequent troubles and Remedies – Troubles in Lubrication system – Excessive oil consumption – Care and maintenance of lubrication system.
3 Maintenance of transmission system – General maintenance – Differential trouble shooting – Frequent troubles and Remedies.
4 Maintenance of cooling system and cleaning of radiators - Frequent troubles and Remedies – Cooling system troubles – Over heating – slow warm up of the engine – care and maintenance of cooling system.
5 Maintenance of Ignition system – Care and Maintenance of batteries – Frequent troubles and Remedies – causes of ignition failure in battery system.
6. Maintenance of hydraulic system – Working principle – Basic components of hydraulic system – Types of hydraulic system – Frequent troubles and Remedies – Repairs and maintenance of hydraulic system – Precautions of hydraulic system.
7. Periodical maintenance of tractors – at 8 – 10 engine working hours – At 50 – 60 engine working hours at 100-120 engine working hours – at 200-250 engine working hours – at 480-500 engine working hours – at 960 – 1000 engine working hours.
8. Emission of smoke – Over heating of engines - maintenance of clutch brakes hydraulic problems..
9. Maintenance of Agricultural machinery before and after use like primary tillage implements M.B. plough, Disc plough and secondary tillage implements like harrows, seed drills, weeders, cultivators.
10 Driving in forward and reverse gears, Driving safety sales and study bean trepanned.
11 Hitching and field operation of M.B. plough, disc plough and harrows.
12 Field operation and adjustments of seed drill, Trans planers.
13 Adjustment and maintenance of threshers.

REFERENCES:

1. Elements of Agricultural Engineering. Jasgishwara Sahay 1992. Agro Book Agency, Patna.
2. Farm Tractor Maintenance and Repair. Jain S.C. and Roy C.R. 1984. Tata McGraw-Hill Publishing
Co. Ltd., New Delhi.
3. Tractors and their Power units. Liledahi J.B. Carleton W.M. Turnquist P.K. and Smith D.W. 1984.
AVI Publishing Co., Inc., Westport, Connecticut.
4. Farm Machines and their Equipment. Nakra C.P. 1986 Dhanpet Rai and Sons. New Delhi.

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IV Year B.Tech. Ag. Engg I Sem.

DAIRY AND FOOD ENGINEERING LAB

Practical

1. To study composite pilot milk processing plant & equipments
2. To study various parts of Pasteurizer and its working
3. To study various parts of Sterilizer and its working
4. To study various parts of Homogenizer and its working
5. To study various parts of Cream Separator and its working
6. To study various parts of Butter Churner and its working
7. To study various parts of Evaporator and its working
8. To study various parts of milk dyer and its working
9. To study various parts of freezer and its working
10. Design and layout of dairy plant
11. To determine various physical properties of Food Products
12. To estimate steam requirement for various operations in dairy plant
13. Visit to food industry/ dairy plant.

REFERENCES:

1. Food Engineering and Dairy Technology, Kessler H G 1981. Verlag A. Kessler, Freising
2. Outlines of Dairy Technology, Sukumar De 2005. Oxford University Press, New Delhi
3. Principles of Food Science, Fennema O R 2006. The Bangalore Printing & Publishing Co., Ltd., Bangalore

IV Year B.Tech. Ag. Engg II Sem.

DESIGN OF AGRICULTURAL MACHINERY

Objective: To enable the students to understand the general procedure for designing any machine parts. To know the design of cotter and knuckle joints, leavers, springs, various types of shafts, couplings bearings and various IC engine parts.

Unit-I:
Machine Design – Definition, Classification of machine design, General considerations in machine design, General procedure in machine design. Fundamental units, Mass and Weight, inertia, laws of motion, force, moment of force, couple mass density, torque, work, power and energy. Simple stress in machine parts – Introduction, load, stress, strain, tensile stress and strain, compressive stress and strain, Young's modulus, shear stress and strain, shear modulus, bearing stress.

Unit-II:
Stress strain diagram, working stress, Factor of safety and selection, stresses in composite bars, thermal stress, linear and lateral strain, Poisson's ratio, volumetric strain, bulk modulus and relations, impact stress, resilience. Principal stresses and principal planes – Theories of failure under static load, Rankine's theory, Guest's theory, maximum distortion theory, stress concentration, notch sensitivity - Important terms used in Limit System, fits, types of cotter joints, design of socket and spigot cotter joint. Knuckle joint, Dimensions of various parts of knuckles joint, methods of failure of knuckle joint, design procedure of knuckle joint.

Unit-III:
Levers – Introduction, application of levers in engineering practice, design of lever hand levers, foot lever, cranked lever. Springs – Introduction, types of springs, material for helical springs, spring wire, terminology, springs in series and parallel, flat spiral springs, leaf springs, construction of leaf springs.

Unit-IV:
Design of Machinery : Design of Tillage equipment – cultivator, Rotovator, sowing machinery – Tractor Operated seed com Fertilize drill - Design of harvesting & threshing equipment – reaper, power thresher, Design of spraying equipment – Tractor mounted Boom sprayer.

Unit-V:
Shafts – Material used for shafts, types and sizes of shafts, stresses in shafts, maximum working stresses. Design of shafts, for twisting moment, bending moments, fluctuating loads, axial load in addition to combined twisting and bending loads, design of shafts on the basis of rigidity. Keys and coupling – Introduction, types of keys, sunk keys, saddle keys, tangent keys, round keys, splines, forces acting on sunk keys, strength of sunk key. Effect of key ways, shaft couplings, types of shaft couplings, muff coupling, design of flange coupling.

Unit-VI:
Fly wheel – Introduction, Coefficient of fluctuation of speed, fluctuation of energy, maximum fluctuation of energy, energy stored in a flywheel. Bearing – Introduction, classification of bearing, types of sliding contact bearings, rolling contact bearings – Introduction, advantages and disadvantages of rolling contact bearing over sliding contact bearings. Types of rolling contact bearings, types of radial ball bearings, Standard dimensions and designations of ball bearings,

types of roller bearings, basic static load rating of rolling contact bearings, life of a bearing. Basic dynamic load rating of rolling contact bearings, dynamic load rating for rolling contact bearings under variable loads, reliability of bearing, lubrication of ball and roller bearings.

TEXT BOOK:

1. Machine Design – Khurmi R.S. and Gupta J.K. 1996, Eurasia Publishing House Pvt. Ltd., New Delhi.

REFERENCES:

1. Machine Design – Jain R.K. 1991. Khanna Publishers, New Delhi.

IV Year B.Tech. Ag. Engg II Sem.

GIS AND REMOTE SENSING
(Elective-III)

Objective: To equip the students with the knowledge on techniques of Remote Sensing and GIS applications for land and water resources management with projections on yield response to irrigation water, mapping of salt affected and waterlogged lands and techniques of image processing for various applications in efficient natural resources management.

Unit-I:
Introduction to Remote Sensing, stages I remote sensing, Sensors- Remote sensing types and applications, important features of Indian Remote Sensing Satellites, Data acquisition and analysis – from satellitesinterpretation,

Unit - II
Electromagnetic spectrum- different bands- Resolution, Spectral response Pattern-multi spectral data use, modern remote sensing technology versus conventional aerial photography.

Unit – III:
Visual image interpretation, image interpretation, Basic principles of image interpretation, Factors governing the quality of an image, Factors governing interpretability, visibility of objects, Elements of image interpretation, Techniques of image interpretation, Digital image processing-Radiometric correction-DN (Digital Number value) – Noise removal and correction-image enhancement, Digital image processing-Contrast manipulation-gray level thresholding-level slicing-contrast stretching, Digital him age processing-spatial Feature Manipulation-spatial filtering-convolution edge enhancement.

Unit-IV:
Digital image processing-Fourier Analysis-Multi Spectral scanners-MSS operation and design considerations- Imaging spectrometry –Multi image manipulation, Digital image processing vegetation components image classification supervised image classification unsupervised classification output stage data merging,

Unit – V
Remote sensing in agriculture progress and prospects Yield assessment, Remote sensing in water resources development,

Unit – VI
Remote sensing in soil conservation, Remote sensing in geology and soil mapping.

Unit - VII:
Microwave radiometry for monitoring agriculture crops and hydrologic forecasting, Aerial photo interpretation for water resources development and soil conservation survey, definition-Geographical Information Systems GIS: History of development of GIS definition, Basic components and standard GIS packages.

Unit-VIII:
Date entry, storage and maintenance, Data types spatial non spatial (attribute-date), Data structure, data format, point line vector-raster polygon, Object structural model, files, files organization,

Data base management, systems (DBMS), Entering data in computer-digitizer-scanner data compression.

TEXT BOOKS:

1. Remote sensing and Geographical information system, BS publications, sultan Bazaar, Hyderabad – 3
2. Introduction to Remote sensing, James B and Compell, Published by Taylor & Francis Limited.

REFERENCES:

1. Basics of remote Sensing and GIS, University Science Persons.
2. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Persons, New Delhi.

IV Year B.Tech. Ag. Engg II Sem.

HUMAN ENGINEERING AND SAFETY
(Elective-III)

Objective: To enable the students to study of human relation with environmental factors, study of anthropometry study of safety gadgets for spraying, chaff cutting and tractor & trailer operator.

Unit-I:
Introduction to human engineering & safety different working systems-human factors, Machine factorsenvironmental factors – relationship between the three, study of human machine model, Human performance – effectors and senses, Importance of FMJ (Fitting Man Job) & FJM (Fitting Job man).

Unit-II:
Study of anthropometrics in designs, Workspace design for standing and seated workers, Tasks requirements –
visual requirements and postural requirements.

Unit – III:
Functions of the skeletal and muscular systems, The conditions for the static equilibrium for the human body, The muscle function and types of muscle fatigue & discomfort, Factors influencing the work posture,

Unit-IV:
Design of hard tools, Biometrics and energy for muscle contraction oxygen dependent & oxygen independent system & CO2 consumption, Importance of cardio Vascular system and respiratory system in physical work handling, Difference between static and dynamic works.

Unit – V:
Physical work capacity- Factors effecting the work capacity – Introduction, Work capacity- Factors effecting the work capacity- Personal factors- Age, Sex, Environmental Factors- Light, climate, Indirect measures of energy expenditure, Calculation of rest periods in manual work.

Unit – VI:
Safety using the difference machines and measures taken for the protection, Vision- Importance of visionmeasures taken for the protection of the vision- Guidelines for using colour combinations.

Unit-VII:
Sound- measurement of sound- the nature of sound and the damages due to noise and preventive measures taken, Displacer- types of displace-Visual displace, Audio signals, Communication, Noise communication, Audio warning cues.

Unit – VIII:
Advance affects of air pollution- safety regulation acts for the safety measures to be taken in forming operated, Rehabilitation and compensation to accident victims, Human information processing, skill and performance – General model of human information processing, Memory storage- Short term and long term storages, Feedback information, Design of hand tools for Agricultural operation.

TEXT BOOK:

Work study and Ergonomics, Dalela S and Saurabh 1995, Standard Publishers and Distributors, New Delhi

REFERENCES:

1. Introduction to Ergonomics, Bridger R S
2. New Horizons I Human Factor Design, Huckingson 1992. McGraw-Hill Book Co., New Delhi.
3. Human Factors Engineering, McCormick E J 1992. McGraw-Hill Book Co., New Delhi.
4. Human Factors in Engineering and Design, Sanders M S and McCormick E J 1992. McGraw-Hill Book Co., New Delhi

IV Year B.Tech. Ag. Engg II Sem.

PRODUCTION TECHNOLOGY OF AGRICULTURAL MACHINERY
(ELECTIVE-III)

Objective: To enable the students to understand the different processes and machinery involved in
manufacturing the agricultural machines and to acquire knowledge on CNC tooling, turning tools, milling tools, drilling tools, finishing tools. To know the industrial lay out, planning, organization, administration and management.

Unit-I:
Critical appraisal in production of agricultural machinery-Stresses in machine elements working stresses-stress analysis of machine parts by using standard software.

Unit-II:
Cutting tools including CNC tools and finishing tools-High speed steel cutting tools, cemented carbides, coated carbides, ceramics, drilling tools, types of drill bits, milling cutters.

Unit-III:
CNC tooling-turning tools, milling tools, drilling tools, finishing tools associated with tool turrets, different types of tools used in CNC machining centers – vertical anis machining centers – twin turret tuning centre. CNC Turning centers – Multiple spindle turning centers – integrated material handling.

Unit-IV:
Powder metallurgy-introduction, powder metallurgy process, preparation of metal powders. Characteristics of metal powders – mixing compacting – sintering – hot pressing – applications of powder metallurgy. Limits, fits & tolerances – limits and fits compound tolerances – conditions for the success of any system of limits & fits, Terms & definitions.

Unit-V:
Jigs & fixtures – Jigs, fixtures, differences between jigs & fixtures – advantages of jigs & fixtures – essential features of jigs & fixtures. General rules for designing jigs & fixtures – Different types of jigs – Types of fixtures. Controllers – CNC controlling for machine tools – motion control systems – Point to point control system – continuous path control system. CNC controlling for machine tools absolute incremental control system – open loop and closed loop system.

Unit-VI:
Machine control unit – introduction – configuration of machine control unit. Distributed numerical control – introduction and configuration. CNC part programming – Part programming fundamentals – manual part programming methods. CNC part programming – interpretation of G-codes, computer Assisted part programming types- quality of good industrial management. Advantages of good organization – economic order quantity – site selection of a factory – general location of a factory – plant lay out. Selection of stander and critical components for manufacturing agricultural machines. Case studies of manufacturing of agricultural machinery.

Reference:

1. CAD/CAM : Principles and Applications, Rao P.N, 2004, McGraw Hill Education India, New Delhi.

2. Engineering Metrology, Jain R.K., Khanna Publishers, New Delhi.

3. Industrial Organization and Engineering, Banga T.R. and Sharam S.C., 2004, Khanna Publishers, New Delhi.

4. Mechanisms and Machine Theory, Rao J.S. and Dukkipatti R.V., 1990, Wiley Astern Ltd., New Delhi.

5. Theory of Mechanisms and Machines, Jagdish La, 191, Metropolitan Book Co. Pvt. Ltd., New Delhi MINOR IRRIGATION AND COMMAND AREA DEVELOPMENT To be included

IV Year B.Tech. Ag. Engg II Sem.

HYDRAULIC DEVICES AND CONTROLS
(Elective-IV)

Objective The students will be trained to highlight the usage and operation of hydraulic and pneumatic controls required for operation of automated farm machinery with hydraulic and pneumatic systems.

Unit –I:

Hydraulic basics – Pascal's law applications, fluid flow, fluid energy, fluid work, Fluid power – advantages, draw backs, applications, components. Hydraulic system, color coding. Reservoirs – Hydraulic reservoirs, design and construction features, sizing of reservoirs. Strainers and filters – Hydraulic filters, positions, types, disfilters, water traps, air dryers, different air dryers. Filtering material and elements – introduction strainers, filters, filtering methods, location of filters in hydraulic circuits, beta ratio of filters.

Unit- II:

Accumulators – Definition, types, weight – loaded, spring loaded, gas – loaded (non-separator, separator), piston, diaphragm, bladder. Accumulators – As a auxiliary power source, leakage compensator, emergency power source, hydraulic shock absorber. Pressure gauges and volume meters – Bourdon gauge, Schrader gauge, rotameter, sight flow indicator, disc piston, turbine flow meter, electronic digital readout. Hydraulic circuits-control of single acting and double acting hydraulic cylinder, regenerative cylinder circuit, pump unloading circuit, double pump hydraulic system, Counter balance valve application; hydraulic cylinder sequencing circuits.

Unit-III:

Grain handling equipment-bucket elevator: types of bucket elevators, components f the vision-Guidelines for using colour combinations.

Unit-IV:

Pumps, pump theory, pump classification, performance, displacement, designs, gear pumps, vane pumps, piston pumps, pump operation. Hydraulic actuators- Linear actuators, cylinders, construction, seals, rotary actuators. applications (speed control, actuator synchronization, regeneration, counter balance and dynamic braking, pilot operated check valves, pre-fill and compression relief), maintenance. Hydraulic cylinders operating features, cylinder mountings and mechanical linkages, cylinder force, velocity and power, cylinder loadings through mechanical linkages, hydraulic cylinder cushions, hydraulic shock absorbers. Hydraulic motors limited rotation

hydraulic motors, gear motors, vane motors, piston motors, hydraulic motor theoretical torque, power and flow rate, performance, hydraulic transmissions.

Unit-V:

Hydraulic valves- directional control valves, flow control valves, Servo valves, proportional control valves, cartridge valves, hydraulic fuses, valve installation, valve failures, remedies, valve assembly, trouble shooting of valves. Hydraulic circuit diagrams and trouble shooting, USASI graphical symbols –Symbols, description, Tractor hydraulics – Power steering (hydraulic power steering, surface and soil conditions, sizing of components, actuator, control valves, lines hoses and internal passages, orifices, power steering pumps, Tractor hydraulicsnoise in hydraulic systems, hi-tech tractor kinetic energy, problems, integral hi-tech systems, three point hitches quick attaching coupler for three point hitches. Pneumatics: Air services – Compressors

(Introduction, piston compressors, compressor starting un loader controls, screw compressor, vane compressor, capacity rating sizing of air receiver, power. Fluid conditioners (air filters, air pressure regulators, air lubricators pneumatic pressure indicators), pneumatic silencers, after coolers, air dryers) analysis of moisture removal from air, air-flow rate control with orifices and sizing of valves), Air services-Air control valves (regulators, check valves, shuttle valves, directional control twoway valves, three way and four way control valves, flow control valves, sizing of valves)

Unit-VI:

pneumatic actuators (pneumatic cylinders, pneumatic rotary actuator, rotary air motors, air requirement, problems), pneumatic circuits and applications-Introduction, pneumatic circuit design considerations, air pressure loses in pipe lines, economic cost of energy losses, basic pneumatic circuit analysis using metric systems, Basic electrical controls –Electrical components, control of a cylinder using a singly limit switch, reciprocation of a cylinder using pressure or limit switches, dual cylinder sequence circuits, box-sorting system, electrical control of regenerative circuit, counting timing, reciprocation of hydraulic cylinder. Logic units-Moving part logic (MPL) control systems, MPL control of fluid power circuits, Boolean algebra, illustrative examples using Boolean algebra, Fail, safe and safety systems, Safety, cleanliness, fault finding instruments, fault finding, preventive maintenance, Robotics, use of hydraulic and pneumatic drives in agricultural systems, Advanced electrical controls-Components of an electro hydraulic servo system, analysis, programmable logic controllers.

Unit-VII:

Sound- measurement of sound- the nature of sound anydraulic circuits-Automatic cylinder reciprocating system, locked cylinder using pilot check valves, cylinder synchronizing circuits, fail-safe circuits, speed control of hydraulic cylinder, speed control of hydraulic motor. Hydraulic circuits-Hydraulic motor braking system, hydrostatic transmission system, air-over-oil circuit, analysis of hydraulic system with frictional losses considered mechanical hydraulic system. Hydraulic conductors and fittings –conductor sizing for flow rate requirements, pressure rating of conductors, steel pipes, steel tubing, plastic tubing, flexible houses, quick disconnect couplings, metric steel tubing. ydraulic circuits-Automatic cylinder reciprocating system, locked cylinder using pilot check valves, cylinder synchronizing circuits, fail-safe circuits, speed control of hydraulic cylinder, speed control of hydraulic motor. Hydraulic circuits-Hydraulic motor braking system, hydrostatic transmission system, air-over-oil circuit, analysis of hydraulic system with frictional losses considered mechanical hydraulic system. Hydraulic conductors and fittings – conductor sizing for flow rate requirements, pressure rating of conductors, steel pipes, steel tubing, plastic tubing, flexible houses, quick disconnect couplings, metric steel tubing.

REFERENCES:

1. Robotics Control, Sensing Vision, and Intelligence, Gonzalezr K S and Lee S G 1987 Mc Graw – Hill Book Company, New Delhi.

2. Tractors and their Power Units, Lijedahl J B, Carleton WM, Turnquist P K and Smith D W 1984. AVI Publishing Co. Inc., Westport, Connecticut.

3. Mechanical Measurements, Thomas GB and Buck N L 1969 Oxford and IBH Publishing Co. Ltd., 66 Janpath, New Delhi.

4. Robot Engineering – An Integrated approach, Klafter R D, Cmielewski T A and Negin M. Prentice – Hall of India, New Delhi.

5. Fluid Power with Applications, Esposoto A. 2003. Pearson Education, Inc., Delhi.

6. Hydraulics and Pneumatics, Parr A. 2005. Jaico Publishing House, Mumbai.

IV Year B.Tech. Ag. Engg II Sem.

PRINCIPLES OF ENTREPRENEURSHIP
(Elective-IV)

Unit I:

Introduction to Entrepreneurship: Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Intrapreneur. The Entrepreneurial decision process. Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs. Opportunities for Entrepreneurs in India and abroad. Woman as Entrepreneur.

Unit II:

Creating and Starting the Venture Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and development process.

Unit III:

The Business Plan Nature and scope of Business plan , Writing Business Plan, Evaluating Business plans, Using and implementing business plans. Marketing plan, financial plan and the organizational plan, Launching formalities.

Unit IV:

Financing and Managing the new venture Sources of capital, Record keeping, recruitment, motivating and leading teams, financial controls . Marketing and sales controls. E-commerce and Entrepreneurship, Internet advertising.

Unit V:

New venture Expansion Strategies and Issues Features and evaluation of joint ventures, acquisitions, merges, franchising. Public issues, rights issues, bonus issues and stock splits.

Unit VI:

Institutional support to Entrepreneurship Role of Directorate of Industries, District Industries, Centres (DICs), Industrial Development Corporation (IDC), State Financial corporation (SFCs), Small Scale Industries Development Corporations (SSIDCs), Khadi and village Industries Commission (KVIC), Technical consultancy Organisation (TCO), Small Industries Service Institute (SISI), National Small Industries Corporation (NSIC), Small Industries Development Bank of India(SIDBI)

Unit VII:

Production and Marketing Management Thrust of production management, Selection of production Techniques, plant utilization and maintenance, Designing the work place, Inventory control, material handling and quality control. Marketing functions, market segmentation, market research and channels of distribution, Sales promotion and product pricing.

Unit VIII:

Labour legislation, Salient Provision under Indian Factories Act, Industrial Disputes Act, Employees State Insurance Act, Workmen's Compensation Act and payment of Bonus Act. This course replaces the course offered in earlier years as 'Entrepreneurship& Management'

TEXT BOOKS:

1. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 5th Edition.
2. Dollinger: Entrepreneurship,4/e, Pearson, 2004.

REFERENCES:

1. Vasant Desal: Dynamics of Entrepreneurial Development and management, Himalaya Publishing House,2004.
2. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.
3. Robert J.Calvin: Entrepreneurial Management, TMH, 2004.
4. Gurmeet Naroola: The Entrepreneurial Connection, TMH, 2001.
5. Bolton & Thompson : Entrepeneurs- Talent, Temperament, Technique, Butterworth Heinemann, 2001.
6. Agarwal :Indian Economy , Wishwa Prakashan 2005.
7. Dutt & Sundaram : Indian Economy. S. Chand, 2005.
8. Srivastava: Industrial Relations & Labour Laws, Vikas, 2005.
9. Aruna Kaulgud: Entrepreneurship Management by. Vikas publishing house, 2003.
10. Thomas W. Zimmerer & Norman M. Scarborough: Essential of Entrepreneurship and small business management, PHI, 4/e, 2005.
11. Mary Coulter: Entrepreneurship in Action, PHI, 2/e, 2005.
12. Kaplan: Patterns of Entrepreneurship, Willey, 2005.
13. ND Kapoor: Industrial Law, Sultan Chand & Sons, 2005.

IV Year B.Tech. Ag. Engg II Sem.

AGRO INDUSTRIES AND BI-PRODUCT UTILIZATION

Objective: Processes to convert low value byproducts from agricultural and food processing industries will be explained in detail to produce economically viable value added products. Knowledge on treatment techniques of waste water from agricultural/food industry and animal sheds for safe disposal will be imparted to the students.

Unit –I

Agro-industries-Definition, classification, factors responsible for establishment. By-products utilization-Rice husk- Introduction, characteristics, uses, production of pure silica and silicon, uses of amorphous silica, grades of silicon, structure of rice husk silica. Burning of rice husk for production of white ash, production of high purity silicon (calcium reduction process). Ceramic materials from rice husk – Classification of ceramics, advantages of rice husk white ash, raw materials for ceramics, production process, merits of process. Rice husk combustion – Furnace design calculation, efficiency of furnace, problems on rice husk combustion, design of inclined grate furnace.

Unit-II:

Rice husk – Alcoholic fermentation – Introduction, processes for manufacture of alcohol, production of ethyl alcohol by SSF process. Rice husk – Furfural – Chemistry, products properties of furfural, synthesis, production of furfural and xylose from corn cobs, furfural through RRL process. Rice bran – Oil extraction, food and chemical products processing. Coconut coir and shell utilization – Introduction. Commercial products – Edible copra, milling copra, oil milling, quality of copra and oil.

Unit –III:

Fresh kernel based products and product diversification – Desiccated coconut, canned coconut cream, coconut water. Coconut toddy production. Coir – Brown fiber milling, manufacture of white fiber. Coconut shell products. Mango stone and peel utilization – Mango vinegar, mango leather, mango flour-Cashew nut-Harvesting, processing. Cashew products – Nuts, testa, apple, cashew nut shell liquid, extraction of CNSL. Banana pseudo stem – Pseudo stem, banana stem candy, banana starch from pseudo stem, banana cheese from peel, banana pectin from peel, banana vinegar from pulp and peel, banana peel as cattle feed.

Unit-IV:

Sugarcane bagasse – Molasses, bagasse, filter mud, sugarcane wax. Paper making from agricultural wastes – paper processing – Manufacture of pulp and paper. Raw materials for paper production, paper board production from agricultural wastes. Feed processing plants – Introduction, feedstuffs from cereals, classification of feeds, specialized feeding requirements, feed manufacturing processes, forms of feed. Equipment for unit operations in feed processing – Liquid feed blenders, flaking, milling, mixing, pelleting and extruding. Formulating feeds, layout of feed mills for commercial production.

sssUnit-V:

Agricultural waste management – Planning waste management systems – System selection, system principles, waste utilization opportunities, waste management alternative systems. Properties of agricultural waste – characteristics of solid and liquid wastes, parameter importance, determination of DO, COD, total organic carbon, BOD. BOD analysis of industrial waste waters, determination of BOD with seed material, problems on BOD. Waste collection, storage and handling – Collection, components of waste collection systems, storage of manures and slurries, factors affecting choice of storage facility. Waste handling and transport, pumping liquid manure, sumps and mixing, mixing and agitation. Industrial waste treatment – Physical treatment of waste – Solid-liquid separation – Settling, problems on solid-liquid separation, screening, drying, incineration, and pyrolysis.

Unit –VII:

Biological treatment – Introduction. Anaerobic decomposition, lagoon systems, anaerobic lagoons, advantages and disadvantages of anaerobic lagoons. Design of anaerobic lagoons, problems on design of anaerobic lagoons, anaerobic lagoon sludge. Aerobic treatment – Introduction, reactions and processes for anaerobic treatment, advantages and disadvantages of anaerobic treatment. Types of aeration systems - Natural aeration - Introduction, planning and design, Mechanical aeration – Film reactors – Tricking filters, rotating biological contactors, problems on tricking filters. Floc reactors – Mechanically aerated lagoons, diffused air systems, Waste for reuse. Briquetting – Introduction, principle, briquetting machines. Processing – Direct compaction, carbonization and extrusion. Establishment of agro processing industries in rural areas, factors affecting for establishing of agro processing plants, cost benefit ratio for agro processing industries, employment generation.

REFERENCES:

Agricultural Waste Manual, Vandersholm D H 1984. New Zealand
Agricultural, Engineering Institute, Lincoln College, Ne**9** PROJECT WORK