SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS) BATCHELOR OF TECHNOLOGY DEPARTMENT OF AGRICULTURAL ENGINEERING CURRICULUM

<u>I YEAR – I SEMESTER</u>

| S No. | COURSE CODE | SUBJECT | | Т | P/ Drg | С |
|------------------------|----------------|--------------------------------------|-------|-------|-----------|---|
| 1 | 16HS601 | Functional English | 3 | - | - | 3 |
| 2 | 16HS602 | Engineering Mathematics-I | 3 | 1 | - | 3 |
| 3 | 16HS603 | Engineering Physics | 3 | 1 | - | 3 |
| 4 | 16CS501 | Computer Programming | 3 | 1 | - | 3 |
| 5 | 16HS606 | Human Values and Professional Ethics | 3 | - | - | 3 |
| 6 | 16HS608 | Engineering Physics Lab | - | - | 4 | 2 |
| 7 | 16CS502 | Computer Programming Lab | - | - | 4 | 2 |
| 8 | 16ME301 | Engineering & IT Workshop Lab | - | - | 4 | 2 |
| Contact Periods / Week | | 15 | 3 | 12 | 21 | |
| | | Tota | l/Wee | ek 30 | 21 | |

I YEAR – II SEMESTER

| S No. | COURSE CODE | SUBJECT | | Т | P/ Drg | С |
|------------------------|----------------|---|---------------|----|-----------|----|
| 1 | 16HS610 | Professional English | 3 | - | - | 3 |
| 2 | 16HS611 | Engineering Mathematics-II | 3 | 1 | - | 3 |
| 3 | 16HS604 | Engineering Chemistry | 3 | 1 | - | 3 |
| 4 | 16ME302 | Engineering Graphics | - | - | 6 | 3 |
| 5 | 16CE101 | Engineering Mechanics | 3 | 1 | - | 3 |
| 6 | 16HS607 | English Language and Communication Skills Lab | - | - | 4 | 2 |
| 7 | 16HS609 | Engineering Chemistry Lab | - | - | 4 | 2 |
| 8 | 16CE102 | Applied Mechanics Lab | - | - | 4 | 2 |
| Contact Periods / Week | | 12 | 3 | 18 | 21 | |
| Contact I enous / week | | | Total/Week 33 | | | 41 |

II YEAR – I SEMESTER

| S No. | COURSE CODE | SUBJECT | | Т | P/ Drg | С |
|------------------------|--|--|----|---|-----------|----|
| 1 | 16HS612 | Engineering Mathematics-III | 3 | 1 | - | 3 |
| 2 | 16AG701 | Engineering Properties of Biological Materials | 3 | 1 | - | 3 |
| 3 | 3 16CE104 Strength of Materials | | | | - | 3 |
| 4 | 16CE112 | Fluid Mechanics & Hydraulic Machinery | 3 | 1 | - | 3 |
| 5 | 5 16EE207 Basic Electrical & Electronics Engineering | | | | - | 3 |
| 6 | 6 16CE155 Soil Science & Mechanics | | | | - | 3 |
| 7 | 16CE158 | Strength of Materials / Soil Mechanics Lab | - | - | 4 | 2 |
| 8 | 16CE116 | Fluid Mechanics & Hydraulic Machinery Lab | - | - | 4 | 2 |
| | | Credit Course | | | | |
| 9 | COE-I | Comprehensive Online Examination-I | - | - | - | 1 |
| | | Audit Course | | | | |
| 10 | 16CS503 | Data Structures Through C | 3 | - | - | |
| | | Contact Periods / Week | 21 | 5 | 8 | 23 |
| Contact Periods / week | | Total/Week 34 | | | 23 | |

<u>II YEAR – II SEMESTER</u>

| S No. | COURSE CODE | SUBJECT | L | Т | P/ Drg | С |
|-------|----------------|---|------|--------|-----------|----|
| 1 | 16HS613 | Probability & Statistics | 3 | 1 | - | 3 |
| 2 | 16AG702 | Principles of Agronomy and Soil Science | 3 | 1 | - | 3 |
| 3 | 16CE156 | Hydrology | 3 | 1 | - | 3 |
| 4 | 16CE105 | Surveying | 3 | 1 | - | 3 |
| 5 | 16ME344 | Theory of Machines | 3 | 1 | - | 3 |
| 6 | 16ME345 | Tractor and Automotive Engines | 3 | 1 | - | 3 |
| 7 | 16CE157 | Surveying Lab | - | - | 4 | 2 |
| 8 | 16AG703 | Agronomy and Soil Science Lab | - | - | 4 | 2 |
| | | Credit Course | | | | |
| 9 | COE-II | Comprehensive Online Examination-II | - | - | - | 1 |
| | | Audit Course | | | | |
| 10 | 16HS614 | Comprehensive Soft Skills | 3 | - | - | |
| | • | Contact Periods / Week | 21 | 6 | 8 | 23 |
| | | | Tota | al/Wee | ek 32 | 43 |

III YEAR – I SEMESTER

| S No. | COURSE CODE | RSE SUBJECT | | | P/ Drg | С |
|-------|---|---|---------------|---|-----------|----|
| 1 | 16AG704 | Agricultural Process Engineering | 3 | 1 | - | 3 |
| 2 | 16AG705 | Soil and Water Conservation Engineering | 3 | - | - | 3 |
| 3 | 3 16AG706 Irrigation and Drainage Engineering | | | | - | 3 |
| 4 | 4 16AG707 Farm Machinery and Equipment-I | | | | - | 3 |
| 5 | 5 16ME307 Engineering Thermodynamics | | | | - | 3 |
| 6 | 6 16AG708 Design of Agricultural Machinery | | | | - | 3 |
| 7 | 7 16AG709 Soil and Water Conservation Engineering Lab | | | | 4 | 2 |
| 8 | 16AG710 | Irrigation and Drainage Engineering Lab | - | - | 4 | 2 |
| | | Credit Course | | | | |
| 9 | COE-III | Comprehensive Online Examination-III | - | - | - | 1 |
| | | Audit Course | | | | |
| 10 | 16HS616 | Aptitude Practice-I | 3 | - | - | |
| | | Contact Periods / Week | 18 | 4 | 8 | 22 |
| | Contact Periods / Week | | Total/Week 30 | | | 43 |

III YEAR – II SEMESTER

| S No. | COURSE CODE | SUBJECT | | Т | P/ Drg | С |
|------------------------|----------------|---|----|---|-----------|----|
| 1 | 16HS605 | Environmental Studies | 3 | - | - | 3 |
| 2 | 16AG711 | Agro Industry and Bi-Product Utilization | 3 | 1 | - | 3 |
| 3 | 16AG712 | Farm Machinery and Renewable Energy Resources | 3 | - | - | 3 |
| 4 | 16ME343 | Heat and Mass Transfer | 3 | 1 | - | 3 |
| 5 | 16AG713 | Tractor Systems and Control | 3 | 1 | - | 3 |
| 6 | 16AG714 | Farm Machinery and Renewable Energy Resources Lab | - | - | 4 | 2 |
| 7 | 16AG715 | Workshop Technology Lab | - | - | 4 | 2 |
| 8 | 16ME331 | Computer Aided Engineering Lab | - | - | 4 | 2 |
| | | Credit Course | | | | |
| 9 | COE-IV | Comprehensive Online Examination-IV | - | - | - | 1 |
| Audit Course | | | | | | |
| 10 | 16HS617 | Aptitude Practice-II | 3 | - | - | |
| Contact Periods / Week | | Contact Periods / Week | 18 | 3 | 12 | 22 |
| | | Total/Week 33 | | | | |

IV YEAR – I SEMESTER

| S No. | COURSE | SUBJECT | T. | т | P / | С |
|---------------|----------|---|-----|--------|------------|----|
| 0110 | CODE | | | T | Drg | U |
| 1 | 16MB750 | Managerial Economics and Financial Analysis | 3 | - | - | 3 |
| 2 | 16AG716 | Dairy and Food Engineering | 3 | 1 | - | 3 |
| 3 | 16AG717 | Greenhouse Technology | 3 | 1 | - | 3 |
| 4 | 16ME325 | Refrigeration and Air Conditioning | 3 | 1 | - | 3 |
| | | DEPARTMENT ELECTIVE-I | | | | |
| 5 | 16AG718 | Micro Irrigation Engineering | | | | |
| 5 | 16AG719 | Tractor Design and Testing | 3 | 1 | - | 3 |
| | 16AG721 | Remote Sensing and GIS Application | | | | |
| OPEN ELECTIVE | | | | | | |
| | 16CE145 | Elements of Road Traffic Safety | | | | |
| | 16EE239 | Neural Networks & Fuzzy Logic | | | | 3 |
| 6 | 16EC443 | Mat lab Programming | 3 | 3 - | - | |
| | 16CS511 | Data Base Management Systems | 5 | | | 3 |
| | 16MB732 | Intellectual property Rights | | | | |
| | 16ME313 | Non-Conventional Energy Resources | | | | |
| 7 | 16ME317 | Thermal Engineering Lab | - | - | 4 | 2 |
| 8 | 164 G720 | Field Operation and Maintenance of Tractors and | _ | _ | Λ | 2 |
| 0 | 10A0720 | Farm Machinery Lab | - | - | + | 2 |
| | | | 18 | 4 | 8 | |
| | | Contact Periods / Week | Tot | al/Wee | ek 30 | 22 |

IV YEAR – II SEMESTER

| S No | COURSE | SUBIFCT | | т | P / | C |
|-------------------------|------------------------|---|--------|-------|------------|----|
| 5 110. | CODE | SUBJECT | L | 1 | Drg | C |
| 1 | 16MB751 | Entrepreneurship Development | 3 | - | - | 3 |
| | | DEPARTMENT ELECTIVE-II | | | | |
| | 16AG722 | Food Processing Plant Design and Layout | 2 | 1 | - | 2 |
| 2 | 16AG726 | Information Technology for Land and Water Management | 2 | 1 | - | 2 |
| | 16AG727 | Design of Agricultural Machinery | 2 | 1 | - | 2 |
| DEPARTMENT ELECTIVE-III | | | | | | |
| | 16AG723 | Ground Water Hydrology-Wells and Pumps | | | | |
| 3 | 16AG724 | Operations Research | 3 | 1 | | 3 |
| | 16AG725 | Water Resources Systems Planning & | 5 | 1 | - | 5 |
| | | Management | | | | |
| | | MOOCS | | | | |
| 1 | | MOOC courses-offered by | | | | |
| 4 | MOOCS | SWAYAM/NPTEL/NISTE-suggested by the | 3 | 1 | - | 3 |
| | | department (online courses) | | | | |
| 5 | 16AG728 | 16AG728 Seminar | | - | 4 | 2 |
| 6 | 6 16AG729 Project Work | | - | - | 20 | 10 |
| | | Contact Periods / Week | 11 | 3 | 24 | 23 |
| Contact Periods / Week | | Tota | al/Wee | ek 38 | 23 | |

* L – Lecture Hours, T – Tutorial, P – Practical, Drg – Drawing, C – Credit.

Total Credits:

| Year | 1 st y | vear | 2 nd ye | ear | 3 rd y | ear | 4 th ye | ear | Total |
|----------|-------------------|--------|--------------------|--------|-------------------|--------|--------------------|--------|-------|
| Semester | I sem | II sem | I sem | II sem | I sem | II sem | I sem | II sem | |
| Credits | 21 | 21 | 23 | 23 | 23 | 22 | 22 | 23 | 178 |

B. Tech I Year I Semester

L T P C 3 0 0 3

(16HS601) FUNCTIONAL ENGLISH

Course Educational Objectives:

• English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, and advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere.

Course Outcomes:

Students undergoing this course are able to

- Use LSRW skills through the prescribed text and develop their ability to communicate effectively.
- Articulate well among themselves and with Faculty.
- Construct compound sentences using common conjunctions.

UNIT I:

Text: Pollution- Green Cover- Solution to Plastic Pollution.

- 1. Present, Past and Future
- 2. Introducing oneself
- 3. Brainstorming

Grammar – Parts of speech-Kinds of sentences-Tenses Vocabulary – Synonyms& Antonyms-Affixes – Phrasal verbs Listening & Reading Activities Writing – Paragraph Writing-Note taking &making Phonetics- Syllabification

UNIT II:

Text: Solar Thermal Power- Nano Technology

- 1. Learning through enjoyment
- 2. Set in the Past

3. Inter-personal skills

Grammar – Articles – Past Events – Voice & Impersonal passive voice – Gerund & ing forms – To-infinitives - Vocabulary- Phrases – Idioms – word roots -Listening & Reading Activities-Writing – Letter writing-In formal-Formal Phonetics – Accent.

UNIT III:

Text: Child Labor-Remedies- E- Waste

- 1. Learning through enjoyment
- 2. Describing a person, place and object
- 3. Possibilities

Grammar – Modals – Conditionals – Framing Questions – Compound nouns - Verbs Vocabulary- One word substitute– Fixed expressions– Clauses, Listening & Reading Activities, Writing – Information transfer, Intonation-Falling & Rising

UNIT IV:

Text: Hubble Telescope- Genesis of ISRO

- 1. Learning through enjoyment
- 2. Analytical thinking
- 3. Communal learning

Grammar- Concord-Reported speech-compare & contrast

Vocabulary-Numerical expressions-definitions-collocations

Listening & Reading

Writing-Summary-Essay writing-Making instructions JAM

UNIT V:

Text: History of Media- Power of Media- Interviews.

- 1. Learning through enjoyment
- 2. Exploring creative ideas
- 3. Synthesis of sentences

Grammar- Simple, compound and complex-Spotting errors

- Vocabulary-Discourse Markers-Homonyms-Homophones-Homographs
- Listening & Reading Activities

Writing-Writing recommendations-scrambled sentences-

Convincing others

TEXT BOOK:

1. "Mindscapes: English for Technologists and Engineers", Orient Black Swan, 2014.

2. -Adrian Doff and Christopher Jones, Language in use", Classroom Book (Upper -

Intermediate), Cambridge University Press, 2000.

REFERENCES:

- 1. "*Raymond Murphy's Intermediate English Grammar with CD*", Raymond Murphy, Cambridge University Press, 2012.
- 2. "Communication Skills", Sanjay Kumar & Pushpalatha, Oxford University Press, 2012.
- 3. "Writing Tutor. Advanced English Learners", Dictionary, 9th Edition, Oxford University Press, 2015.
- 4. "Powerful Vocabulary Builder", Anjana Agarwal, New Age International Publishers, 2011.
- 5. "Keep Talking", F. Klippel, Cambridge University Press, 2013.
- 6. "Listening Extra", Miles Craven, Cambridge University Press, 2008.

Mode of Evaluation: Written Examination, Day-to-day Assessment

B. Tech I Year I Semester

L T P C 3 1 0 3

(16HS602) ENGINEERING MATHEMATICS-I

(Common to all Branches)

Course Objectives:

- To train the students thoroughly in Mathematical concepts of ordinary differential equations, multiple integrals, Laplace Transforms and their applications
- To prepare students for lifelong learning and successful careers using mathematical concepts of ordinary differential equations, multiple integrals, Laplace Transforms and their applications
- To develop the skill pertinent to the practice of the mathematical concepts including the student abilities to formulate and modeling the problems, to think creatively and to synthesize information

Course Outcomes:

- The students become familiar with the application of ordinary differential equations, multiple integrals, Laplace Transforms and their applications
- The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems with engineering applications

UNIT – I

Differential Equations: Exact and Non-exact (Integrating factors), Linear and Bernoulli differential equations, Applications to first order equations: Orthogonal Trajectories, Newton's Law of Cooling, Natural Law of Growth and Decay. Linear Differential Equations of second and higher order with constant coefficients. Method of variation of parameters. Applications of linear differential equations- Simple electric circuits.

UNIT – II

Taylor's and Maclaurin's Series, Functions of several variables, Jacobian, Maxima and Minima of functions of two variables, Lagrange's method of undetermined Multipliers with three variables only. Radius of curvature.

$\mathbf{UNIT} - \mathbf{III}$

Multiple Integrals: Evaluation of Double and Triple integrals, Change of order of integration, Change of variables. Simple applications to areas.

UNIT – IV

Laplace transform I: Laplace transforms of standard functions, first shifting Theorem, transforms of derivatives and integrals, Unit step function, second shifting theorem, Laplace transforms of Periodic functions.

UNIT-V

Laplace transform II: Inverse Laplace Transforms, Convolution theorem, Application of Laplace transforms to ordinary differential equations of first and second order.

TEXT BOOKS:

- 1. *Higher Engineering Mathematics*, B.S. Grewal, Khanna publishers-42nd Edition, 2012.
- 2. *"Engineering Mathematics Volume-I",* by T.K.V. Iyengar, S. Chand publication-12thEdition, 2015.

REFERENCES:

- 1. *Engineering Mathematics, Volume -* I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher 1st Edition, 2010.
- 2. Engineering Mathematics, Volume I, by G.S.S. Raju, CENGAGE publisher, 2013.
- 3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India-10th Edition, 2012.
- 4. Higher Engineering Mathematics, by B.V. Ramana, Mc Graw Hill publishers, 2008.
- 5. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier-1st Edition, 2001.

B.Tech I Year I Semester

L T P C 3 1 0 3

(16HS603) ENGINEERING PHYSICS

(Common to CIVIL, AG, EEE & ME)

COURSE OBJECTIVES:

- To evoke interest on applications of superposition effects like interference & diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric wave guides along with engineering applications.
- To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays & non-destructive evaluation using ultrasonic techniques.
- To get an insight into the microscopic meaning of conductivity, classical & quantum free electron model & evaluation of band theory to distinguish materials & to understand electron transport mechanism in solids.
- To open new avenues of knowledge & understanding semiconductor based electronic devices, basic concepts and applications of semiconductors & magnetic materials have been introduced which find potential in the emerging micro device applications.
- To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them & their fascinating applications. Considering the significance of microminiaturization of electronic devices & significance of low dimensional materials, the basic concepts of nanomaterial's, their synthesis, properties & applications in emerging technologies are elicited.

COURSE OUTCOMES:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fiber optics.
- The important properties of crystals like the presence of long range order and periodicity, structure determination using X-ray diffraction are focused with defects in crystals & ultrasonic nondestructive techniques.
- The discrepancies between the classical estimates & laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
- The properties and device applications of semiconducting & magnetic materials are illustrated.
- *The importance of superconducting materials and nanomaterial's along with their engineering applications are well elucidated.*

UNIT - I

PHYSICAL OPTICS, LASERS AND FIBRE OPTICS:

Physical Optics: Interference -Introduction - Interference in thin films by reflection – Newton's Rings. Diffraction - Introduction- Fraunhofer diffraction due to single slit and diffraction grating.

Lasers: Introduction - Characteristics of laser – Spontaneous and stimulated emission of radiation –-Einstein's relation, Population inversion – Excitation mechanism & optical resonator – ND: YAG laser - He-Ne laser, semiconductor diode laser - Applications of lasers.

Fiber Optics: Introduction– Construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in fibers - Optical fiber communication system – Applications of optical fibers in communications, sensors and medicine.

UNIT - II

CRYSTALLOGRAPHY, ACOUSTICS AND ULTROSONICS:

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC-Directions and planes in crystals – Miller indices – Inter planar spacing in cubic crystals – X-ray diffraction - Bragg's law.

Acoustics: Intensity – Absorption coefficient and its determination –Reverberation – Reverberation time (qualitative treatment) – Factors affecting acoustics of buildings and their remedies.

Ultrasonic: Introduction – Production of ultrasonic by piezoelectric method – Properties and detection – Applications in non-destructive testing.

UNIT - III

QUANTUM MECHANICS AND FREE ELECTRON THEORY:

Quantum Mechanics: Introduction to matter waves – de 'Broglie hypothesis - Heisenberg's uncertainty principle and its applications - *Schrödinger*'s time independent and time dependent wave equation – Significance of wave function - Particle in a one dimensional infinite potential well.

Free Electron theory: Classical free electron theory - Equation for electrical conductivity - Quantum free electron theory - Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT-IV

SEMICONDUCTORS AND MAGNETIC MATERIALS:

Semiconductor Physics: Introduction – Intrinsic and extrinsic semiconductors (qualitative treatment), Drift & diffusion currents - Einstein's relation– Hall effect Direct & indirect band gap semiconductors.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis - Soft and hard magnetic materials and applications

[R16-B.Tech]

UNIT -V

SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS:

Superconductivity: Introduction – Meissner effect - Properties of superconductors- Type I and Type II superconductors- ac and dc Josephson effects BCS theory (qualitative) –Applications of superconductors.

Physics of Nanomaterials: Introduction - Significance of nanoscale - Surface area and quantum confinement –Synthesis of nanomaterials: ball mill, chemical vapour deposition, solgel, plasma arcing –applications of nano materials

TEXT BOOKS:

- 1. *Engineering Physics* K. Thyagarajan, 5th Edition, MacGraw Hill Publishers, New Delhi, 2014.
- 2. Engineering Physics Gaur R.K. and Gupta S.L. Dhanpat Rai Publishers, 2009.

REFERENCES:

- 1. Engineering Physics Mani Naidu S., Pearson Publications, 2011.
- 2. Engineering Physics Arumugam K.-PHI Learning Pvt., India, 2009.
- 3. Engineering Physics Palanisamy P.K, SCITECH Publications, 2011.
- 4. Engineering Physics Rajagopal K. PHI, New Delhi, 2011.
- 5. *Engineering Physics* Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10th Edition, S.Chand and Company, New Delhi, 2014.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUT' UI

(AUTONOMOUS)

B.Tech I Year I Semester

| L | Т | Р | С |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

(16CS501) COMPUTER PROGRAMMING

(Common to All Branches)

Course Objective:

- To understand the core aspects of computer problem solving techniques.
- To understand the programming language constructs.
- To understand the programming paradigms.

Course Outcome:

- *Able to design the flowchart and algorithm for real world problems.*
- Able to learn and understand new programming languages.
- Able to construct modular and readable programs.
- Able to write C programs for real world problems using simple and compound data types.

UNIT-I

Overview of Computers and Programming - Electronic Computers Then and Now – Computer Hardware - Computer Software - Algorithms - Flowcharts - Software Development Method -Applying the Software Development Method. C Language Elements- Variable Declarations & Data Types Executable Statements – General form of a C Program- Expressions - Precedence and Associativity- Operators and Expression – Type Conversions

UNIT-II

Decision Statements – If Statement, If-else Statement, Nested- If-else Statement, Else if Ladder, Switch case – break – continue – go to Statements – Example Programs Loop Control Statements – for loop – while loop - do while – Example Programs

UNIT-III

Arrays: Declaring and referencing Arrays – Array Subscripts, Using for loops for sequential access – Using Array elements as Function arguments – Array arguments – Multidimensional Arrays – Example Programs

Strings: Introduction – Declaring and Initializing String variables – Reading Strings from Terminals – Writing Strings to Screen – Arithmetic Operations on Characters – Putting Strings together – Comparison of two Strings – String Handling Functions – Table of Strings- Other Features of Strings.

UNIT-IV

Functions: Definition – Function without Arguments – Functions with input arguments – Functions with simple output parameters – Communication among Functions – Scope – Storage clauses – Type Qualifiers – Recursion

Pointers: Introduction – Understanding Pointers – Accessing the address of a variable – Declaring Pointers variables- Initialization of Pointer variables – Accessing a variable through its Pointer – Chain of Pointers – Pointer Expressions – Pointer Increment & Scale Factors – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments. - Function returning Pointers – Pointers to Function.

UNIT-V

Structures: Introduction – Defining a Structure – Declaring Structure Variables – Accessing Structure Members – Structure Initialization – Copying and Comparing Structure variables – Operations on Individual members – Arrays of Structures – Arrays with in Structures – Structures with in Structures – Structures and Functions – Unions –Bit fields – TYPEDEF – ENUM

File Management in C: Introduction – Types of Files – Defining and Opening a File – Closing a File – Input / Output Operations on Files – Error handling during I/O Operations – Random access to files – Command line arguments. Preprocessor - #define and #include.

Text Books:

- ¹ "Programming in C and Data Structures –, Jeri R. Hanly, Elliot B Koffman, Ashok Kamthane, An Anand Rao Pearson. (UNITS I, II and III)
- 2 "Programming in C and Data Structures", E Balagurusamy McGrawHill

References:

- "Computer Fundamentals and C Programming", Dr. P. Chenna Reddy, ISBN: 9789351045885, Publisher: Pothi.com
- 2. *"Programming in C, Second Edition ",* Pradip Dey, Manas Ghosh, Oxford University Press.
- 3. "C from Theory to Practice", George S. Tselikis- Nikolaos D. Tselikas- CRC Press.
- 4. "Programming with C", R S Bichkar- University Press.
- 5. *"Programming in C and Data Structures"*, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education. (UNIT-I)

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUT' UI(AUTONOMOUS)LTPCB.Tech I Year I Semester3003

(16HS606) HUMAN VALUES AND PROFESSIONAL ETHICS

Course Educational Objectives:

• To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

Course Outcomes:

Students undergoing this course are able to

• Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

UNIT I

Human Values - Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II

Engineering Ethics - Senses of _Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III

Engineering as Social Experimentation - Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV

Safety, Responsibilities and Rights- Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk

Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V

Global Issues-Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility • Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

TEXTBOOKS:

- 1. Mike W. Martin and Roland Schinzinger, -Ethics in Engineering||, Tata McGraw Hill, New Delhi, 2003.
- 2 Govindarajan M, Natarajan S, Senthil Kumar V. S, -Engineering Ethics^{II}, Prentice Hall of India, New Delhi, 2004.

REFERENCES:

- 1 Charles B. Fleddermann, -Engineering Ethics^{II}, Pearson Prentice Hall, New Jersey, 2004.
- ² Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, -Engineering Ethics Concepts and Cases^{II}, Cengage Learning, 2009.
- John R Boatright, -Ethics and the Conduct of Business^{II}, Pearson Education, New Delhi, 2003.
- 4 Edmund G Seebauer and Robert L Barry, -Fundametals of Ethics for Scientists and Engineers^{II}, Oxford University Press, Oxford, 2001.

B. Tech I Year I Semester

L T P C 0 0 4 2

(16HS608) ENGINEERING PHYSICS LAB

(Common to CIVIL, EEE & ME)

Course Objectives:

- Will recognize the important of optical phenomenon like interference and diffraction.
- Will understand the role of optical fibre parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and Hall-Effect in a semiconductor.
- Will understand the application of B-H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms lattice constant.
- Will recognize the application of laser in finding the particle size and its role in diffraction studies.
- Will learn to synthesis of the nanomaterials and recognize its importance by knowing its nano particle size and its impact on its properties.

Outcomes:

- Would recognize the importance of optical phenomenon like interference and diffraction.
- Would have acquired the practical application knowledge of optical fibre, semiconductor, dielectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.
- Would recognize the significant importance of nanomaterials in various engineering fields.

Any 10 of the following experiments has to be performed during the I year I semester

- 1. Determination of radius of curvature of a Plano-convex lens by forming Newton's rings.
- 2. Determination of wavelength of given source using diffraction grating in normal incidence method.
- 3. Determination of Numerical aperture, acceptance angle of an optical fiber.
- 4. Determination of the Energy gap of a Semiconductor diode.
- 5. Hall-Effect Determination of mobility of charge carriers.
- 6. B-H curve Determination of hysteresis loss for a given magnetic material.
- 7. Determination of Crystallite size using X-ray pattern (Powder) using Debye- Scheerer method.
- 8. Determination of particle size by using laser source.
- 9. Determination of dispersive power of a prism.
- 10. Determination of thickness of the thin wire using wedge Method.
- 11. Laser: Diffraction due to single slit
- 12. Laser: Diffraction due to double slit
- 13. Laser: Determination of wavelength using diffraction grating
- 14. Magnetic field along the axis of a current carrying coil Stewart and Gee's method.

15. Synthesis of nano material by any suitable method.

References:

- 1. Engineering Physics Practicals NU Age Publishing House, Hyderabad.
- 2. Engineering Practical Physics Cengage Learning, Delhi.

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B. Tech I Year I Semester

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(16CS502) COMPUTER PROGRAMMING LAB

Common to All Branches

Course Objective:

- To make the student learn C Programming language.
- To make the student solve problems, implement those using C & C++ programming languages.
- To strengthen the ability to identify and apply the suitable data structure for the given real-world problem.

Course Outcome:

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

- Apply problem solving techniques of C to find solution.
- Use C language features effectively to implement solutions.
- Use C++ language features effectively to solve problems.
- Identify and develop apt searching and sorting technique for a given problem.
- *Identity, design and develop the appropriate data structure for a given problem or application.*

List of Experiments/Tasks

- 1. Practice DOS and LINUX Commands necessary for design of C Programs.
- 2. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, to read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
- 3. Write a program to find the roots of a Quadratic equation.
- 4. Write a program to compute the factorial of a given number.
- 5. Write a program to check whether the number is prime or not.
- 6. Write a program to find the series of prime numbers in the given range.
- 7. Write a program to generate Fibonacci numbers in the given range.
- 8. Write a program to find the maximum and minimum of a set of numbers.
- 9. Write a program to reverse the digits of a number.
- 10. Write a program to find the sum of the digits of a number.
- 11. Write a program to find the sum of positive and negative numbers in a given set of numbers.
- 12. Write a program to check for number palindrome.
- 13. Write a program to evaluate the sum of the following series up to n terms

$e^{x} = 1 + x + x^{2/2!} + x^{3/3!} + x^{4/4!} + \dots$

- 14. Write a program to generate Pascal Triangle.
- 15. Write a program to read two matrices and print their sum and product in the matrix form.
- 16. Write a program to read matrix and perform the following operations.
 - i. Find the sum of Diagonal Elements of a matrix.
 - ii. Print Transpose of a matrix.
 - iii. Print sum of even and odd numbers in a given matrix.

- 17. Write a program to accept a line of characters and print the number of Vowels, Consonants, blank spaces, digits and special characters.
- 18. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
- 19. Write a program to split a "file" in to two files, say file1 and file2. Read lines into the file from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
- 20. Write a program to merge two files.
- 21. Write a program to read a set of strings and sort them in alphabetical order.
- 22. Write a program to read two strings and perform the following operations without using Built in string Library functions and by using your own implementations of functions.
 - i. String length determination ii. Compare Two Strings
 - ii. Concatenate them, if they are not equal iv. String reversing
- 23. Write programs using recursion for finding Factorial of a number, GCD, LCM, and solving Towers of Hanoi problem.
- 24. Write a program to exchange two numbers using pointers.
- 25. Write a program to read student records into a file. Record consists of roll no, name and Marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
- 26. A file consists of information about employee salary with fields employee id, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employee id, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions are user specified. Compute the Gross and Net salary of the employee and update the file.
- 27. Write a program to perform Base (decimal, octal, hexadecimal,) conversions.
- 28. Write a program to find the square root of a number without using built-in library function.
- 29. Write C program to convert a string to number.

30. Write C program to generate multiplication tables from 11 to 20.

References:

- 1 -How to Solve it by Computer^{||}, R.G. Dromey, Pearson.
- 2 -The C Programming Language II, Brian W. Kernighan, Dennis M. Ritchie, Pearson.
- 3. -Let us C, Yeswant Kanetkar, BPB publications
- 4 -Pointers in $C\parallel$, Yeswant Kanetkar, BPB publications.
- 5. *–Programming in C and Data Structures*", J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education.

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(16ME301) ENGINEERING & IT WORK SHOP LAB

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Course Educational Objectives:

ENGINEERING WORKSHOP:

The course provides hands-on training in the trades of Carpentry, Fitting, House-• wiring, Tin Smithy, and Foundry. Overview of metal cutting processes, plumbing and welding is provided through live demonstrations.

IT WORKSHOP:

This course deals with practice sessions on PC hardware, Internet, World Wide • Web, MS-Word, Excel, Power Point and Publisher. Demonstrations on installations of system software such as MS-Windows, Linux and device drivers, hardware and software troubleshooting, and protecting the personal computer from viruses and other cyber-attacks are include.

Course Outcomes:

ENGINEERING WORKSHOP:

After completion of this course, a successful student will be able to:

- Utilize workshop tools for engineering practice.
- *Employ skills for the production a component for real time applications.*
- Appreciate the hard work and intuitive knowledge of the manual workers.

IT WORKSHOP:

After completion of this course, a successful student will be able to:

- Can install the software's in the computers.
- Utilize skills for the development of application software.
- Can protect personal computer from virus and other cyber-attacks.

LIST OF EXPERIMENTS

1. TRADES FOR EXERCISES:

- **a.Carpentry shop**: Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, Cross lap joint, Mortise and tenon T joint, Bridle T joint from soft wood stock.
- **b.** Fitting shop: Two joints (exercises) from: Square joint, v joint, half round joint or Dove tail joint out of 100 x 50 x 5 mm M.S. stock.
- c.Sheet metal shop: Two jobs (exercises) from: Tray, Cylinder, Hopper or Funnel from out of 22 or 20 gauge G.I. sheet.
- **d.** House-wiring: Two jobs (exercises) from: Wiring for ceiling rose and two lamps (bulbs) with independent switch, two way switch, controls with or without looping, wiring for stair case lamp, wiring for water pump with single phase starter.

- e. Foundry: Preparation of two moulds (exercises): for a single pattern and a double pattern.
- **f. Welding**: Preparation of two welds (exercises): Single V butt joint, Lap joint, Double V butt joint or T fillet joint.

2. TRADES FOR DEMONSTRATION:

- a. Plumbing
- b. Machine Shop
- c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, first aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

References:

- 1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
- 2. Work shop Manual, P. Kannaiah & K.L. Narayana, SciTech Publishers, 2004.
- 3. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House, 1999.

IT WORKSHOP

LIST OF EXPERIMENTS

1. Preparing your Computer Knowledge (5 weeks)

- **2.Learn about Computer**: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.
- **3.Assembling a Computer:** Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and troubleshooting a computer.
- **4.Install Operating system:** Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.
- **5.Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.
- 6 Networking and Internet (4 weeks)
- **61** Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented.

62 Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

7.Antivirus: Students should download freely available Antivirus software, install it and use into check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

8. Productivity tools (6 weeks)

- **8.1 Word Processor:** Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, inserting header and Footer, changing the font, changing the color, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.
- **8.2 Spreadsheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.
- **8.3 Presentations: creating**, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

References:

- 1. Introduction to Computers, Peter Norton, Mc Graw Hill, 6th Edition, 2008.
- 2. *MOS study guide for word, Excel, PowerPoint & Outlook Exams*, Joan Lambert, Joyce Cox, PHI, 2010.
- 3. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education, 2012.
- 4. Networking your computers and devices, Rusen, PHI, 2011.
- 5. *Trouble shooting, Maintaining & Repairing PCs*, Bigelows, TMH,5th Edition, 2001.

B.Tech I Year II Semester

(16HS610) PROFESSIONAL ENGLISH

Course Educational Objectives:

- To develop communication skills for the students.
- To construct proficiency in academic and social purpose to improve their grammatical accuracy.

Course Outcomes:

Students undergoing this course are able to

- Use LSRW skills through the prescribed text and develop their ability to communicate effectively.
- Articulate well among themselves and with Faculty.

UNIT I

Text: Importance of History- Lessons From the past.

- 1. Technical Vocabulary-Extended definitions
- 2. Oral presentation
- 3. Effective writing

Grammar - Relative Clauses-Adjectives

Vocabulary - Sequencing words

Listening & Reading Activities

Writing - Analytical paragraph writing, Minutes of meeting

UNIT II

Text: Nuclear Energy- Alternative Sources.

- 1. Extract from Literature
- 2. Preparing and presenting slides, Telephone etiquettes
- 3. Making drafts

Grammar – Adverbs-cause and effect expressions

Vocabulary- prepositions-phrasal verbs for written communication

Listening & Reading Activities

Writing – Report writing

UNIT III

Text: Challenger Disaster-Protection from Natural Calamities .

- 1. Learning from Literature
- 2. Poster presentation, Debate
- 3. Technical drafting

Grammar –Using connectives-Gap filling exercise using appropriate tense form Vocabulary- Acronyms & Abbreviations Listening & Reading Activities

Writing –Writing projects

UNIT IV

Text: Tourism- AtithiDevoBhava- Tourism in India.

- 1. Learning from Literature
- 2. Group Discussion
- 3. Reading comprehension
 - Grammar- Structure indicating purpose-Subject-verb agreement
 - Vocabulary-emoticons-cloze test
 - Listening & Reading
 - Writing-Intensive and extensive reading

UNIT V

Text: SWOT Analysis- Preparing for Interviews.

- 1. Learning from Literature
- 2. Interview etiquettes
- 3. Job application

Grammar- Spotting errors, Gap filling exercises using -gerunds & present participle forms Vocabulary-verbal ability

Listening & Reading Activities

Writing- Covering letter, Resume, Curriculum vitae

Convincing others

Text Books:

1. English for Technologists and Engineers, MINDSCAPES Orient Blackswan, 2014

REFERENCES:

- 1. Effective Tech Communication, Rizvi, Tata McGraw-Hill Education, 2007.
- 2. Technical Communication, Meenakshi Raman, Oxford University Press.
- 3. English Conversations Practice, Grant Taylor, Tata McGrawHill publications, 2013.
- 4. Practical English Grammar. Thomson and Martinet, OUP, 2010.

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUT U. (AUTONOMOUS) L T P

B.Tech I Year II Semester

(16HS611) ENGINEERING MATHEMATICS-II

(Common to all Branches)

Course Objectives:

- To train the students thoroughly in Mathematical concepts of Matrices, Vector calculus, Fourier series, Fourier transforms and Partial differential equations
- To prepare students for lifelong learning and successful careers using mathematical concepts of Matrices, Vector calculus, Fourier series, Fourier transforms and Partial differential equations.
- To develop the skill pertinent to the practice of the mathematical concepts including the student abilities to formulate and modeling the problems, to think creatively and to synthesize information.

Course Outcomes:

- The students become familiar with the application of Matrices, Vector calculus, Fourier series, Fourier transforms and Partial differential equations.
- The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems with engineering applications.

UNIT - I

Matrices: Rank of a matrix, Echelon form, Normal form, Consistency of system of linear equations (Homogenous and Non-homogeneous), Eigen values, Eigen vectors, Cayley Hamilton theorem (Only statement) and its applications. Quadratic forms, Diagonalization.

UNIT – II

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties, Line, Surface and Volume integrals, Green's, Stoke's and Gauss divergence theorems (Only statement) and its applications.

UNIT – III

Fourier Series: Determination of Fourier coefficients- Fourier series- Even and odd functions, Fourier series in an arbitrary interval, Periodic function, Half range sine and cosine series, Harmonic analysis.

$\mathbf{UNIT} - \mathbf{IV}$

Fourier integral theorem (only statement), Fourier sine and cosine integrals. Fourier transform, Fourier sine and cosine transforms, properties, Inverse transforms, Finite Fourier transforms.

UNIT-V

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, Method of separation of variables, Solution of one dimensional wave equation, Heat equation and two-dimensional Laplace equation under initial and boundary conditions.

Text Books:

- 1. *Higher Engineering Mathematics*, B.S.Grewal, Khanna publishers, 42nd Edition, 2012.
- 2. Engineering Mathematics Volume-I, by T.K.V. Iyengar, S. Chand publication, 2015.
- 3. Mathematical Methods by T.K.V. Iyengar, S. Chand publication, 2015.

Reference Books:

- 1. *Engineering Mathematics*, Volume I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher 1st Edition (2010)
- 2. *Fourier Series and Integral Transforms*, by S.Sreenadh & S. Ranganatham, S.Chand Publication (2014)
- 3. Engineering Mathematics, Volume I, by G.S.S. Raju, CENGAGE publisher. (2013)
- Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India-10th Edition (2012)
- 5. *Advanced Engineering Mathematics*, by Erwin Kreyszig, Wiley India-10th Edition (2012)
- 6. *Higher Engineering Mathematics*, by B.V. Ramana, Mc Graw Hill publishers (2008)
- 7. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier-1st Edition (2001)

B.Tech I Year II Semester

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(16HS604) ENGINEERING CHEMISTRY (Common to CIVIL, AG, EEE & ME)

Course Objectives:

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand the concepts of chemistry and apply to various materials for engineering applications.

Course Outcomes:

The student is expected to:

- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.
- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Understand characteristics and applications of fuels and Lubricants.

UNIT – I

ELECTROCHEMISTRY, CELL & CORROSION:

Electrolytes- Strong and Weak electrolytes- Definition- examples. Electrolysis- Industrial applications of electrolysis. Cell- Galvanic cell, Batteries- Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries), Fuels cells - (Hydrogen-Oxygen and Methanol-Oxygen).

Corrosion- Introduction, type of corrosion (Concentration cell corrosion, Galvanic corrosion), Chemical (Dry) and Electrochemical (Wet) Theory of corrosion, Galvanic series, factors affecting the corrosion (Metal and environment) Prevention- Cathodic protection (Sacrificial anode and impressed current), electroplating (Copper, nickel and chromium) and electroless plating (Copper and nickel).

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UNIT – II

WATER AND ITS TREATMENT:

Hardness of water and its Units, Estimation of hardness by EDTA method.

Troubles of Boilers: Scale & Sludge, Priming and Foaming, and Boiler Corrosion. Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment. **External Treatment:** Ion-Exchange and Permutit processes.

$\mathbf{UNIT} - \mathbf{III}$

FUEL TECHNOLOGY AND LUBRICANTS:

Fuel Technology- Introduction, classification, characteristics of a good fuel, calorific value, liquid fuels, petroleum, refining of petroleum, knocking, octane number, cetane number, power alcohol, synthetic petrol, gaseous fuels, important gaseous fuels.

Lubricants- Definition, functions of lubricants, mechanism of lubrication, properties of lubricants –viscosity, flash and fire points, cloud and pour points, aniline points, neutralization number and mechanical strength.

UNIT – IV

POLYMERS

Introduction- Basic concepts of polymerization, types of polymerization (Chain Growth – Addition, step growth (Condensation), Mechanism: Cationic, anionic, free radical and coordination covalent.

Plastomers- Thermosetting and thermoplastics, preparation, properties and engineering applications of PVC, Teflon, Bakelite and nylons.

Elastomers-Natural rubber, processing of natural rubbers, compounding of rubber.

Synthetic rubber- Preparation, properties and engineering applications of Buna-S, Buna-N, polyurethane, polysulfide (Thiokol) rubbers.

Conducting polymers- mechanism, synthesis and applications of polyacetylene, polyaniline. Inorganic polymers: Basic introduction, silicones, polyphospazines applications.

UNIT –V:

ENGINEERING MATERIALS:

Cement- composition of Portland cement, preparation (dry and wet process) setting and hardening of cement.

Refractories- introduction, classification, properties and applications.

Nanomaterials- Introduction-Carbon Nano Tubes, Fullerenes. Semiconductors, superconductors and quantum dots.

Text Books

- 1. *Engineering Chemistry*, First Edition, Jayaveera KN, Subba Reddy GV and Ramachandraiah C, McGraw Hill Higher Education, New Delhi, 2013.
- 2. *A Text Book of Engineering Chemistry*, 15th Edition, Jain and Jain, Dhanapathi Rai Publications, New Delhi, 2013.

References:

1. *A Text book of Engineering Chemistry*, 12th Edition, SS Dhara, Uma, S. Chand Publications, New Delhi, 2010.

- 2. *Engineering Chemistry*, First edition, Chandra Sekhar K B, Das U N and Sujatha Mishra, SCITECH Publications India Pvt. Limited, 2010.
- 3. *Engineering Chemistry*, First edition, Seshamaheswaramma K and Mridula Chugh, Pearson Education, 2013.
- 4. *Concise Inorganic Chemistry*, 7th Edn, Lee J.D., Blackwel Science Publications Oxford, London, 2004.

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(16ME302) ENGINEERING GRAPHICS

Course Educational Objectives:

- To familiarize the students in basic concept of conic sections, projections and developments of objects.
- To develop the imagination and drafting skills of students.

Course Outcomes:

Students undergoing this course are able to

- Frame ideas based on the conceptual modeling and design
- Provide good understanding of the methods involved in preparing various views in engineering drawings
- Can prepare 2D and 3D diagrams of various objects.

INTRODUCTION (Not to be included for examination)

Drawing instruments and their use – Lettering - Dimensioning – Simple Geometrical constructions.

UNIT-I

CONIC SECTIONS: Construction of Ellipse, Parabola, Hyperbola (General and special methods). Special Curves: Cycloids, Involutes.

UNIT-II

POINTS: Projections of points

LINES: Projections of straight lines - Determination of true lengths and true inclinations – line inclined to both reference planes., traces.

UNIT-III

PLANES: Projections of planes – Surface inclined to both reference planes **SOLIDS:** Projections of simple solids (Prisms, pyramids, cylinder and cone) - Axis inclined to both the planes.

UNIT-IV

SECTIONS: Sections of solids (prisms, pyramids, cylinder and cone) in simple vertical position by using cutting plane inclined to one reference plane and perpendicular to the other – true shape of the section.

DEVELOPMENTS: Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinder and cone.

UNIT-V

ISOMETRIC and ORTHOGRAPHIC PROJECTIONS – Principles of Isometric projection-Isometric Scale- Isometric Views- Conversion of Isometric to orthographic views– Isometric projection of simple solids (Cube, Cylinder and Cone)

INTERPENETRATION/INTERSECTIONS OF SOLIDS: Simple solids.

COMPUTER AIDED DRAFTING – Introduction to drafting packages - orthographic views and projections and Isometric projections (demonstration only)

TEXT BOOKS:

- 1. Engineering Drawing, N.D. Bhatt, Charotar Publishers, 53rd Edition, 2016.
- 2. *A text Book of Engineering Drawing*, K.L. Narayana, Kannaiah, Scitech Publishers, 2010
- 3. *Engineering Graphics with using AutoCAD*, Jeyapoovan.T., Vikas Publishing House, 2007.

REFERENCES:

- 1. *Fundamentals of Engineering Drawing*, Warren J. Luzadder and Jon. M.Duff Prentice Hall of India Pvt., Ltd., Eleventh Edition, 2001.
- 2. Engineering Graphics, Bhattacharyya, S.C. Bera, I. K. International Pvt Ltd. 2009.
- 3. *A text Book of Engineering Drawing and Graphic*, K. Venugopal New Age Publishing New Delhi, 2008,

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(16CE101) ENGINEERING MECHANICS

(Common to Civil, AG and ME)

Course Objectives:

- To learn about forces and force systems and their applications.
- To learn about friction and to use the concept of Friction.
- To learn how to find centroid and Moments of Inertia of different objects using mathematical formula.
- To learn about rectilinear and curvilinear motions of bodies.

Course Outcomes:

Students undergoing this course are able to

- Construct free body diagrams and develop appropriate equilibrium equations.
- Understand the concepts of friction and to apply in real life problems.
- Determine the centroid and Moment of Inertia for composite sections.
- Understand the dynamic analysis of rigid body motion.

UNIT-I

BASICS: Fundamental Principles – Resolution and Composition of Forces and Equilibrium of Particles – Principle of transmissibility – Free body diagram – Equilibrium of Rigid Body.

FORCES AND FORCE SYSTEMS: Types of force systems – Resultant of coplanar, concurrent and non-concurrent force systems – Concepts of moment – varignon's theorem.

EQUILIBRIUM OF SYSTEM OF FORCES:

Equilibrium concepts in mechanics – Free body diagram – Equilibrium of coplanar force systems – types of members and supports – support reactions.

UNIT-II

FRICTION: Types of friction– laws of Friction–Limiting friction–Cone of limiting friction– static and Dynamic Frictions – Motion of bodies – Wedge, Screw jack and differential Screw Jack-Ladder Friction.

UNIT-III

CENTROID&**CENTRE OF GRAVITY:** Centroids of simple figures (from basic principles) – Centroids of Composite Figures Centre of gravity of simple body -center of gravity of composites (simple Problems only).

AREA MOMENT OF INERTIA: Definition – Parallel axis and Perpendicular theorems – Polar Moment of Inertia – Radius of gyration – Moment of inertia of basic shapes, Composite Section and simple solids.

UNIT-IV

ANALYSIS OF PERFECT FRAMES: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, and methods of sections for vertical loads, horizontal loads and inclined loads.

UNIT-V

KINEMATICS: Introduction to Dynamics - Rectilinear and Curvilinear motion – Displacement, Velocity and Acceleration – Motion of a Rigid Body.

KINETICS: Bodies in rectilinear translation – Curvilinear translation - D'Alembert's Principle - Principle of Work and Energy – Principle of Impulse and Momentum- (Simple Problems only).

TEXT BOOKS:

- 1. *A Textbook of Engineering Mechanics (As per the latest Syllabus JNTU, Anantapur)*, 3rd Edition, Bhavikatti S S, New Age International, 2016.
- 2. Engineering Mechanics, Dr. R. K. Bansal, 4th Edition, Laxmi Publications, 2011.

REFERENCE BOOKS:

- 1. Engineering Mechanics, D.S. Kumar, 3rd Edition, S.K. KATARIA & SONS
- 2. *Singer's Engineering Mechanics: Statics and Dynamics*, 3rd Edition, K. Vijaya Kumar Reddy, J. Suresh Kumar, B.S. Publications, 2011.
- 3. *Engineering Mechanics: Statics*, 6th Edition, J L Meriam, L G Kraige, Wiley India Pvt. Ltd, 2001.
- 4. *Engineering Mechanics: Dynamics*, 6th Edition, J L Meriam, L G Kraige, Wiley India Pvt. Ltd, 2010.

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(16HS607) ENGLISH LANGUAGE AND COMMUNICATION SKILLS (ELCS) LAB (Common to CIVIL, AG, EEE, ME)

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts. Course objectives:

- To enable students to learn better pronunciation through stress on word accent, Intonation and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence.
- To train students to use language appropriately in both formal and informal situations.
- To enhance written communication among the students.

Course outcomes:

- To become active participants in the learning process and acquire proficiency in spoken English.
- To speak with clarity and confidence thereby enhances employability skills.
- To prepare effective job application

UNIT - I

- 1. Phonetics -Importance
- 2. Introduction to Sounds of Speech
- 3. Vowels and Consonant sounds
- 4. Phonetic Transcription

UNIT - II

- 5. Word Stress
- 6. Syllabification
- 7. Rules of Word Stress
- 8. Intonation

UNIT - III

- 9. Situational Dialogues/ Role Play
- 10. Telephonic Communication
- 11. JAM

UNIT – IV

- 12. Describing Persons/ places/ things
- 13. Oral Presentations
- 14. Debate
UNIT – V

15. Group Discussion

16. Job application

17. Interview skills

Minimum Requirements for ELCS Lab:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab: 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.

2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system,

Projector, 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:

- i) P-IV Processor
 - a) Speed 2.8 GHZ
 - b) RAM 512 MB Minimum
 - c) Hard Disk 80 GB
- ii) Headphones of High quality

Suggested Software:

- 1. Clarity Pronunciation Power Part I (Sky Pronunciation)
- 2. Clarity Pronunciation Power part II
- 3. K-Van Advanced Communication Skills
- 4. Walden InfoTech Software.

References:

- 1. *A Textbook of English Phonetics for Indian Students* 2nd Ed T. Balasubramanian. (Macmillian),2012.
- 2. *A Course in Phonetics and Spoken English*, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
- 3. *Speaking English Effectively*, 2nd Edition Krishna Mohan & NP Singh, 2011. (McMillan).
- 4. *A Hand book for English Laboratories*, E. Suresh Kumar, P. Sreehari, Foundation Books, 2011.
- 5. *Spring Board Success*, Sharada Kouhik, Bindu Bajwa, Orient Blackswan, Hyderabad, 2010.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

B.Tech I Year II Semester

L T D C

(16HS609) ENGINEERING CHEMISTRY LAB 0 0 4 2

Course Objectives:

• To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

Course Outcomes:

On completion of this course, students will have the knowledge in.

- Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results, and
- Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.

Any 10 of the following experiments has to be performed during the I year II Semester

List of Experiments:

- 1. Determination of total hardness of water by EDTA method.
- 2. Determination of Copper by EDTA method.
- 3. Estimation of Dissolved Oxygen by Winkler's method.
- 4. Estimation of iron (II) using diphenylamine indicator (Dichrometry –Internal indicator method).
- 5. Determination of Alkalinity of Water.
- 6. Determination of acidity of Water.
- 7. Preparation of Phenol-Formaldehyde (Bakelite).
- 8. Determination of Viscosity of oils using Redwood Viscometer I.
- 9. Determination of Viscosity of oils using Redwood Viscometer II.
- 10. Determination of calorific value of gaseous fuels by Junker"s Calorimeter.
- 11. Conductometric estimation of strong acid using standard sodium hydroxide solution.
- 12. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
- 13. Potentio metric determination of iron using standard potassium dichromate.
- 14. Colorometric estimation of manganese.
- 15. pH meter calibration and measurement of pH of water and various other samples

References:

- 1. *Vogel's Text book of Quantitative Chemical Analysis*, Sixth Edition Mendham J et al, Pearson Education, 2012.
- 2. *Chemistry Practical– Lab Manual*, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

B.Tech I Year II Semester

L T D C

0 0 4 2

(16CE102) APPLIED MECHANICS LAB

Course Objective:

- To learn about polygon law of forces.
- To learn about Static friction and its concepts.
- To learn how to find centroid and Moments of Inertia of an objects.
- To learn about single and double Gear Crab.

Course Outcomes:

Students undergoing this course are able to

- Understand different laws of forces.
- Understand concepts of support reaction.
- Fundamentals of applied mechanics.
- Understand concepts of different types of pendulum.

LIST OF EXERCISES:

- **1. Polygon Law of Coplanar Forces:** To verify the Polygon Law of Coplanar Forces for a concurrent force system.
- 2 Support Reactions of a Beam: To find experimentally the reactions at the supports of a simply supported beam and verify the same with analytical values.
- **3.** Bell Crank Lever: To verify the Principle of moments using the Bell Crank lever apparatus.
- 4. Friction Plane: To determine the coefficient of Static Friction between two surfaces.
- **5. Moment of Inertia of Flywheel:** To find screw jack and determine the coefficient of friction between the threads of the screw.
- **6 Compound Pendulum:** To estimate the acceleration due to gravity using a compound pendulum.
- 7. Single Gear Crab: To understand the gear arrangement and establish the law of machine.
- **8** Double Gear Crab: To compare the efficiency of Single and Double Gear Crab.
- 9. Differential Pulley Block: To establish law of machine.
- **10. Differential Axle and Wheel:** To understand the velocity ratio of the machine and to interpret the law of machine.

*Minimum Eight experiments must be conducted in the lab session.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUT U (AUTONOMOUS)

B.Tech II Year I Semester

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(16HS612) ENGINEERING MATHEMATICS-III

(Common to all Branches)

Course Objectives:

- To train the students thoroughly in Mathematical concepts of Complex Analysis, Interpolation, Curve fitting, Numerical Differentiation and Integration and their applications
- To prepare students for lifelong learning and successful careers using mathematical concepts of Complex Analysis, Interpolation, Curve fitting, Numerical Differentiation and Integration and their applications
- To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate and modeling the problems, to think creatively and to synthesize information

. Course Outcomes:

At the end of the course, students would be expected to:

- Have acquired ability to participate effectively in group discussions
- Have developed ability in writing in various contexts
- Have acquired a proper level of competence for employability
- *Have acquired computational skills to solve real world problems in engineering*

UNIT- I

Complex Analysis-I: Analytic functions, Cauchy– Riemann equations, complex integration, Cauchy's theorem, Integral formula, Evaluation of Integrals.

UNIT- II

Complex Analysis-II: Singularities, poles, Residues, Residues theorem, Evaluation of real

integrals of the types $\int_{0}^{2\pi} f(\cos\theta,\sin\theta)d\theta, \quad \int_{-\infty}^{\infty} e^{imx} f(x)dx - \text{conformal mapping} - \text{Bilinear}$

transformations- Transformation of e^z , Z^2 , Sin z, and Cos z.

UNIT-III

Solution of Algebraic and Transcendental Equations: The Bisection Method, The Method of False Position, Newton-Raphson Method.

Interpolation: Newton's forward and backward interpolation formula, Lagrange's interpolation formula.

UNIT-IV

Curve fitting: Fitting of a straight line, Second degree curve, Exponential curve, Power curve by method of least squares.

Numerical Differentiation and Integration: Trapezoidal rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule.

UNIT-V

Numerical Solution of Ordinary Differential Equations: Solution by Taylor's series, Picard's Method of successive Approximations, Euler's Method, Runge-Kutta second and fourth order methods.

Text Books:

- 1. Higher Engineering Mathematics, B.S. Grewal, Khanna publishers, 2012.
- 2. Advanced Engineering Mathematics, Peter V. O'Neil, CENGAGE publisher, 2009.

Reference Books:

- 1. Engineering *Mathematics III* by T.K.V. Iyengar, S. Chand publications, 2015.
- 2. Mathematical Methods by T.K.V. Iyengar, S. Chand publications, 2015.
- 3. Engineering Mathematics, Volume III, E. Rukmangadachari & E. Keshava Reddy

Pearson Publisher, 2015.

4. *Advanced Engineering Mathematics* by M.C. Potter, J.L. Goldberg, Edward F. Aboufadel, and Oxford, 2012.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

B. Tech II Year I Semester

3 1 0 3

(16AG701) ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS

Course Objectives:

Course Objectives:

- At the end of the course student attains adequate knowledge about different properties of biological materials
- At the end of the course student should be able to recognize the importance of the properties in design of the equipment, processes, handling and storage.

Course Outcomes:

After completion of the course the student will be able to:

- Measure the physical, thermal, optical and rheological properties of the biological materials
- Use the properties data in design of the equipment and process.

UNIT - I

Classification and importance of engineering properties of Agricultural Produce, shape, size, roundness, sphericity, volume, density, porosity, specific gravity, surface area of grains, fruits and vegetables,

UNIT - II

Thermal properties, Heat capacity, Specific heat, Thermal conductivity, Thermal diffusivity, Heat of respiration; Co-efficient of thermal expansion,

UNIT - III

Friction in agricultural materials; Static friction, Kinetic friction, rolling resistance, angle of internal friction, angle of repose, Flow of bulk granular materials, Aero dynamics of agricultural products, drag coefficients, terminal velocity.

UNIT - IV

Rheological properties; force, deformation, stress, strain, elastic, plastic and viscous behaviour, Newtonian and Non-Newtonian liquid, Visco-elasticity, Newtonian and Non-Newtonian fluid, Pseudo-plastic, Dilatant, Thixotropic, Rheopectic and Bingham Plastic Foods, Flow curves.

UNIT - V

Electrical properties; dielectric loss factor, loss tangent, A.C. conductivity and dielectric constant, method of determination. Application of engineering properties in handling processing machines and storage structures

Text Books

- 1. Mohesin, N.N. 1980. Physical Properties of Plants & Animals. Gordon & Breach Science Publishers, New York.
- 2. Mohesin, N.N. 1980. Thermal Properties of Foods and Agricultural Materials. Gordon & Breach Science Publishers, New York.
- 3. Prentice, J.H. 1984. Measurement in Rheological Properties of Food Stuffs. Elsevier Applied Science Pub. Co. Inc. New York.

Reference Books

- 1. Singhal OP & Samuel DVK. 2003. Engineering Properties of Biological Materials. Saroj Prakashan.
- Rao, M.A. and Rizvi, S.H., 1995. Engineering Properties of Foods. Marcel Dekker Inc. New York.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

B.Tech II Year I Semester

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3 1 0 3

(16CE104) STRENGTH OF MATERIALS

(Common to ME, AG)

Course Educational Objectives:

- To learn about simple stresses and strains and their applications.
- To learn how to find shear force and bending moment and construction of SFD & BMD.
- To understand about the concept of simple bending and shear stress distribution.
- To learn about deflections of Beams by using different methods.
- To learn about columns and struts and their applications.

Course Outcomes:

Students undergoing this course are able to:

- The students would be able to understand the behaviour of materials under different stress and strain conditions.
- The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.
- The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams under various loading conditions.
- Determine shear stress in the shaft subjected to torsional moments.

UNIT - I

SIMPLE STRESSES AND STRAINS: Elasticity and plasticity – Types of stresses and strains – Hooke's law – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – Composite bars – Temperature stresses.

STRAIN ENERGY: Resilience – Gradual, sudden, impact and shock loadings- Simple applications.

UNIT - II

SHEAR FORCE AND BENDING MOMENTS: Types of supports – Types of beams – Shear force and bending moment diagrams for simply supported - Cantilever and over hanging beams with point loads, uniformly distributed load, uniformly varying loads and couples – Relationship between shear force and bending moment.

UNIT - III

THEORY OF SIMPLE BENDING: Assumptions made in the theory of simple bending – Derivation of bending equation: M/I = f/y = E/R –Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I-Tangle and Channel sections – Design of simple beam.

SHEAR STRESS DISTRIBUTION: Derivation of formula – Shear stress distribution in rectangular, triangular, circular, I and T sections.

UNIT- IV

DEFLECTIONS OF BEAMS: Bending into a circular arc – Slope - deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads - Uniformly distributed load, uniformly varying load. **TORSION OF CIRCULAR SHAFTS AND SPRINGS:** Theory of pure torsion - Torsional theory applied to circular shafts – Power transmission - Close and open coiled helical springs under axial loads and axial twist – Carriage springs.

UNIT - V

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter and volume of thin cylinders – Riveted boiler Shells - Thin spherical shells.

THICK CYLINDERS: Thick cylinders – Lame's equation – Design of thick cylindrical shells – Compound cylinders – Shrink fit allowance – Initial difference of radii at the junction.

Text Books:

- 1.*Strength of Materials (Mechanics of Solids)*, 6th Edition, Er. R.K. Rajput, S. Chand Publishing, 2015.
- 2.A Textbook of Strength of Materials, 6th Edition, Dr. R. K. Bansal, Laxmi Publications, 2016.

Reference Books:

- 1. *Mechanics of Materials*, Revised, 2016 Edition, Dr. B. C. Punmia, Er. Ashok Kr. Jain, Dr. Arun Kumar Jain, Laxmi Publications, 2016.
- 2. Strength of Materials, 3rd Edition, R. Subramanian, Oxford University Press, 2010.
- 3. Strength of Materials, 24th Edition, R. S. Khurmi, S. Chand Publishing, 2015.
- 4. Strength of Materials, 11th Edition, Sadhu Singh, Khanna Publishers, 2013.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUT U (AUTONOMOUS)

B.Tech II Year I Semester

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(16CE112) FLUID MECHANICS & HYDRAULIC MACHINERY

Course Educational Objectives:

- To understand the basic concepts of Fluid properties and fluid statics.
- To understand the applications of fluid kinematics and dynamics.
- To understand the behavior of pipe flow and losses in pipe flow.
- To understand the concepts of flow measurements and boundary layer flows.
- To understand the working principles of hydraulic machinery.

Course Outcomes:

After completion of this course the student will be able to,

- *How to find frictional losses in a pipe when there is a flow between two places.*
- Know types of flow and its measurements and applications.
- Identify the suitable pump required for different purposes.
- Classify the turbines and design criteria based on water availability.

UNIT I

Fluid Properties: Dimensions and units - Definition of a fluid – Physical properties of fluids-Density, Specific weight, Specific volume, Specific gravity, Compressibility, Vapour pressure, Surface tension and capillarity and Viscosity.

Fluid Statics: Pascal's law, Pressure variation in a static fluid – Atmospheric, gauge and absolute pressures, Measurement of pressure – Piezometer – U–tube and inverted U–tube manometers and Bourdon's pressure gauge, Hydrostatic forces on plane and curved surfaces, Center of pressure.

UNIT II

Fluid Kinematics: Types of flow – Streamline – Streak line – Path line – Stream tube – Control volume – Continuity equation in one and three dimensional forms – Stream function and velocity potential function – Flow net – Acceleration of a fluid particle – Local and convective accelerations – Tangential and normal accelerations.

Fluid Dynamics: Euler's equation of motion along a streamline – Bernoulli's energy equation – Energy correction factor – Impulse–momentum equation – Momentum correction factor – Force on a bend – Energy gradient line – Hydraulic gradient line – Analysis of free liquid jets – Forced vortex and free vortex.

UNIT III

Analysis of Pipe Flow: Reynold's experiment – Reynold's number - Minor losses in pipe flow - Darcy–Weisbach lequation – Variation of friction Factor – Moody's chart – Pipes in series – Pipes in parallel, Boundary Layer Theory.

Flow Measurement: Velocity measurement by Pitot tube and Pitot static tube – Discharge measurement by Venturimeter and orifice meter – Orifices and mouthpieces

UNIT IV

Dimensional Analysis and Similitude: Introduction, dimensions; dimensional homogeneity; Methods of dimensional analysis- Rayleigh's method; Buckingham - Pi theorem. Similitude - Types of Similarities. Model Laws.

UNIT V

HYDRAULIC TURBINES: Elements of hydroelectric power plants- Heads and efficiencies of turbines – Classification of turbines –Pelton Wheel-Modern Francis turbine – Kaplan turbine. Main components and working principle- Expressions for work done and efficiency – Working proportions and design of each.

CENTRIFUGAL PUMPS: Classification and types of pumps – Components and working of a centrifugal pump – Work done by the impeller– Heads and efficiencies – Net positive suction head(NPSH)- Priming – Priming devices – Minimum starting speed – Multistage pumps – Pumps in series and parallel – Submersible pumps – Limiting suction head – Cavitation – Expression for specific speed.

Text Books:

- 1. *Hydraulics and Fluid Mechanics Including Hydraulics Machines (A-4-Size)*, 20th Edition, Dr. P.N. Modi & Dr. S.M. Seth, Standard Book House, 2015.
- 2. *A Textbook of Fluid Mechanics and Hydraulic Machines*, 9th Edition, Dr. R. K. Bansal, Laxmi Publications, 2016.

Reference Books:

- 1. *Fluid Mechanics*, 9th Edition, Victor Streeter, E. Benjamin Wylie, K.W. Bedford, McGraw Hill Education, 2010.
- 2. *Fluid Mechanics and Machinery*, 1st Edition, C.S.P. Ojha, P.N. Chandamouli & R. Berndtsson, Oxford University Press, 2010.
- 3. *Fluid Mechanics and Hydraulic Machines*, 1st Edition, S. C. Gupta, Pearson India Education Services Pvt. Ltd, 2006.
- 4. *Fluid Mechanics and Machinery*, 1st Edition, Rama Durgaiah D., New Age International, 2002.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUT U. (AUTONOMOUS)

B.Tech II Year I Semester

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(16EE207) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING PART – A BASIC ELECTRICAL ENGINEERING

Course Objectives:

• Basic Electrical Engineering contains basic Electrical Laws, Network theorems, AC & DC generators and motors which are widely used in industry are covered and their performance aspects will be studied.

Course Outcomes:

• After going through this course, the student gets a thorough knowledge on basics of Network theorems, two port networks, DC Motors and Transformers with which he/she can able to apply the above conceptual things to real-world problems and applications.

UNIT – I

INTRODUCTION TO ELECTRICAL ENGINEERING

Ohm's Law, Basic Circuit Components, Kirchhoff's Laws, Types of Sources, Resistive Networks, Inductive Networks, Capacitive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities.

UNIT-II

NETWORK THEOREMS & TWO PORT NETWORKS

Network Theorems: Thevenin's, Norton's, Maximum Power Transfer, Reciprocity and Superposition Theorems for DC Excitations.

Two Port Networks: Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations.

UNIT-III

DC MOTORS and TRANSFORMERS

DC Motors: Principle of Operation of DC Motors, Types of DC Motors, Torque Equation, Losses and Efficiency Calculation in DC Motor- Swinburne's Test and Applications.

Transformers: Principles of Operation, EMF equation, Losses and Efficiency, Regulation of Transformer, Testing: OC & SC Tests.

PART-B

UNIT I

Semiconductor Devices: Intrinsic Semiconductors-Electron-Hole Pair Generation, Conduction in Intrinsic Semiconductors, Extrinsic Semiconductors-N-Type and P-Type Semiconductors, Comparison of N-Type and P-Type Semiconductors. The p-n Junction – Drift and Diffusion Currents, The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics-Diode Specifications, Applications of Diode, Diode as a Switch. Diode as a Rectifier-Half-

Wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Rectifiers with Filters, Zener Diode-Volt-Ampere Characteristics, Zener Diode as Voltage Regulator.

UNIT II

BJT and FETs: Bipolar Junction Transistor (BJT) – Types of Transistors, Operation of NPN and PNP Transistors, Input-Output Characteristics of BJT-CB, CE and CC Configurations, Relation between I_{C} , I_B and I_E . Transistor Biasing-Fixed Bias, Voltage Divider Bias, Transistor Applications- Transistor as an Amplifier, Transistor as a Switch, Junction Field Effect Transistor (JFET)- Theory and Operation of JFET, Output Characteristics, Transfer Characteristics, Configurations of JFET-CD, CS and CG Configurations, JFET Applications-JFET as an Amplifier, JFET as a Switch, Comparison of BJT and JFET, MOSFET-The Enhancement and Depletion MOSFET, Static Characteristics of MOSFET, Applications of MOSFET.

UNIT III

Oscillators and Op-Amps: Sinusoidal Oscillators, Barkhausen Criteria for Oscillator Operation, Components of an Oscillator-Transistor Amplifier Circuits, Feedback Circuits and Oscillator Circuits, Classification of Oscillators, LC Tuned, RC Phase Shift Oscillator circuits. **Operational Amplifiers(Op-Amps)-**Symbol of an Op-Amp, single Input and Dual Input Op-Amps (Differential Amplifier), Characteristics of an Ideal Op-Amp, Basic Forms of Op-Amps-Inverting & Non-Inverting Amplifiers, Applications of Op-Amps, summing, Differential, Integrator, differentiator Amplifier.

TEXT BOOKS:

- 1. *Basic Electrical Engineering* –, M.S. Naidu and S. Kamakshiah TMH.
- 2 -*Basic Electrical Engineering* -, T.K. Nagasarkar and M.S. Sukhija Oxford University Press.
- 3. *Basic Electrical and Electronics Engineering*, M.S. Sukhija, T.K. Nagsarkar, Oxford University, Press, 1st Edition, 2012.
- 4 *Basic Electrical and Electronics Engineering*, S.K Bhattacharya, Pearson Education, 2012

REFERENCES:

- 1 -*Theory and Problems of Basic Electrical Engineering* -, D.P. Kothari & I.J. Nagrath PHI, 2011.
- 2 -Principles of Electrical Engineering^{II}, V. K Mehta, S. Chand Publications, 2015.
- ³ *-Fundamentals of Electrical Electronics Engineering*∥, T. Thyagarajan, SCITECH Publications 5th Edition-2007.
- *Electrical and Electronic Technology*-By Hughes Pearson Education, 10th Edition, 2008.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

B. Tech II Year I Semester

LTPC

3 0 0 3

(16CE155) SOIL SCIENCE & SOIL MECHANICS

Course Objectives:

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

Course Outcomes:

At the end of the course, students would be expected to:

- Fundamental knowledge of soil physical parameters.
- The procedures involved in soil survey, soil classification.
- The phase relationship and soil compaction.
- Concepts of bearing capacity and slope stability.

PART A SOIL SCIENCE

UNIT I

Soil genesis and classification: Weathering - formation and composition of soil - classification of soils.

Soil colloids: Inorganic and organic colloids, their nature and physico-chemical properties - ion exchange phenomena, and nutrient availability.

Mineral nutrition of plants: Essential elements - Chemical fertilizers - Organic manures.

UNIT II

Physics of soil: Texture, structure and basic physical properties, retention and movement of soil water, permeability and ground water flow, gaseous exchange, soil strength and thermal properties of soil.

Soil tillage: Types of tillage and their influence on soil physical properties and crop performance.

Soil management: Management of acid, saline, sodic, highly and slowly pehneable soils, water quality

PART B: SOIL MECHANICS

UNIT - III

Three phase system of soil – Basic definitions – Determination of index properties – Clay mineralogy - Atterberg Limits – Sieve analysis & particle size distribution – Indian standard classification

UNIT - IV

Permeability & Seepage: Soil Water – Permeability – Darcy's law - Factors affecting permeability – Laboratory & field methods of determining coefficient of permeability – Effective stress – Quick sand – Flow nets

Vertical Stress Distribution: Geostatic stress - Boussinesq's equation – Westergaard equation – Pressure bulb – Newmark's chart

UNIT - V

Compaction: Definition – Proctor's compaction test – Compaction curve – Field control of compaction

Consolidation: Definition - Terzaghi's one dimensional consolidation theory

Shear Strength: Mohr-Coulomb failure theory - Measurement of shear strength: Direct Shear, UCC, Triaxial Shear & Vane Shear Test.

TEXT BOOKS

- 1. Nyle C. Brady, *-The Nature and Properties of Soil*, Macmillan Publishing Company, 10th Edition, New York, 2008.
- 2 Punmia, B.C., -Soil Mechanics and Foundation -Laxmi Publishers, New Delhi. 2007.

REFERENCES:

- 1. Edward J. Plaster., -Soil Science ||, Cengage Learning India Ltd, New Delhi, 2009.
- 2 Arora, K.R. *–Soil Mechanics and Foundation Engineering* ||, Standard Publishers and Distributors, New Delhi, 2007.
- 3. Murthy, V.N.S. *–Soil Mechanics and Foundation Engineering* ||, UBS Publishers and Distributors, New Delhi, 2007.

Sehgal, S.B., -*Text Book of Soil Mechanics* , CBS Publishers and Distributors New Delhi, 2007.

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B. Tech II Year I Semester

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(16CE158) STRENGTH OF MATERIALS / SOIL MECHANICS LAB Course Objectives:

- To learn the testing procedures of mild steel by tension, direct shear, torsion, hardness tests.
- To learn the concept of modulus elasticity, and to know how to measure deflection of beams.
- To learn the compressive strength of wood, concrete stone and bricks.
- To learn the testing procedures for burnt clay bricks and comparison with BIS standard of brick.
- Experiments to find Types of Metals, Steels, Cast irons and their Microstructures; Heat Treatment procedures; Data acquisition and recording; Grain size analysis; Phase segmentation.
- Analyze the microstructure and estimate the amount of porosity and grain size of the casted specimen.
- Apply the knowledge of phase diagrams and testing methods to suit design specification in related areas.

Course Outcomes:

After completion of the course the student will be able to,

- Estimate Young's modulus, tensional rigidity of mild steel rods.
- Know the hardness of mild steel and HYSD specimens.
- Analyze the strength of wood, concrete, stone and bricks.
- Assess the quality of wood, concrete, stone and bricks.

LIST OF EXPERIMENTS:

- 1. Bending test on simple support beam.
- 2. Compression test on wood or Brick.
- 3. Impact test on metal specimen (Izod and Charpy).
- 4. Compression test on helical spring.
- 5. Tension test on mild steel rod.
- 6. Torsion test on mild steel rod.
- 7. Hardness test on metals (Rockwell and Brinell Hardness Number Tests).
- 8. Continuous beam-deflection test

SOIL MECHANICS LAB

- a. Special gravity of soil solids
- b. Grain size distribution
- c. Atterberg Limits
- d. Field density Test (Sand replacement method)
- e. Permeability determination (constant head and falling head methods)
- f. Direct shear test in cohesion-less soil
- g. Unconfined compression test in cohesive soil
- h. California Bearing Ratio Test

*Minimum Five experiments must be conducted in the lab from each lab

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B. Tech II Year I Semester

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(16CE116) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

Course Educational Objectives:

- To learn the concepts of Venturimeter & Orifice meter
- To learn the concepts of notch's
- To learn the basic concepts of turbines
- To learn the basics concepts of different types of pumps.

Course Outcomes:

Students undergoing this course are able to

- Calibrate Venturimeter & Orifice meter
- Calculate losses in flows
- Estimate the efficiency of different pumps.
- Study the performance of different turbines.

LIST OF EXPERIMENTS

*Cycle 1:

- 1. Verification of Bernoulli's equation.
- 2. Calibration of Coefficient of discharge for Venturimeter.
- 3. Calibration of Coefficient of discharge for Orifice meter.
- 4. Calibration of Friction factor. (major losses experiment)
- 5. Determination of loss of head due to sudden contraction. (minor losses experiment)
- 6. Calibration of Discharge over Notches (Rectangular/Triangular Notch.)
- 7. Determination of Coefficient of discharge for a small orifice / mouthpiece by a constant head method / variable head method.

*Cycle 2:

- 8. Impact of jet on vanes.
- 9. Performance test on Pelton wheel turbine.
- 10. Performance test on Francis turbine.
- 11. Efficiency test on centrifugal pump.
- 12. Study on Hydraulic jump.
- 13. Performance test on Kaplan turbine

*Minimum Four experiments must be conducted in the lab from each cycle.

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B. Tech II Year I Semester

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(16CS503) DATA STRUCTURES THROUGH C

Course Objective:

- Understand different data structures
- Understand searching and sorting techniques

Course Outcome:

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

- Design algorithms to implement various data structures.
- Understand and program stacks and list data structures.
- Write programs to implement different types of queues.
- Understand and make use of hash tables in applications like dictionary, spell checker etc.,
- Understand why height balanced trees are advantageous over other data structures.

UNIT-I

Introduction and overview: One Dimensional array- Multi Dimensional array- pointer arrays. **Linked lists**: Definition- Single linked list- Circular linked list- Double linked list- Circular Double linked list- Application of linked lists.

UNIT-II

Stacks: Introduction-Definition-Representation of Stack-Operations on Stacks- Applications of Stacks. **Queues**: Introduction, Definition- Representations of Queues- Various Queue Structures- Applications of Queues.

UNIT-III

Trees: Basic Terminologies- Definition and Concepts- Representations of Binary Tree-Operation on a Binary Tree- Types of Binary Trees-Binary Search Tree, Heap Trees **Graphs**: Introduction- Graph terminologies- Representation of graphs- Operations on Graphs-Application of Graph Structures: Shortest path problem- topological sorting.

UNIT-IV

Sorting: Sorting Techniques- Sorting by Insertion: Straight Insertion sort- List insertion sort-Binary insertion sort- Sorting by selection: Straight selection sort- Heap Sort- Sorting by Exchange- Bubble Sort- Shell Sort- Quick Sort-Sorting by Mergin: Simple Merging-Binary Merge-Merge Sort.

UNIT-V

Searching: Linear Search Techniques: Linear Search with Array- Linear Search with Linked List- Linear Search with ordered list- Binary Search- Fibonacci Search.

Tables: Hash Tables: Hashing Techniques- Collision Resolution Techniques- Closed Hashing-Open Hashing.

Text Books:

- 1. "Classic Data Structures", Second Edition by Debasis Samanta, PHI, 2009.
- 2. *"Data Structures a Pseudo Code Approach with C",* Second Edition by Richard F. Gilberg, Behrouz A. Forouzan, Cengage Learning, 2007.

Reference Books:

- 1. *"Fundamentals of Data Structures in C*, Horowitz, Sahni, Anderson-Freed, Universities Press, Second Edition, 2008.
- 2. "Schaum' Outlines Data Structures ", Seymour Lipschutz McGrawHill- Revised First Edition, 2014.
- 3. *"Data structures and Algorithms using C++"*, Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education, 2010.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUT U (AUTONOMOUS)

B. Tech II Year II Semester

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(16HS613) PROBABILITY & STATISTICS

(Common to CE, AG, ME & CSE)

Course Objectives:

- To train the students thoroughly in Mathematical concepts fundamentals of probability, test of hypothesis, Test of significance and ANOVA.
- To prepare students for lifelong learning and successful careers using mathematical concepts of probability, test of hypothesis, Test of significance and ANOVA.
- To develop the skill pertinent to the practice of the mathematical concepts including the Student abilities to formulate and modeling the problems, to think creatively and to Synthesize information.

Course Outcomes:

At the end of the course, students would be expected to:

- Have acquired ability to participate effectively in group discussions.
- *Have developed ability in writing in various contexts.*
- Have acquired a proper level of competence for employability.

UNIT I

Probability: Introduction, Conditional probability – Baye's theorem, Random variables – Discrete and continuous Distributions, Expectation, Varience, Moments, Moment generating functions

UNIT II

Distributions-Binomial, Poisson, Normal, Uniform, Exponential and Gamma distributions – Related properties and applications

UNIT III

Test of Hypothesis: Population and Sample, Confidence interval of mean from Normal distribution, Null and Alternative hypothesis, Level of significance

Test of significance: Test based on normal distribution, Z test for means and proportions, Small samples t- test for one sample and two sample problem and paired t-test, F-test and Chi-square test (testing of goodness of fit and independence).

UNIT IV

Analysis of variance one way classification and two-way classification (Latin square Design and RBD)

UNIT V

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of X-bar Chart, R-Chart, P-Chart and C-Chart.

Text Books:

- L -Statistical methods ||, S.P. Gupta, S. Chand publications, 2014.
- 2 -Probability & Statistics", T.K.V. Iyengar, S. Chand publications, 2015.

Reference Books:

- -Probability & Statistics'. Rukmangadachari & E. Keshava Reddy, Pearson Publisher, 2015.
- 2 -*Probability & Statistics for engineers*∥, Dr. J. Ravichandran WILEY-INDIA publishers, 2012.
- ³ "Probability & Statistics for Science and Engineering^{II}, G. Shanker Rao, Universities Press, 2013.
- 4 -Probability and Statistics for Engineering and Sciences[∥], Jay L. Devore, CENGAGE, 2009.
- 5 -Probability and Statistics ||, R.A. Johnson and Gupta C.B, Pearson Publisher, 2007.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUT U (AUTONOMOUS) L

B. Tech II Year II Semester

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1 (16AG702) PRINCIPLES OF AGRONOMY AND SOIL SCIENCE

Course Objectives:

- At the end of the course student attains adequate knowledge in crop production.
- At the end of the course student attains adequate knowledge in assessing both Physical ٠ and Engineering behavior of soils through laboratory testing procedures.

Course Outcomes:

After completion of the course the student will be able to:

- Different crops and cropping techniques •
- Know the techniques to determine index properties and engineering properties such as • shear strength, compressibility and permeability by conducting appropriate tests.

UNIT – I

Agronomy

Introduction and scope of agronomy. Classification of crops, Effect of different weather parameters on crop growth and development. Principles of tillage, tilth and its characteristics. Crop seasons. Methods, time and depth of sowing of major field crops. Methods and time of application of manures and fertilizers. Organic farming-Sustainable agriculture.

UNIT - II

Soil water plant relationship, crop coefficients, water requirement of crops and critical stages for irrigation, weeds and their control, crop rotation, cropping systems, Relay cropping and mixed cropping.

UNIT - III

Soil science

Nature and origin of soil; soil forming rocks and minerals, their classification and composition, soil forming processes, classification of soils - soil taxonomy orders; important soil physical properties; and their importance; soil particle distribution;

UNIT - IV

soil inorganic colloids - their composition, properties and origin of charge; ion exchange in soil and nutrient availability; soil organic matter - its composition and decomposition, effect on soil fertility; soil reaction - acidic, saline and sodic soils;

UNIT - V

Quality or irrigation water; essential plants nutrients – their functions and deficiency symptoms in plants; important inorganic fertilizers and their reactions in soils. Use of saline and sodic water for crop production, Gypsum requirement for reclamation of sodic soils and neutralising RSC; Liquid fertilisers and their solubility and compatibility.

TEXT BOOKS

- 1. William L Donn. 1965. Meteorology. McGraw-Hill Book Co. New York.
- 2. Arnon L. 1972. Crop Production in Dry Regions. Leonard Hill Publishing Co. London.
- 3. Yawalkar K S and Agarwal J P. 1977. Manures and Fertilizers. Agricultural Horticultural Publishing House, Nagpur.
- 4. Gupta O P. 1984. Scientific Weed Management in the Tropics and Sub-Tropics. Today and Tomorrow's Printers and Publishers. New Delhi.
- 5. Brady Nyle C and Ray R Well. 2002. Nature and properties of soils. Pearson Education Inc., New Delhi.
- 6. Indian Society of Soil Science. 1998. Fundamentals of Soil Science. IARI, New Delhi.

Reference Books

- 1. Rao V S. 1992. Principles of Weed Science. Oxford and IBH Publishing Co. Ltd. New Delhi.
- 2. Reddy Yellamanda T and Shankar Reddy G H. 1995. Principles of Agronomy. Kalyani Publishers Ludhiana.
- 3. Sehgal J. A. Textbook of Pedology Concepts and Applications. Kalyani Publishers, New Delhi.
- 4. Hillel D. 1982. Introduction to Soil Physics. Academic Press, London.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

B. Tech II Year II Semester

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(16CE156) HYDROLOGY

Course Outcomes:

• To introduce the student to the concept of hydrological aspects of water availability

and requirements and should be able to quantify, control and regulate the water resources **Course Outcomes:**

At the end of the course, students would be expected to:

- an understanding of the key drivers on water resources, hydrological processes and their integrated behavior in catchments,
- ability to construct and apply a range of hydrological models to surface water and groundwater problems including Hydrograph, Flood/Drought management, artificial recharge
- ability to conduct Spatial analysis of rainfall data and design water storage reservoirs

UNIT I

PRECIPITATION AND ABSTRACTIONS: Hydrological cycle- Meteorological measurements – Requirements, types and forms of precipitation - Rain Gauges-Spatial analysis of rainfall data using Thiessen and Isohyetal methods Interception - Evaporation. Horton's equation, pan evaporation measurements and evaporation suppression - Infiltration-Horton's equation - double ring infiltrometer, infiltration indices.

UNIT II

RUNOFF: Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Run off estimation using empirical – Strange's table and SCS methods – Stage discharge relationships- flow measurements- Hydrograph – Unit Hydrograph – IUH

UNIT III

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

UNIT IV

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

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UNIT V

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

TEXTBOOKS:

- 1. Subramanya.K. "Engineering Hydrology"- Tata McGraw Hill, 2010
- 2. Jayarami Reddy.P. "*Hydrology*", Tata McGraw Hill, 2008. 3. Linsley, R.K. and Franzini, J.B. "*Water Resources Engineering*", McGraw Hill International Book Company, 1995.

REFERENCES:

- 1. David Keith Todd. "Groundwater Hydrology", John Wiley & Sons, Inc. 2007
- 2. Ven Te Chow, Maidment, D.R. and Mays, L.W. "*Applied Hydrology*", McGraw Hill International Book Company, 1998.
- 3. Raghunath. H.M., "Hydrology", Wiley Eastern Ltd., 1998.

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B. Tech II Year II Semester

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(16CE105) SURVEYING

Course Objectives:

- To train the students on the basic principles of surveying for the measurement of distances and areas
- To measure bearing of a line with prismatic compass and horizontal angles between the lines and vertical angles of elevated or depressed objects by transit theodolite.
- To apply for horizontal and vertical distance computation by tachometry survey.
- To set out different types of curves in the field

Course Outcomes:

- be in a position to apply the basic principle of surveying and usage of surveying instruments in all civil engineering activities, including the construction of buildings, bridges, roads and high ways, pipe lines, dams, ports and harbors
- be an expert of demarcation of ownership and / or delimitation of land, property, etc. through surveying process.
- surveying techniques to collect data for planning, designing and execution, able to employ green field.
- use total station and able to assess the electromagnetic distances.

UNIT – I

PRINCIPLES OF SURVEYING: Surveying – Definition; primary divisions, Classification, Principles of surveying; Scales used for Maps and plans, Duties of a surveyor. Errors: Accuracy and Precision, Sources and types of errors.

ANGLES, AZIMUTHS AND BEARINGS: Units of angle measurement. Meridians, Azimuths bearings. Magnetic declination, Local attraction and corrections to angles and bearing of lines.

TYPES OF SURVEYING: Introduction to Chain, Compass and Plan Table Survey.

UNIT - II

LEVELLING: Introduction, basic definitions, methods of leveling, leveling instruments: dumpy level, levelling staff, Temporary adjustments of dumpy level, theory of simple and differential leveling, Level field book, Classification of direct leveling methods, Reciprocal leveling, Profile leveling and Cross sectioning, Curvature and Refraction, Difficulties in leveling, errors in leveling, Degree of Precision.

CONTOURING: Introduction, contour interval, Characteristics of contours Methods of locating contours - Direct and indirect methods; Interpolation and sketching of contours, Contour gradient- Uses of contour maps.

UNIT - III

THEODOLITE: Vernier Theodolite: Basic definitions; Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle; Repetition and

Reiteration methods of horizontal angle measurement. Measurement of vertical angle; Sources of errors in Theodolite survey. Traversing, omitted measurements, Closing error. Determination of the level of the top of an object, when its base is accessible and inaccessible; Determination of the height of the object when the two instrument stations are not in the same vertical plane; **TACHEOMETRIC SURVEYING:** Definition, Advantages of Tachometric surveying-Basic systems of tachometric measurement, Determination of constants K and C, inclined sight with staff vertical; Inclined sight with staff normal to the line of sight, Movable hair method, Tangential method.

UNIT - IV

CURVES: Simple curves–Definitions and Notations - designation of a curve - Elements of simple Curves - Methods of setting simple curves, Rankine's method, Two theodolite method. Compound curves – Elements of compound curve - reverse curves – Elements of reverse curve - relationship between various elements.

UNIT - V

ELECTRONIC DISTANCE MEASUREMENTS: Introduction, Basic conceptselectromagnetic waves, basic definitions, phase of the wave, units, types of waves; distance from measurement of transit time, Computing the distance from the phase differences, EDM instruments, electronic theodolites, total station-models, fundamental measurements, recording, traversing, data retrieval.

TEXT BOOKS:

- 1. *Surveying Vol-I*, 16th Edition, Punmia B. C, Laxmi Publications.
- 2. *Surveying Vol-II*, 15th Edition, Punmia B.C, Laxmi Publications.
- 3. *Surveying and Leveling*, 2nd Edition, Basak N.N, Tata McGraw Hill Publishing Company Ltd.

REFERENCE BOOKS:

- 1. *Surveying and levelling part I & II*, 23rd Edition, Kanetkar.T.P. & S.V. Kulkarni, Puna Vidyarthi Girha, Prakashan,
- 2. *Fundamentals of Surveying and Levelling*, 1st Edition, R. Subramanian, Oxford University Press, India
- 3. Surveying Vol-I, 10th Edition, Arora K. R, Rajsons Publications Pvt. Ltd.

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B. Tech II Year II Semester

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(16ME344) THEORY OF MACHINES

Course Educational Objectives:

- To understand the basic concepts of mechanisms, cam, gear train and their kinematics.
- To understand the effects of friction in the motion of machine components.

Course Outcomes:

Students undergoing this course are able to

- Familiarity with common mechanisms used in machines and everyday life.
- Identify different mechanisms, Inversions of kinematic chains
- Ability to perform analysis of different types of links, position, velocity, acceleration analyses.

UNIT I

BASICS OF MECHANISMS: Elements, links, pairs, kinematics chain, and mechanisms. Classification of pairs and mechanisms. Lower and higher pairs. Four bar chains, slider crank chain and their inversions. Determination of velocity and acceleration using graphical (relative velocity and acceleration) method. Instantaneous centers.

UNIT II

GEARS: Types of gears. Law of gearing, velocity of sliding between two teeth in mesh. Involute and cycloidal profile for gear teeth. Spur gear, nomenclature, interference and undercutting. Introduction to helical, spiral, bevel and worm gear.

UNIT III

GEARS TRAINS: Simple, compound, reverted, and epicyclic trains. Determining velocity ratio by tabular method. Turning moment diagrams, co-efficient of fluctuation of speed and energy, weight of flywheel, flywheel applications.

UNIT IV

POWER TRANSMISSION SYSTEM: Belt drives, types of drives, belt materials. Length of belt, power transmitted, velocity ratio, belt size for flat and V belts. Effect of centrifugal tension, creep and slip on power transmission, Chain drives.

FRICTION: Types of friction, laws of dry friction. Friction of pivots and collars. Single disc, multiple disc, and cone clutches. Rolling friction, anti-friction bearings.

UNIT V

GOVERNORS: Types of governors. constructional details and analysis of Watt, Porter, Proell governors. Effect of friction, controlling force curves. Sensitiveness, stability, hunting, isochronism, power and effort of a governor. Static and dynamic balancing. Balancing of rotating masses in one and different planes. Partial primary balancing of reciprocating meases.

TEXT BOOKS:

- 1. *Theory of Machine*, S.S. Rattan, Tata McGraw-Hill, 3rd Edition, 2013.
- 2. Theory of Machine, R.S Khurmi, S Chand Publications, 14th Edition, 2005.
- 3.*Kinematics and dynamics of machinery*, R.L. Norton, Tata McGraw-Hill, 1st Edition, 2013.

REFERENCES:

- 1. *Theory of Machines and Mechanisms*, J.E. Shigley 4rd Edition Oxford International Student Edition
- 2. *Theory of Machines*, Thomas bevan, Pearson (P), 3 rd Edition, 2012
- 3. Mechanics of Machines, Ramamurthy, V. Narosa Publishing House, 2002.

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(16ME345) TRACTOR AND AUTOMOTIVE ENGINES

Course Educational Objectives:

Course Objective:

- The objective of this subject is to impart the knowledge of tractor engine components, working principles of IC engines, auxiliary systems, the combustion aspects of SI and CI engines in addition to the methods of improving performance.
- The students shall become aware on the latest developments in the field of IC engines like MPFI, CRDI etc. The student also shall apply the thermodynamic concepts in IC engines.

Course Outcomes:

After completion of the course the student will be able to:

- Know the working principles of IC engines, auxiliary systems, the combustion aspects of SI and CI engines in addition to the methods of improving performance.
- Know the thermodynamic concepts in IC engines.

UNIT I

Sources of farm power: Farm mechanization, Introduction of tractor, Classification of tractors, Various components of tractor, Thermodynamic System, State, Property, Process and Cycle, Laws of thermodynamics.

I.C. Engines: Definition of Engine and Heat Engine, I.C Engine Classification – Parts of I.C. Engines,

UNIT II

Working of I.C. Engines: Two Stroke & Four Stroke I.C. Engines SI & CI Engines, Valve and Port Timing Diagrams.

Gas Power Cycle: Carnot Cycle, Otto Cycle, Diesel Cycle, Dual Cycle, their applications, comparison of Otto, Diesel and Dual cycles

UNIT III

Fuel System: S.I. Engine: Fuel Supply Systems, carburetor types Air Filters, Mechanical and Electrical Fuel Pump – Filters– Gasoline Injection Systems.

Cooling & Lubrication System: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo Siphon, Water and Forced Circulation System; Lubrication Systems-Flash, Pressurized and Mist Lubrication.

Ignition System: Function of An Ignition System, Battery coil Ignition System, Magneto Coil Ignition System, Electronic Ignition System using Contact Breaker, Electronic Ignition using Contact Triggers – Spark Advance and Retard Mechanism.

UNIT IV

Fuels and Combustion:

S I engine: Normal Combustion and Abnormal Combustion – Importance of Flame Speed and Effect of Engine Variables – Type of Abnormal Combustion, Pre-Ignition and Knocking

(Explanation) – Fuel Requirements and Fuel Rating, Anti Knock Additives, Combustion Chambers.

I. Engine: Stages of Combustion – Delay Period and Its Importance – Effect of Engine Variables – Diesel Knock– Combustion Chambers (DI And IDI), Fuel Requirements and Fuel Rating.

UNIT V

Testing and Performance of I.C. Engines: Measurement of Cylinder Pressure, Fuel Consumption, Air Intake, Exhaust Gas Composition, Brake Power – Determination of Frictional Losses and Indicated Power – Performance Test – Heat Balance Sheet and Chart.

Students are advised to refer the text book of "Internal Combustion Engine Fundamentals" by John B. Heywood.

Text Books:

- 1. Internal Combustion Engines / V. Ganesan- TMH, 4th Edition, 2012
- 2. Thermal Engineering / Rajput / Lakshmi Publications, 9th Edition, 2013

Reference Books:

- 1. I.C. Engines fundamentals, Heywood, McGraw-Hill, 1st Edition, 2011
- 2. IC Engines Mathur & Sharma DhanpathRai & Sons, ,2010
- 3. Engineering fundamentals of IC Engines Pulkrabek, Pearson, PHI, 2nd Edition, 2009
- 4. Thermal Engineering, Rudramoorthy TMH, 10th Edition, 2010
- 5. Thermodynamics & Heat Engines, B. Yadav, Central publishing house., Allahabad, 2002
- 6. Thermal Engineering R.S. Khurmi & J.K. Gupta S. Chand, 15th Edition, 2012

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B. Tech. II Year II Semester

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(16CE157) SURVEYING LAB

Course Objectives:

- To train the students in plotting of land by chain and tape plan table surveys.
- To train the students in determine distance between two inaccessible points by prismatic compass and plane table and theodolite methods.
- To train the students in plotting of contour maps by conducting leveling survey and total station and tachometric methods.
- To introduce in curriculum. Drawing of Plans and Maps and determining the area are pre-requisites before taking up any Civil Engineering works.
- To set out simple curves for high ways and railways and to determine height of remote objective, horizontal distance and coordinates of points using total station.

Course Outcomes:

After completion of the course the student will be able to:

- Gain knowledge and expertise in operation of various survey instruments for computation of area of a land.
- Gains in accurate measurement of horizontal and vertical angles by theodolite and total station.
- Attains skills in computing the horizontal as well as vertical distance using tangential tachometry and expertise in handling of dumpy level, theodolite and total station for developing contour maps and longer sighting of objective distance and difference in elevation.

LIST OF EXPERIMENTS:

1. Survey of an area by chain survey (Closed traverse) & Plotting.

- 2. Chaining across obstacles.
- 3. Determination of distance between two inaccessible points with compass.
- 4. Surveying of a given area by prismatic compass (Closed traverse) and plotting after adjustment.
- 5. Radiation method, intersection methods by plane Table survey.
- 6. Compound leveling (differential leveling).
- 7. An exercise of L.S. and C.S. and plotting.
- 8. Measurement of horizontal angles by method of repetition and reiteration.
- 9. Determination of height of building by trigonometric survey
- 10. Heights and distance using Principles of tachometric surveying
- 11. Determination of area using total station.
- 12. Traversing using total station.
- 13. Contouring using total station.
- 14. Determination of remote height using total station.

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(16AG703) AGRONOMY AND SOIL SCIENCE LAB

Course Objectives:

- At the end of the course student attains adequate knowledge in crop production.
- At the end of the course student attains adequate knowledge in assessing both Physical and Engineering behavior of soils through laboratory testing procedures.

Course Outcomes:

After completion of the course the student will be able to:

- Different crops and cropping techniques
- Know the techniques to determine index properties and engineering properties such as shear strength, compressibility and permeability by conducting appropriate tests.

List of Experiments:

Agronomy

- 1. Identification of crops and their varieties, seeds, manures, fertilizers and weeds;
- 2. Fertilizer application methods;
- 3. Different weed control methods;
- 4. Practice of ploughing,
- 5. Practice of Puddling,
- 6. Practice of sowing.

Practical-- soil science

- 1. Identification of rocks and minerals;
- 2. Examination of soil profile in the field;
- 3. Determination of organic carbon of soil;
- 4. Determination of Nitrogen,
- 5. Determination of Phosphorus and Potassium;
- 6. Identification of nutrient deficiency symptoms of crops in the field;
- 7. Determination of gypsum requirement of sodic soils;
- 8. Determination of water quality parameters.

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(16HS614) COMPREHENSIVE SOFT-SKILLS (Common to All Branches)

Course Description:

Soft Skills is an intangible idea in which the qualities like attitude, ability, integrity, reliability, positivity, flexibility, dependability, punctuality, management, cooperation, habits and practices are combined proficiently to capitalize on a person's work efficacy. Soft Skills do the work of combining all these components in accurate share into skills and shaping them into competencies. Companies opt for, maintain and prop up persons, who are trustworthy, ingenious, principled and good communicators and who are prepared to work under stress. These lessons are developed with a view to create awareness of the importance of the soft skills and assist the learners to improve them.

Course Objectives:

The main objectives of this course are:

- To help the students understand interpersonal skills.
- To support them in building interpersonal skills.
- To enhance the ability to work with others.

Course Outcomes:

- To know the importance of Soft Skills.
- To apply Soft Skills in the different environment.
- To enrich the different levels of Soft Skills to develop their personality.

UNIT I:

Nonverbal Communication – Body Cues – Smiling, Posture, Gesture, Eye-contact – Stage appearance – Interpersonal and Intrapersonal Skill Telephonic Etiquette – Dos and Don'ts of Telephonic Conversation

UNIT II:

Self-exploration – Self Discovery – Self acceptance – Self-esteem – Self-confidence – Personal grooming – Attitudes – Confidence building. Interpersonal relationship in the present context – Kinds of relationships – Team building – Formation of team

UNIT III:

Vision and Goal setting – Personal goal – Career goal – Types of Organization – Deep dive of company profiles – Win-win situation – Proactive skills – Entrepreneurial skills and model startups- Developing Mind skills – quizzes – General knowledge – Puzzles – Reading Comprehension - Spell Bee - Seminar – Who is who? – Biographies

UNIT IV:

Flight Leadership: Assessing Leadership qualities – Experiential learning of leadership skills exercise in team work Time and Stress Management: Importance of Time Management – The art of prioritizing and scheduling – Stress and Source of Stress Types of Stress – Managing stress

UNIT V:

Change: Coping skills – Critical and Adaptive Mindsets – Changes in Career/ Life/ people – Just A Minute – Mock GDs and Mock Interviews

References:

- 1. Business Communication, Aruna Koneru, McGraw Hill Education, 2008
- 2. Effective Tech Communication, Rizvi, Tata McGraw Hill Education, 2007.
- 3. Reading Extra, Liz Driscoll, Cambridge University Press, 2004.
- 4. Speak Well, Jayashree Mohanraj et al, Orient Blackswan, 2013.
| (16AG704) AGRICULTURAL PROCESS | ENGINEERING |
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Course objectives:

• To train students on unit operations of agricultural process engineering. Acquaint with preliminary operations such as cleaning, size reduction, mixing, separation, filtration and materials handling equipment.

Course outcomes:

Studies will be familiar with

- Be proficient in the use of processing machinery and scope of the process engineering.
- Be proficient in an ability to identify, formulate and solve engineering problems.
- Various basic terms related to machine design aspects.
- Some of the basic concepts related to food processing cleaning and grading of cereals.

UNIT-I:

Scope and importance crop processing – principles and methods of food process cleaning and grading of cereals. Pulses & oilseeds – Principles. Size reduction –principle of combination / size reduction, mechanisms of combination 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 (Ratzinger'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, and powder-liquid contacting devices), mixers for high viscosity liquids and pastes, mixers for dry powders and particulate solids. Aerodynamics of agricultural products – drag coefficient – frictional drag and profile drag or pressure drag – and terminal velocity.

UNIT-III:

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. Airscreen grain cleaner principle 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. 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.

UNIT –IV:

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

UNIT –V:

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.

TEXT BOOK:

- 1. Transport Processes and separation Process Principle, Geankoplis C J 2015 Prentice-Hall Inc., New Jersey.
- 2. Unit operations in Food processing, Earle R L 1983. Pergamon Press, New York

- 1. Post-Harvest Technology of Cereals, Pulses and oil seeds, Chakraverty A 2018. Oxford and IBH Publishing Co. Ltd., Calcutta.
- 2. Unit Operations of Chemical Engineering, McCabe WL, Smith JC and Harriott P 2017 McGraw-Hill Book Co., Boston.
- Unit Operations of Agricultural Processing, Sahay KM and Singh KK 2004, Vikas Publishing House Pvt. Ltd., New Delhi.

(16AG705) SOIL AND WATER CONSERVATION ENGINEERING

| B. Tech III Year I Semester | L | Т | Р | С |
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Course objectives:

- To enable the students to acquire knowledge on different soil loss 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.

Course outcomes:

Studies will be familiar with

- Various basic terms related to Soil Erosions, Rainfall-Runoff relationships.
- Some of the basic concepts related to soil conservation.
- Simple terms related to soil loss estimation models.
- Recognize importance of various soil conservation structures and their designs.
- Understand the importance of hydrometry.

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, and wind erosion control measures – Vegetative, mechanical measures, wind blades and shelter belts, sand dunes stabilization – Wind erosion and its control.

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 – III:

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.

Contour trenching – Staggered and continuous trench – Adaptability and types.

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.

UNIT – IV:

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 - V:

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:

- 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.
- Manual of Soil and Water Conservation Practicals. Gurmel Singh. Venkataramanam C. Sastry G and Joshi BP. 2017.Oxford and IBH Publishing Co. Ltd., New Delhi.
- 3. Chow, V. T. (2009). Open Channel Hydraulics. McGraw Hill.
- Soil and Water Conservation Research in India. Dhruvanarayana, V. V. (2012). ICAR, New Delhi.
- Erosion and Sediment Control. Goldman, S. J, Jackson K. and Bursztynsky, T. A.(1986). Handbook. McGraw-Hill Book Company.
- Principles of Agricultural Engineering. Michael, A. M. and Ojha, T.P. (2013). (Vol. II). Jain brothers, New Delhi.

- 1. Land and Water Management Engineering. Murthy VVN (2013). Kalyani Publishers, New Delhi.
- 2. Introduction to Soil and Water Conservation Engineering. Mal B.C. (2011) Kalyani Publishers, Rajinder Nagar, Ludhiana.
- 3. Soil and water Conservation Engineering. Suresh, R. (2014). Standard Publishers and Distributors.
- 4. Soil and water conservation engineering. Schwab, G.O, Frevert, R.K., Edminister T.W., and Barnes, K.K. (1993). John Wiley and sons.
- 5. Design of Small Canal Structures. USBR. (2017). U S Bureau of Reclamation.

(16AG706) IRRIGATION AND DRAINAGE ENGINEERING

| B. Tech III Year I Semester | L | Т | Р | С |
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Course objectives:

- To introduce the concept of micro irrigation
- To design Sprinkler and Drip irrigation systems.
- To understand the basic concepts for planning, design and management of land drainage works in cultivated areas
- To study the various methods of land drainage and its impact on environment

Course outcomes:

Studies will be familiar with

- Various basic terms related to development of irrigation in India and AP and classification if irrigation projects.
- Some of the basic concepts related to water conservation.
- Simple terms related to soil loss estimation models.
- Recognize importance of various micro irrigation systems and designs.
- Understand the importance of drainage system, drainage problems.

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).

UNIT –II:

SPRINKLER AND DRIP IRRIGATION – adaptability, problems and prospects, types of sprinkler irrigation systems; design of sprinkler irrigation system: layout selection, hydraulic design of lateral, sub-main and main pipe line, design steps; selection of pump and power Module for sprinkler irrigation system, performance evaluation of sprinkler irrigation system uniformity coefficient and pattern efficiency.

UNIT – III:

MAINTENANCE OF MICRO IRRIGATION SYSTEM– clogging problems, filter cleaning, flushing and chemical treatment; fertigation: advantages and limitations of fertigation, fertilizers solubility and their compatibility, precautions for successful fertigation system, fertigation frequency, duration and injection rate, methods of fertigation.

UNIT – IV:

WATER LOGGING – causes and impacts; drainage, objectives of drainage, familiarization with the drainage problems of the state

SURFACE DRAINAGE– Surface drainage coefficient, types of surface drainage, design of surface drains; sub-surface drainage: purpose and benefits, investigations of design parameters-hydraulic conductivity, drainable porosity, water table; derivation of Hooghoudt's and Ernst's drain spacing equations.

SUB-SURFACE DRAINAGE SYSTEM–Design of subsurface drainage system; drainage materials, Drainage pipes, drain envelope; layout, construction and installation of drains. Drainage structures.

SPECIAL DRAINAGE SYSTEMS: vertical drainage; bio-drainage; mole drains. Salt balance, reclamation of saline and alkaline soils, leaching requirements, conjunctive use of fresh and saline water.

UNIT – V:

HYDRAULICS OF DRAINAGE PIPES-Manning's equation for pipe flow-hydraulic gradient and slope; Investigations of drain design parameters through drain testing-hydraulic conductivity, transmissivity, drainable porosity; Observation wells and their installation; Recording water table data and drain discharges; Flow equations used in drainage testing-steady state and non-steady state conditions; Drainage design criteria and system economics.

TEXT BOOKS:

- 1. Irrigation Engineering and Hydraulic Structures —Garg,S. K. (2017). Khanna Publishers, New Delhi.
- 2. Irrigation Principles and Practices —Israelson and Hassan. (2016). John Wiley and sons, New York.
- 3. Irrigation Theory and Practice Michael, A.M. (2008). Vikas Publishing House, New Delhi.
- 4. Drainage Engineering Luthin, J. N (2015). John Wiley & Sons, New York.
- 5. Irrigation Water Resources and Water Power Engineering. Modi, P. (2014). Standard Book House, New Delhi.
- 6. Drainage Principles and Applications Ritzema H. P. (1994). (2 ed.). ILRI Publication

- 1. Principles of Farm Irrigation system Design —John Wiley & Sons (1988), New York.
- 2. Majumdar, D. K. (2014). Irrigation Water Management Principles and Practice.Prentice-Hall of India, New Delhi.
- 3. Michael, A. M. and Ojha, T.P. (2013). Principles of Agricultural Engineering (Vol. II).Jain brothers, New Delhi.
- 4. Murthy, C. S. (2002). Water Resources Engineering Principles and Practice —New Age International (P) Ltd. New Delhi.
- 5. Murthy, V. (2013). Land and Water Management Kalyani Publishing, New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG707) FARM MACHINERY AND EQUIPMENT –I

| B. Tech III Year I Semester | L | Т | Р | С |
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Course objectives:

• 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.

Course outcomes:

Studies will be familiar with

- *Apply basic knowledge of the* Farm Mechanization importance.
- To apply the transplanting concepts into various fields
- Various basic terms related to seed metering mechanisms.
- Some of the basic concepts related to forces acting on tillage tools.
- Simple terms related to soil and machine.

UNIT – I:

INTRODUCTION -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:

TILLAGE- Classification and types of tillage, concept of tillage i.e. primary and secondary tillage. Primary tillage implements-Mould board plough and its parts, Disc plough, and other ploughs and subsoiler. Secondary tillage equipment's- Disc harrows, spike tooth harrow, blade harrow and Rotavator, implements-Cultivators and intercultural implements. Forces acting on tillage tools, Problems on forces analysis, Draft measurement of tillage equipment's, Draft and unit draft related problems.

UNIT – III:

EARTH MOVING EQUIPMENT-Terminology, Earth moving equipment's, construction and their working principles, Earth moving equipment- shovels, Bulldozers, Earth moving equipment's-Trenches and elevators.

UNIT – IV:

SEEDING METHOD- 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 types of nozzles and their uses and dusters. Sprayer's calibration and selection. Constructional features of different components of sprayers and dusters and their adjustments.

$\mathbf{UNIT} - \mathbf{V}$:

TRANSPLANTING METHODS- What is transplanting, different types of Transplanting machinery and their working principle, adjustments in transplanting equipment. Fertilizer application equipment – fertilizer meeting mechanism calibration of fertilizer equipment.

TEXT BOOKS:

- 1. Farm Machinery and Equipment Smith H P 2011. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
- 2. Principals of Farm Machinery —Kepner R A, Bainer R and Barger E L 2016. CBS Publishers and Distributors, Delhi.
- 3. Elements of Agricultural Engineering —Jagadeshwar Sahay 2015. Agro Book Agency, Patna.

- 1. Land Reclamation Machinery —Borshahov Mansurov Sergecv 1988. Mir Publishers, Moscow.
- 2. Principals of Agricultural Engineering Michael A. M and OJha T. P 2010. Vol.I, Jain Brothers, New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16ME307) ENGINEERING THERMODYNAMICS

| B. Tech III Year I Semester | L | Т | Р | С |
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Course Objectives:

- To understand the basic laws of thermodynamics and their application to the non-flow and flow processes.
- To understand the thermodynamic properties of ideal and real gases, gaseous mixtures.
- To get the awareness on thermodynamic principles, skills to perform the analysis and design of thermodynamic systems.

Course Outcomes:

Students undergoing this course are able to

- Apply the laws of thermodynamics to analyze thermal systems.
- Can understand the energy transformation from one system to other system.
- Can understand the working principles of I.C. Engines.

UNIT I

BASIC CONCEPTS - Basic concepts, Concept of continuum, Microscopic and Macroscopic approach, Thermodynamic systems (closed, open, isolated),homogeneous & heterogeneous systems control volume, property, point and path functions, Thermodynamic equilibrium, State, Path and process, Reversible and Quasi-static process, Work, Modes of work, Zeroth law, Concept of temperature and heat.

UNIT II

FIRST LAW OF THERMODYNAMICS- First law, Application to closed and open systems, Internal energy, Enthalpy, Specific heat capacities ($C_p \& C_v$), Steady flow process mass balance and energy balance for a single steady flow with reference to various engineering devices.

UNIT III

SECOND LAW OF THERMODYNAMICS - Second law – Kelvin, Planck and Clausius statements, Heat engine, Refrigerator and Heat pump, Efficiency and COP, Thermodynamic temperature scale, Reversibility and Irreversibility, Carnot cycle, Clausius Inequality, Concept of entropy, Entropy of ideal gases, Principle of increase of entropy, Quality of energy, Energy (Availability), Reversible work, Energy and Irreversibility for closed system and control volume, Second law efficiency.

UNIT IV

IDEAL & REAL GASES - Properties of ideal and real gases, Avogadro_s hypothesis and gas laws, Vander Walls and other equations of state, Principle of corresponding states, Compressibility factor, Generalized compressibility charts. Non- reactive ideal gas mixtures, Mass and Mole fractions, Dalton_s law of additive pressures, Amagat_s law of additive volumes, Properties of ideal gas mixtures

UNIT V

GENERAL THERMODYNAMIC PROPERTY RELATIONS: Partial derivatives and associated relations, Differential relations for U, H, G and A, Maxwell_s relations, Clausius Clapeyron equation, Joule Thomson coefficient, Air and Gas tables.

AIR STANDARD CYCLES: Carnot Cycle, Sterling Cycle, Ericson Cycle, Otto Cycle, Diesel Cycle, Dual Cycle, their applications, comparison of Otto, Diesel and Dual cycles, Second Law Analysis of Gas Power Cycles

TEXT BOOK:

- 1. Engineering Thermodynamics, P K Nag, Tata McGraw Hill, 6th Edition, 2013
- 2. Thermal Engineering, R.K.Rajput, , Lakshmi Publications, 7th Edition, 2015
- 3. Thermal Engineering, P.L.Balleny, Khanna Publications, 9th Edition.2009

- 1. Thermodynamics An Engineering Approach, Yunus A Cengel / Michael A Boles, Tata Mc Graw Hill India, 7e,Special Indian Edition 2011.
- 2. Thermodynamics and Heat Engines, Yadav R., Vol 1, Central Publishing House, 2011.
- 3. Engineering Thermodynamics, J.B. Jones and R.E.Dugan., Prentice Hall of India, 2010.
- 4. Basic Engineering Thermodynamics, T. Roy Choudry., , Tata McGraw Hill, Second Edition 2012.

(16AG708) DESIGN OF AGRICULTURAL MACHINERY

| B. Tech III Year I Semester | L | Τ | Р | С |
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Course objectives:

- 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.
- *To develop an ability to identify, formulate and solve engineering problems.*

Course outcomes:

Studies will be familiar with

- Be proficient in the use of software for analysis and design.
- *Be proficient in an ability to identify, formulate and solve engineering problems.*
- Various basic terms related to machine design aspects.
- Some of the basic concepts related to Fundamental units, Mass and Weight, inertia, Laws of motion, force, moment of force, couple mass density, torque, work, power and energy.

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, and 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.

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 – IV:

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 - V:

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, 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, lubrication of ball and roller bearings.

TEXT BOOKS:

- 1. Machine Design Khurmi R.S. and Gupta J.K. 2005, Eurasia Publishing House Pvt.Ltd.,New Delhi.
- 2. Machine Design-Robert.1.Norton.2018, Person Education.

- 1. Machine Design Jain R.K. 1991. Khanna Publishers, New Delhi.
- 2. Machine Design-P.C.Gope. 2012, Prentice hall India learning private limited.

(16AG709) SOIL AND WATER CONSERVATION ENGINEERING (LAB)

| B. Tech III Year I Semester | L | Т | Р | С |
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Course objectives:

- To enable the students to acquire knowledge on different soil loss 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.

Course outcomes:

Studies will be familiar with

- Various basic terms related to Soil Erosions, Rainfall-Runoff relationships.
- Some of the basic concepts related to soil conservation.
- Simple terms related to soil loss estimation models.
- *Recognize importance of various soil conservation structures and their designs.*
- Understand the importance of hydrometry.

LIST OF EXPERIMENTS

- 1. Estimation of Soil Loss from using Coshocton 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.

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.

VenkataramanamC.Sastry G and Joshi BP. 2017.Oxford and IBH Publishing Co. Ltd., New Delhi.

- 3. Chow, V. T. (2009). Open Channel Hydraulics. McGraw Hill.
- 4. Soil and Water Conservation Research in India. Dhruvanarayana, V. V. (2012). ICAR, New Delhi.
- 5. Erosion and Sediment Control. Goldman, S. J, Jackson K. and Bursztynsky, T. A.(1986). Handbook. McGraw-Hill Book Company.
- 6. Principles of Agricultural Engineering. Michael, A. M. and Ojha, T.P. (2013). (Vol. II). Jain brothers, New Delhi.

- 1. Land and Water Management Engineering. Murthy VVN (2013). Kalyani Publishers, New Delhi.
- 2. Introduction to Soil and Water Conservation Engineering. Mal B.C. (2011) Kalyani Publishers, Rajinder Nagar, Ludhiana.
- 3. Soil and water Conservation Engineering. Suresh, R. (2014). Standard Publishers and Distributors.
- 4. Design of Small Canal Structures. USBR. (2017). U S Bureau of Reclamatio

(16AG710) IRRIGATION AND DRAINAGE ENGINEERING (LAB)

| . Tech III Year I Semester | L | Т | Р | С |
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Course objectives:

- To introduce the concept of micro irrigation
- To design Sprinkler and Drip irrigation systems.
- To understand the basic concepts for planning, design and management of land drainage works in cultivated areas
- To study the various methods of land drainage and its impact on environment

Course outcomes:

Studies will be familiar with

- Various basic terms related to development of irrigation in India and AP and classification if irrigation projects.
- Some of the basic concepts related to water conservation.
- Simple terms related to soil loss estimation models.
- *Recognize importance of various micro irrigation systems and designs.*
- Understand the importance of drainage system, drainage problems.

LIST OF EXPERIMENTS

- 1. Measurement of soil moisture by different soil moisture measuring instruments.
- 2. Determination of soil moisture constants by pressure plate and pressure membrane apparatus.
- 3. Measurement of irrigation water and infiltration rate.
- 4. Computation of evapotranspiration.
- 5. Determination of crop water requirement.
- 6. Irrigation scheduling.
- 7. Land grading exercises.
- 8. Design of underground pipe line system.
- 9. Design of drip and sprinkler irrigation.
- 10. Measurement of uniformity coefficient of sprinkler irrigation method.
- 11. Measurement of uniformity coefficient of drip irrigation method.
- 12. Field problems and remedial measures for sprinkler and drip irrigation method.
- 13. In-situ measurement of hydraulic conductivity-Auger hole method.
- 14. Determination of drainage coefficients.
- 15. Preparation of water contour maps.
- 16. Measurement of hydraulic conductivity through drain testing.
- 17. Measurement of drainable porosity through drain testing.

- 18. Design of surface drainage systems.
- 19. Design of subsurface drainage systems.
- 20. Installation techniques of sub-surface drainage system.
- 21. Cost analysis of surface and sub-surface drainage system.

TEXT BOOKS:

- 1. Irrigation Engineering and Hydraulic Structures —Garg,S. K. (2017). Khanna Publishers, New Delhi.
- 2. Irrigation Principles and Practices —Israelson and Hassan. (2016). John Wiley and sons, New York.
- 3. Irrigation Theory and Practice Michael, A.M. (2008). Vikas Publishing House, New Delhi.
- 4. Drainage Engineering Luthin, J. N (2015). John Wiley & Sons, New York.
- 5. Irrigation Water Resources and Water Power Engineering. Modi, P. (2014). Standard Book House, New Delhi.
- 6. Drainage Principles and Applications Ritzema H. P. (1994). (2 ed.). ILRI Publication

- 1. Principles of Farm Irrigation system Design —John Wiley & Sons (1988), New York.
- Majumdar, D. K. (2014). Irrigation Water Management Principles and Practice.Prentice-Hall of India, New Delhi.
- 3. Michael, A. M. and Ojha, T.P. (2013). Principles of Agricultural Engineering (Vol. II).Jain brothers, New Delhi.
- Murthy, C. S. (2002). Water Resources Engineering Principles and Practice —New Age International (P) Ltd. New Delhi.
- 5. Murthy, V. (2013). Land and Water Management Kalyani Publishing, New Delhi.

(16HS616) APTITUDE PRACTICE-I

(Common to All Branches) B. Tech III Year I Semester L T P C 3 - - -

Course Objectives:

After thorough learning of Quantitative Aptitude and Reasoning, a student:

- Will be able to critically evaluate various real-life situations by resorting to Analysis of key issues and factors.
- Will be able to read between the lines and understand various language structures.
- Will be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

Course Outcomes:

At the end of the course, students would be expected to:

- Have developed the subtle way of approaching in the candidate.
- Have acquired the decision making with in no time.
- Have acquired logical thinking during professional tenure.
- Have obtained quick decision-making skills.

UNIT-I

Numbers: Classification of numbers, Divisibility rules, finding the units digit, decimal fractions, simplifications, LCM and HCF Models. Square roots and Cube roots.Averages: Averages, Mixtures and AllegationsAges: Problems on Ages

UNIT-II

Time and Distance: Relation between speed, distance and time, Converting mph into m/s and vice versa, Problems on average speed, Relative speed, Trains, Boats and Streams, circular tracks and Races. **Time and Work:** Problems on unitary method, Relation between Men, Days, Hours and Work. Problems on Man-Day-Hours method, Problems on alternate days, Problems on Pipes and Cisterns.

UNIT-III

Percentages: Converting percentage into decimals and vice versa. Equivalent percentage of fractions. **Partnership:** Introduction, Relation between capitals, Period of investments and shares **Ratio and proportion:** Ratio and its properties, Comparison of ratios, Problems on ratios, Compound Ratio, Problems on proportion, Mean proportional and continued proportion.

UNIT-IV

Profit and Loss: Problems on Profit and Loss, Relation between Cost Price and Selling price, Discount and Marked Price, two different articles sold at same Cost Price, two different articles sold at same Selling Price, Gain% and Loss%.

Simple Interest: Definitions, Problems on interest and amount, Problems on rate of interest and time period.

Compound Interest: Definition and formula for amount in compound interest, Difference between simple interest and compound interest for 2 years on the same, Principle and time period.

UNIT-V

Clocks: Finding the angle when the time is given, Finding the time when the angle is known, Relation between Angle, Minutes and Hours, Exceptional cases in clocks

Calendars: Definition of a Leap Year, Finding the number of Odd days, framing the year code for centuries, Finding the day of any random calendar date

Blood relations: Defining the various relations among the members of a family, Solving Blood Relation puzzles, solving the problems on Blood Relations using symbols and notations.

Text Books:

1. Thorpe's verbal reasoning, GL Barrons, McGraw Hills, LSAT Materials

2. A modern approach to Logical reasoning, R S Agarwal, S. Chand

Reference Books:

- 1. Quantitative Aptitude, R S Agarwal, S Chand,
- 2. Quantitative Aptitude, G. L BARRONS
- 3. Quantitative Aptitude, Abhijit Guha McGraw Hills
- 4. Magical Book on Quicker Maths, Tyra, BSC publishing company.

| (16HS605) ENVIRONMENTAL STUDIE | S |
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| B. Tech III Year II Semester | L | Т | Р | С |
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Course Objectives:

- Students have got an idea about the importance of pollution free air, water, soil and food.
- They know about global environmental problems like Acid Rains, Global Warming, Green House Effects,
 - Ozone layer depletion.
- To understand the impacts of developmental activities and mitigation measures along with the environmental policies and regulations.
- To recognize major concepts in environmental studies and demonstrate in-depth understanding the environment.

Course Outcomes:

- Based on this course, the Engineering Student will be able to understand/evaluate/develop technologies on the basis of Ecological principles and environmental regulations along with Legislation, Laws and Policies which in turn help in sustainable development.
- Take preventive measures to reduce air, water, soil pollutions and contaminants in food.
- Effectively carry out waste disposal at individual level.
- Involve in preservation of natural resources.

UNIT- I

INTRODUCTION: Definition, Scope and Importance-Need for Public Awareness. Natural Resources: Classification of resources-Forest resources: Use and over-exploitation, deforestation- Mining, dams and their effects on forests and tribal people – Water resources - Use and over utilization of surface and ground water- Floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources –Energy resources: Renewable and Non Renewable sources of energy- Solar energy, Hydro electrical energy, Wind energy, Nuclear energy, etc.

UNIT-II

ECOSYSTEMS: Concept of an ecosystem– structural features of ecosystem- Producers, Consumers and Decomposers–Biogeochemical cycles- Ecological succession-Food chains, food webs and ecological pyramids – Energy flow in the ecosystem-Types of ecosystems (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems.

UNIT-III

BIODIVERSITY AND ITS CONSERVATION: Introduction, Definition, genetic, species and ecosystem diversity, Bio-geographical classification of India, India as a Mega-diversity Nation, Hot

spots of biodiversity, Value of biodiversity, threats to biodiversity, endemic, endangered and extinct species of India, In-Situ and Ex-situ conservation of biodiversity.

UNIT-IV

NATURAL DISASTERS: Droughts, Floods, Cyclone, Landslides, Earthquake, Pollution episodes: Air pollution, Water pollution, Land pollution, Noise pollution, Automobile pollution and nuclear pollution –Effects-Global warming, Acid Rain and Ozone layer depletion and controlling measures.

GLOBAL ENVIRONMENTAL ISSUES: Population Growth, Urbanizations, Land Management, Water and Waste Water Management. Climate change and impacts on human environment.

SOLID WASTE MANAGEMENT: Causes, effects and control measures of Municipal solid wastes – E-waste and management, Role of an individual in prevention of pollution – pollution case studies.

UNIT-V

ENVIRONMENTAL LEGISLATION, ENVIRONMENTAL PROTECTION ACT – Air Prevention and Control of Pollution act–Water Prevention and control of Pollution act– Wildlife protection act – Forest conservation act – Municipal Solid Waste management, International conventions/Protocols Earth summit, Kyoto protocol and Montreal Protocol. From Unsustainable to sustainable development, Role of NGO_s for Sustainable development, Concepts of Green belt development, Role of IT in Environment-Remote Sensing and GIS methods for Sustainable development.

FIELD WORK- visit to a local area to document environmental assets-river forest grassland/hill, mountain and polluted sites (urban/rural/industrial/Agriculture)- study simple ecosystems (pond/river/hill slopes)

TEXT BOOKS:

- 1. Environmental Sciences A.Kaushik and C.P.Kaushik, 5th edition, New age International publishers, 2015.
- 2. Text Book of Environmental Science and Technology by M.Anji Reddy, BS Publications.2012

REFERENCES:

- Environmental Studies Anil Kumar and Arnab Kumar De, , New Age International Publishers, New Delhi, 3rd Edition 2015
- 2. -Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards R.K. Trivedi,

Vol.I and II, Enviro Media.

3. Environmental Studies by Dr.K.Mukkanthi, Chand Publishers.

| (16AG/11) AGRO | INDUSTRIES AND | D BI-PRODUCT | UTILIZATION |
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| B. Tech III Year II Semester | L | Т | Р | С |
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Course objectives:

• 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.

Course outcomes:

Studies will be familiar with

- Familiar about byproducts utilization and energy saving.
- Be familiar about oil production from byproducts.
- Production of paper and wax from agril. Wastes.
- Familiar about Planning waste management systems

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. 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 – II:

Fresh kernel based products and product diversification – Desiccated coconut, canned coconut cream, and 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 – III:

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.

UNIT – IV:

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 –V:

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. Flock 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.

TEXT BOOKS:

- 1. O.P. Vimal. Energy from Biomass, Agricole Publishing Academy, New Delhi.
- 2. O.P. Vimal and M.S. Bhatt. Wood Energy System, Agricole, Pub. New Delhi.
- 3. N.S. Rathore, N.L. Panwar& S. Kothari. Biomass Production and Utilization Technology, HimanshuPulications, Udaipur.

- 1. Agricultural Waste Manual, Vandersholm D H 1984. New Zealand
- 2. N.S. Rathore, A.K. Kurchania. N.L. Panwar. (2007). Non-Conventional Energy Sources, Himanshu Publications.
- 3. A.Chakravethy, Biotechnology and other alternative technologies

(16AG712) FARM MACHINERY AND RENEWABLE ENERGY RESOURCES

| B. Tech III Year II Semester | L | Т | Р | С |
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Course objectives:

- 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.
- To enable the students to know about the basic principles of different Renewable energy sources like solar, Wind, Biogas, Ocean energy sources and their concepts, benefits and limitations.

Course outcomes:

Studies will be familiar with

- Apply basic knowledge of the Farm Mechanization importance.
- To apply the transplanting concepts into various fields
- Various basic terms related to seed metering mechanisms.
- Some of the basic concepts related to forces acting on tillage tools.
- Simple terms related to soil and machine.
- Apply knowledge about renewable energy sources and their importance in feature.
- *Knowledge about biogas and gas production in simple ways.*

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, components of mower, conventional type of 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,

UNIT –II:

THRESHING – 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, and terminology connected with power thresher. Development of the binder, development of the combine.

UNIT – III:

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

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 row harvester, digging and soil separation, vine removal by harvesters, separation of stones and clods.

UNIT – IV:

RENEWABLE ENERGY RESOURCES: Concepts and limitation of RES, Classification of RES, Solar, Wind, Geothermal, Biomass, Ocean energy sources, Comparison of renewable energy sources with non-renewable sources.

SOLAR ENERGY: Energy available from Sun, Solar radiation data, Solar energy conversion into heat through, Flat plate and Concentrating collectors, different solar thermal devices, Principle of natural and forced convection drying system, Solar photo voltaic: P-N junctions. Solar cells, PV systems, stand alone, Grid connected solar power station, Calculation of energy through photovoltaic power generation and cost economics.

UNIT – V:

WIND ENERGY AND BIOGAS: Energy available from wind, General formula, Lift and Drag. Basis of wind energy conversion, effect of density, Frequency variances, Angle of attack, Wind speed, Types of windmill rotors, Determination of torque coefficient, Induction type generators, Working Principle of wind power plant.

BIOGAS: Types of biogas plants, biogas generation, factors affecting biogas generation and usages, design consideration, advantages and disadvantages of biogas spent slurry.

TEXT BOOKS:

1. Principals of Farm Machinery —Kepner R.A., Bainer R and Barger E.L, 2010. CBS Publishers and Distributors, Delhi.

- 2. Engineering principles of Agricultural machines Ajith k Srivatsava, Carrol E. Goering, RogerP. Rohrbach, 2005, ASAE Publishers.
- 3. Rai, G.D.2013. Non-Conventional Energy Sources, Khanna Publishers, Delhi.
- 4. Rai, G.D., Solar Energy Utilization, Khanna Publishers, Delhi.

- 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 SharmaV.K. Daya Publishing House, New Delhi.
- 3. Rthore N.s., Kurchania A.k., Panwar N.L.2007. Non-Conventional Energy Sources, Himanshu Publications, Udaipur.
- 4. Tiwari, G.N. and Ghoshal, M.K. 2005. Renewable Energy Resources: Bsic Principles and Applications. Narosa Pub. House. Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16ME343) HEAT & MASS TRANSFER

| B. Tech III Year II Semester | L | Т | Р | С |
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Course objectives:

• This course is designed to introduce a basic study of the phenomena of heat and mass transfer, to develop methodologies for solving a wide variety of practical engineering problems, and to provide useful information concerning the performance and design of particular systems and processes. A knowledge-based design problem requiring the formulations of solid conduction and fluid convection and the technique of numerical computation progressively elucidated in different chapters will be assigned and studied in detail

Course outcomes:

- Understand the basic laws of heat transfer.
- Account for the consequence of heat transfer in thermal analyses of engineering systems.
- Analyze problems involving steady state heat conduction in simple geometries.
- Develop solutions for transient heat conduction in simple geometries.
- Obtain numerical solutions for conduction and radiation heat transfer problems.
- Understand the fundamentals of convective heat transfer process.

UNIT – I:

CONDUCTION: Mechanism of Heat Transfer – Conduction, Convection and Radiation – General Differential equation of Heat Conduction – Fourier Law of Conduction – Cartesian Cylindrical and Spherical Coordinates

UNIT –II:

ONE DIMENSIONAL STEADY STATE HEAT CONDUCTION – Conduction through Plane Wall, Cylinders and Spherical systems – Composite Systems – Conduction with Internal Heat Generation **TRANSIENT HEAT CONDUCTION**– Lumped Analysis – Infinite and Semi Infinite Solids-Extended Surfaces-Types of fins-Effectiveness and efficiencies of fins.

UNIT – III:

CONVECTION - Basic Concepts – Convective Heat Transfer Coefficients – Boundary Layer Concept – Forced Convection – External Flow – Flow over Plates, Cylinders Spheres and Bank of tubes – Internal Flow – Free Convection

UNIT – IV:

PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS - Condensation heat transfer-Drop wise and film wise condensation -Nusselt's theory of condensation- Boiling Heat transfer-Types of boiling Regimes of pool boiling and flow boiling, correlations in boiling and condensation.

HEAT EXCHANGER -Types - Overall Heat Transfer Coefficient – Fouling Factors - Analysis – LMTD method, NTU method.

UNIT - V:

RADIATION -Basic Concepts, Laws of Radiation – Wiens Displacement Law - Stefan Boltzman Law, Kirchoff Law .

MASS TRANSFER - Basic Concepts – Diffusion Mass Transfer – Fick's Law of Diffusion — Convective Mass Transfer – Convective Mass Transfer Correlations.

TEXT BOOKS:

- 1. Rajput, R. K., HEAT & MASS TRANSFER, Laxmi Publications, 3rd Edition, New Delhi, 2006.
- 2. Sachdeva, R.C., Fundamentals of Heat and Mass Transfer, 4th Edition, New Age International (P) Ltd., New Delhi, 2012.

- 1. Kothadaraman, C. P., Fundamentals of Heat and Mass Transfer, 4th Edn, New Age International (P) Ltd., New Delhi, 1998
- 2. Yunus A. Cengel, Heat Transfer A Practical Approach Tata Mc Graw Hill 2004
- 3. Frank P. Incropera and David P. Dewitt, Fundamentals of Heat Mass Transfer, John Wiley & Sons, 1998.
- 4. Ghoshdastidar, P.S, Heat Transfer, Oxford, 2004,
- 5. P.K. Nag,, Heat Transfer, Tata Mc Graw Hill, New Delhi, 2002
- 6. Holman, J.P., Heat and Mass Transfer, Tata Mc Graw Hill, 2000
- 7. Ozisik, M.N., Heat Transfer, McGraw Hill Book Co., 1994.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG713) TRACTOR SYSTEM AND CONTROLS

| B. Tech III Year II Semester | L | Т | Р | С |
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Course objectives:

• To enables the students for acquiring the knowledge pertaining to system like transmission system, types of clutch, types of gears, tractor power outlets like P.T.O., tractor stability testing tractor and ergonomics.

Course outcomes:

- Knowledge on systems like transmission system, types of clutch, types of gears, tractor power outlets like P.T.O., tractor stability testing tractor and ergonomics etc.,
- To impart knowledge about different systems in tractor.
- Identify different systems.

UNIT – I:

INTRODUCTION TO TRANSMISSION SYSTEM-drive train of tractor, necessity of drive trains components of drive train, function of drive train. **Clutch**-need, types, function requirement, construction and principle of operation familiarization with mechanical and hydraulic clutches- single, multi, centrifugal and dual clutch systems, construction and working of fluid coupling and torque converter. **Gear box**- gearing theory, principle of operation, gear box types, functional requirement and calculation of speed ratio. working of sliding mesh and constant mesh gear box. Differential systemneed, functional component, construction and calculation of speed reduction. Final drive system- need, functional component, construction and working.

UNIT –II:

BRAKE SYSTEM- types, principle of operation, construction, calculation of breaking torque, working of mechanical brake, internal expanding, and external contracting, working of disc brake and hydraulic brake, qualities of gear box.

STEERING SYSTEM- types, requirement, steering geometry characteristics, functional components, working of mechanical steering, working of power steering. Condition of good steering, advantages of power steering, qualities of good steering, familiarization with ackerman steering, Steering system in track type tractors, types of steering gear box and its construction and working principle.

UNIT – III:

HYDRAULIC SYSTEM IN TRACTOR- principle of operation types of main functional components, functional requirements, types of hydraulic controls, necessity of hydraulic control, important and working of draft control and position control system, hitching implement, familiarization with the hydraulic system adjustment and ADDC (Auto Draft and Depth Control). Hitching system in tractor-

construction and working of three point linkage mechanisms, force analysis, terminologies related to hitching, types of three point hitch operation, free link and restrained link operation.

UNIT – IV:

Tractor power outlet- PTO, drawbar, hydraulic system, PTO construction, PTO standards, types and functional requirements. Introduction to traction, traction terminology and its characteristics. Traction theory and traction aids. Theoretical calculation of thrust force and rolling resistance on traction device using various empirical methods. Wheel and tyres- types like solid tyres and pneumatic tyres, construction, tyre specification, tyre terminology, ply rating. Study of tractor mechanics, forces acting on the tractor, free body diagram of tractor implement combination, methods of CG measurement of tractor. Tractor stability- longitudinal stability, lateral stability, mechanics of tractor under static condition, mechanics of tractor under dynamic condition, mechanics of tractor stability-types of tractor accident, precaution to overcome tractor accident, condition to avoid sideways overturning during turning, safety devices in tractor.

$\mathbf{UNIT} - \mathbf{V}$:

Introduction to tractor testing and performance, preparation of test, types of tractor tests- test procedure, power test, agronomical tests and miscellaneous tests. Introduction to tractor testing- representation of test result, deciphering the engine test code, test codes for various tests. Tractor chassis- function, types of chassis, precaution to be taken prolonged life. Ergonomic consideration and operation safety of tractor, safety measurement in tractor ROPS, construction. Familiarization with tractor as a spring- mass system – determination and importance of moment of inertia of a tractor, static equilibrium of tractor.

TEXT BOOKS:

- 1. Jagdishwar sahay. 2015. Elements of agricultural engineering. Standard publication, New Delhi.
- 2. Principals of Farm Machinery Kepner R.A., Bainer R and Barger E.L, 2010. CBS Publishers and Distributors, Delhi.
- 3. Nakra C.P., 2009, Farm Machines and Equipment's. Dhanpat Rai Publication, New Delhi.

- 1. Sanjay kumar. 2007. A Textbook of tractor at Glance. International Book Distribution Company, New Delhi.
- 2. Farm Machinery and Equipment Smith H.P. 1971. Tata McGraw-Hills Publishing Co., Ltd., New Delhi.

(16AG714) FARM MACHINERY AND RENEWABLE ENERGY RESOURCES (LAB)

B. Tech III Year II Semester

L T P C

- 4 2

Course objectives:

- 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.
- To enable the students to know about the basic principles of different Renewable energy sources like Solar, Wind, Geothermal, Biogas, Ocean energy sources and their concepts, benefits and limitations.

Course outcomes:

Studies will be familiar with

- Apply basic knowledge of the Farm Mechanization importance.
- To apply the transplanting concepts into various fields
- Various basic terms related to seed metering mechanisms.
- Some of the basic concepts related to forces acting on tillage tools.
- Simple terms related to soil and machine.
- Apply knowledge about renewable energy sources and their importance in feature.
- *Knowledge about biogas and gas production in simple ways.*

LIST OF EXPERIMENTS

- 1. Study of various Farm Machinery, equipment.
- 2. Visit to machinery Production industry and ICAR, SAU'S research station. Determination
- 3. Of Field capacity and Field efficiency of primary tillage implements.
- 4. Draft and Fuel consumption measurement for different implements.
- 5. Study of different types of plough bottoms and shares of M.B. Plough.
- 6. Determination of disc angle, tilt angle, concavity of a disc plough.
- 7. Calculation of draft and horse power.
- 8. Study of seed-cum-fertile drill and seed metering mechanisms. Calibration of seed drill and problems.
- 9. Study of sprayers, dusters and measurement of nozzle discharge and field capacity.
- 10. Demonstration of water heating system, natural and forced convection solar dryers.
- 11. Demonstration of fixed type biogas plant (Janata) and Floating type biogas plant (KVIC).

12. Visit to local wind mill/solar energy park.

TEXT BOOKS:

- 1. Principals of Farm Machinery Kepner R.A., Bainer R and Barger E.L, 2010. CBS Publishers and Distributors, Delhi.
- 2. Engineering principles of Agricultural machines Ajith k Srivatsava, Carrol E. Goering, RogerP. Rohrbach, 2005, ASAE Publishers.
- 3. Rai, G.D.2013. Non-Conventional Energy Sources, Khanna Publishers, Delhi.
- 4. Rai, G.D., Solar Energy Utilization, Khanna Publishers, Delhi.

- 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 SharmaV.K. Daya Publishing House, New Delhi.
- 3. Rthore N.s., Kurchania A.k., Panwar N.L.2007. Non-Conventional Energy Sources, Himanshu Publications, Udaipur.
- 4. Tiwari, G.N. and Ghoshal, M.K. 2005. Renewable Energy Resources: Bsic Principles and Applications. Narosa Pub. House. Delhi.

(16AG715) WORKSHOP TECHNOLOGY (LAB)

| B. Tech III Year II Semester | L | Т | Р | С |
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Course objectives:

• The course provides hands-on training in the trades of Carpentry, Fitting, House-wiring, Tin Smithy, and Foundry. Overview of metal cutting processes, plumbing and welding is provided through live demonstrations.

Course outcomes:

Studies will be familiar with

- Utilize workshop tools for engineering practice.
- *Employ skills for the production a component for real time applications.*
- Appreciate the hard work and intuitive knowledge of the manual workers.

LIST OF EXPERIMENTS:

- 1. TRADES FOR EXERCISES
- a) **Carpentry shop**: Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, Cross lap joint, Mortise and tenon T joint, Bridle T joint from soft wood stock.
- **b)** Fitting shop: Two joints (exercises) from: Square joint, V joint, half round joint or Dovetail joint out of 100 x 50 x 5 mm M.S. stock.
- c) Sheet metal shop: Two jobs (exercises) from: Tray, Cylinder, Hopper or Funnel from out of 22 or 20-gauge G.I. sheet.
- **d) House-wiring**: Two jobs (exercises) from: Wiring for ceiling rose and two lamps (bulbs)with independent switch, two-way switch, controls with or without looping, wiring for stair case lamp, wiring for water pump with single phase starter.
- e) Foundry: Preparation of two moulds (exercises): for a single pattern and a double pattern.
- **f)** Welding: Preparation of two welds (exercises): Single V butt joint, Lap joint, Double V butt joint or T fillet joint.

2. TRADES FOR DEMONSTRATION:

- a) Plumbing
- b) Machine Shop
- c) Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood

faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, first aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

TEXT BOOKS:

- Elements of workshop technology (Volume I & II), HajraChoudhury, S.K., HajraChoudhury, A.K. and Nirjhar Roy, 2008. MediaPromoters and Publishers Pvt. Ltd. Mumbai
- Workshop technology (Part I & II), Chapman, W.A.J. 2006. Arnold Publishers (India) Pvt. Ltd. AB/Safdarjung Enclave, New Delhi.
- A course in workshop technology (Volume I &II), Raghuwansi, B.S. 2016. DhanpatRai and Co. (P) Ltd. Educational and technical publishers. 1710, NaiSarak, New Delhi – 110006
- Manufacturing technology- I. Pakirappa and Kumar V.N. 2010. Radiant Publishing House, Hyderabad.
- 5. Workshop technology. M. Anitha. Falcon Publishers, Hyderabad

- Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009
- 2. Work shop Manual, P. Kannaiah& K.L. Narayana, SciTech Publishers.
- 3. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

(16ME331) COMPUTER AIDED ENGINEERING (LAB)

B. Tech III Year II Semester

L T P C

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Course Objectives:

• The objective of the this subject is to enable the students to understand and handle design problems in symmetric manner, gain practical experience in handling 2-D drafting and 3-D modeling software systems, apply CAD in real life applications, understand the concepts G and M codes and manual part programming and know the applications of CNC machines.

Course Outcomes:

Students undergoing this course are able to

• Understanding the need of Group Technology as a means of bringing the benefits of mass production to relatively smaller production.

LIST OF EXPERIMENTS

INTRODUCTION TO ANSYS

Structural Analysis

- 1) Truss Member
- 2) Simply Supported Beam
- 3) Plate with hole
- 4) Taper Cross Section

Thermal Analysis

- 1) Conductive Heat Transfer Analysis in Rectangular 2D Component.
- 2) Conductive Heat Transfer Analysis in Different Geometry 2D Components

<u>Mat Lab</u>

- 1) Construct Perceptron, train and test the performance
- 2) Construct Back Propagation Network, train and test the performance

3) Construct Radial Basis Function Network, train and test the performance Build fuzzy logic membership functions

TEXT BOOKS:

- 1. CAD/CAM, A Zimmers & P.Groover, PE, PHI
- 2. CAD/CAM-Principles and applications, P.N. Rao, TMH, 3rd edition, 2010

- 1. Automation, Production systems & Computer integrated Manufacturing, Groover, P.E.
- 2. *CAD/CAM/CIM*, Radhakrishnan and Subramanian, New Age, 3rd edition, 2008
- 3. Principles of Computer Aided Design and Manufacturing, FaridAmirouche, Pearson
- 4. CAD/CAM Theory and Practice, R. Sivasubramaniam, TMH
- 5. Computer Aided Design and Manufacturing, K.Lalit Narayan, PHI, 2008.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16HS617) APTITUDE PRACTICE-II

(Common to All Branches)

| B. Tech III Year II Semester | (Common to An Branches) | L | Т | Р | С |
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Course Objectives:

After thorough learning of Quantitative Aptitude and Reasoning, a student:

- Will be able to critically evaluate various real-life situations by resorting to analysis of key issues and factors.
- Will be able to read between the lines and understand various language structures.
- Will be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

Course Outcomes:

At the end of the course, students would be expected to:

- Have developed the subtle way of approaching in the candidate.
- Have acquired the decision making with in no time.
- Have acquired logical thinking during professional tenure.
- Have obtained quick decision-making skills.

UNIT-I

Permutations and Combinations: Definition of permutation, Problems on Permutations, Definition of Combinations, Problems on Combinations.

Probability: Definition of Probability, Problems on coins, Dice, Deck of Cards.

UNIT-II

Menstruation: Areas, Volumes of different solids, Problems on Areas, Volumes and Surface Areas.

UNIT-III

Cubes: Basics of a cube, Formulae for finding volume and surface area of a cube, finding the minimum number of cuts when the number of identical pieces are given, Finding the maximum number of pieces when cuts are given, Problems on painted cubes of same and different colors, Problems on cuboids, Problems on painted cuboids, Problems on diagonal cuts.

UNIT-IV

Number and letter series: Difference series, Product series, Squares series, Cubes series, Alternate series, Combination series, miscellaneous series, Place values of letters
Number and Letter Analogies: Definition of Analogy, Problems on number analogy,

Odd man out: Problems on number Odd man out, Problems on letter Odd man out, Problems on verbal Odd man out

UNIT-V

Coding and decoding: Coding using same set of letters, Coding using different set of letters, Coding into a number, Problems on R-model.

Directions: Solving problems by drawing the paths, finding the net distance travelled, finding the direction, Problems on clocks, Problems on shadows, Problems on damaged compass, Problems on direction sense using symbols and notations.

Critical Reasoning: Problems on assumption, Problems on conclusions, Problems on inferences, Problems on strengthening and weakening of arguments, Problems on principle, Problems on paradox.

Text Books:

1. Thorpe's verbal reasoning, GL Barrons, McGraw Hills, LSAT Materials

2. A modern approach to Logical reasoning, R S Agarwal, S. Chand,

Reference Books:

1. Quantitative Aptitude, R S Agarwal, S Chand,

2. Quantitative Aptitude - G. L BARRONS

3. *Quantitative Aptitude* – Abhijit Guha McGraw Hills

4. *Magical Book on Quicker Maths*, Tyra, BSC publishing company

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

(16MB750) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

| B. Tech IV Year I Semester | L | Т | Р | С |
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Course objectives:

• The objectives of this course are to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to enrich analytical skills in helping them take sound financial decisions for achieving higher productivity

Course outcomes:

• The thorough understanding of Managerial Economics and Analysis of Financial Statements facilitates the Technocrats – cum – Entrepreneurs to take-up decisions effectively and efficiently in the challenging Business Environment.

UNIT-I

INTRODUCTION TO MANAGERIAL ECONOMICS - Managerial Economics - Definition, nature and scope – contemporary importance of Managerial Economics - Demand Analysis: Determinants-Law of Demand - Elasticity of Demand. Significance –Types – measurement of elasticity of demand – Demand forecasting- factors governing demand Forecasting methods of demand forecasting – Relationship of Managerial Economics with Financial Accounting and Management.

UNIT-II

THEORY OF PRODUCTION AND COST ANALYSIS -Production Function – Short-run and longrun production - 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 - Break-Even Analysis (BEA) – Managerial Significance and limitations of BEA Determination of Break Even Point (Simple Problems).

UNIT-III

INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT - Market structures: Types of Markets - Perfect and Imperfect Competition - Features, Oligopoly -Monopolistic competition. Price-Output determination - Pricing Methods and Strategies. New Economic Environment- Economic systems – Economic Liberalization – Privatization and Globalization

UNIT-IV

CAPITAL AND CAPITAL BUDGETING - Concept of Capital - Over and under capitalization – Remedial measures - Sources of Short term and Long term capital - Estimating Working Capital requirement – Capital budgeting – Features of Capital Budgeting proposals – Methods and Evaluation of

Capital budgeting – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT-V

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS - Financial Accounting – Concept - emerging need and importance - Double-Entry Book Keeping-Journal - Ledger – Trial Balance - Financial Statements - - Trading Account – Profit & Loss Account –Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Techniques – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

TEXT BOOKS:

- 1. Managerial Economics and Financial Analysis Aryasri:, 4/e, TMH, 2009.
- 2. Managerial Economics Varshney & Maheswari:, Sultan Chand, 2009.

- 1. Financial Accounting and Analysis Premchand Babu, Madan Mohan:, Himalaya, 2009
- 2. Managerial Economics and Financial Analysis S.A. Siddiqui and A.S. Siddiqui:, New Age International, 2009.
- 3. Principles of Business Economics, Pearson Joseph G. Nellis and David Parker:, 2/e, New Delhi.
- 4. Managerial Economics in a Global Economy Domnick Salvatore:, Cengage, 2009.
- 5. Managerial Economics H.L.Ahuja:, S.Chand, 3/e, 2009

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG716) DAIRY AND FOOD ENGINEERING

| B. Tech IV Year I Semester | L | Т | Р | С |
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Course objectives:

• To disseminate the knowledge of properties of products, unit operations and packaging involved in dairy and food engineering.

Course outcomes:

• 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 dairy and food processing systems-Centrifugation, separation, separation by cyclone.

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, Sterilization – UHT method, sterilization in the package, equipment for sterilizing goods in the package

UNIT – III:

HOMOGENIZATION – Emulsifying, types of emulsions, emulsifiers, homogenizing, 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 oil and special butter products

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:

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 calandria, long tube, forced circulation

$\mathbf{UNIT} - \mathbf{V}$:

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

TEXT BOOKS:

- 1. Dairy Plant Engineering and Management Ahmed, T. 2003. 4th Ed. KitabMahal.
- 2. Unit Operations of Chemical Engineering —McCabe, W.L. and Smith, J. C. 2017.McGraw Hill.
- 3. Fundamentals of Food Engineering —Rao, D.G. 2010. PHI learning Pvt. Ltd. NewDelhi.
- 4. Introduction to Food Engineering Singh, R.P. &Heldman, D.R. 2001. Academic Press.
- 5. Fundamentals of Food Process Engineering Toledo, R. T. 2000. CBS Publisher.
- Dairy Plant Engineering and Management TufailAhmed,CBS Publishers andDistributors, New Delhi, 2003.

- 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.
- Food Science, Chemistry and Experimental Foods —Swaminathan M 2006. The Bangalore Printing & Publishing Co., Ltd., Bangalore

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG717) GREENHOUSE TECHNOLOGY

| B. Tech IV Year I Semester | L | Т | Р | С |
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Course objectives:

• Constructional and operational details of greenhouses will lead the students to grow crops with profits and also to use the greenhouses for offseason usage and also to manage them commercially.

Course outcomes:

Studies will be familiar with

- Be proficient about identify the types and structures of existing greenhouse.
- Students will learn the different systems for climate control in greenhouse and their management.
- Familiar with the techniques of light management and CO₂ enrichment used for increasing and control crop production.

UNIT – I:

INTRODUCTION – Greenhouses – Introduction, history, definition, greenhouse effect, advantages of greenhouses. Classification of greenhouses – Greenhouse types based on shape, utility, construction and covering material. Plant response to greenhouse environment – light, temperature, relative humidity, ventilation and carbon dioxide.

UNIT – II:

ENVIRONMENTAL REQUIREMENT FOR CROPS – Temperature requirement of horticultural crops, light requirement of crops and lighting control methods, Greenhouse shading methods, Greenhouse supplemental lighting systems.

ENVIRONMENTAL CONTROL INSIDE GREENHOUSE – Manual controlling, thermostats, microprocessors and computerized control systems. Natural and forced ventilation summer and winter cooling systems, carbon dioxide enrichment method.

UNIT – III:

PLANNING OF GREENHOUSE FACILITY – Site selection and orientation, structural design, covering materials. Materials used for construction of greenhouses – Wood, Galvanised iron pipe and glass.

GREENHOUSE COVERING MATERIALS – Polyethylene film, PVC, Polyester, Tefzel T^2 film, Polyvinyl chloride rigid panel, fiber glass reinforced plastic rigid panel, Acrylic and polycarbonate rigid panel.

UNIT – IV:

Design criteria and construction details of glass and pipe framed greenhouses – Material requirement and procedure for erection.

GREENHOUSE HEATING AND ENERGY STORAGE – Type of heat loss, heating systems, heat distribution systems, water and rock storage, heat conservation practice.

GREENHOUSE IRRIGATION SYSTEMS – Rules of watering, Hand watering, perimeter watering, overhead sprinklers, Boom watering, Drip irrigation.

UNIT – V:

GREENHOUSE UTILIZATION IN OFF SEASON– Drying of agricultural produce. Protected Agriculture Techniques – row covers.

ECONOMICS OF GREENHOUSE PRODUCTION– Capital requirements. Economics of production and conditions influencing returns.

TEXT BOOKS:

- 1. S. Kothari, S.C. Kaushik and A.N. Mathur. (2006). Greenhouse, Science & Technology, Himanshu Publications, Udaipur.
- 2. N.S. Rathore, A.K. Kurchania, N.L. Panwar. (2007). Non-Conventional Energy Sources, Himanshu Publications.
- 3. Pratap Singh et. al. (2004). Sustainable Development through Renewable Energy Sources Yash Publications, Bikaner.

- 1. Green house Technology and Management. RadhaManohar K and IgathinathaneC (2007), B.S. Publication, Hyderabad.
- 2. Green house Technology for controlled environment. TiwariG.NandGoyal (2009), NarosaPublishingR.K.House, New Delhi.
- 3. The complete Book of Greenhouse Gardening. Cavendish M (1991), Marshal cavandish Books Ltd , London

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

(16ME325) REFRIGERATION & AIR CONDITIONING

| B. Tech IV Year I Semester | L | Т | Р | С |
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Course Objectives:

- To understand the underlying principles of operations in different Refrigeration & Air conditioning systems and components.
- To provide knowledge on design aspects of Refrigeration & Air conditioning systems

Course Outcomes:

Students undergoing this course are able to

• Upon completion of this course, the students can able to demonstrate the operations in different Refrigeration & Air conditioning systems and also able to design Refrigeration & Air conditioning systems.

UNIT-I

INTRODUCTION - Introduction to Refrigeration - Unit of Refrigeration and C.O.P. – Ideal cycles, Necessity & Applications of Refrigeration, Types of Air Refrigeration Systems, Problems.

UNIT-II

VAPOUR COMPRESSION REFRIGERATION SYSTEM– Working principle and essential components of VCR system. Vapor compression cycle: P-h and T-S diagrams - deviations from theoretical cycle – sub cooling and super heating, problems

Refrigerants- Desired properties- Environmental issues- Refrigerant Mixtures- Zeotropic & Azeotropic mixtures - Cascade systems & Applications.

UNIT-III

OTHER REFRIGERATION SYSTEMS: Vapour absorption system –Electrolux, Two fluid and Three fluid System, Steam jet refrigeration- Thermoelectric refrigeration- Vortex tube refrigeration systems.

UNIT-IV

INTRODUCTION TO AIR CONDITIONING -Psychrometric Properties and Processes-Psychrometric chart & Construction, Need for ventilation and Infiltration – concepts of RSHF, GSHF, ERSHF and ADP, Air conditioning loads, Problems.

UNIT-V

AIR CONDITIONING SYSTEMS AND DISTRIBUTION OF AIR–Human comfort, effective temperature & Comfort chart, classifications of Air Conditioning Systems- summer, winter & all year round air conditioning, problems, classification of Ducts, Methods of Duct Design – Grills and Registers.

TEXT BOOKS:

- 1. "Refrigeration and Air conditioning", C.P.Arora & Domkundwar, 3rd edition, McGraw Hill, New Delhi, 2010.
- 2. -Refrigeration and Air conditioning∥, R.S.Khurmi., any revised edition, S.Chand Publishers.

- 1. "Principles of Refrigeration", Roy J. Dossat, 4th edition, Pearson Education Asia, 2009.
- 2. "Refrigeration and Air Conditioning", Stoecker, W.F. and Jones J. W., McGraw Hill, New Delhi, 1986.
- 3. ASHRAE Hand book, Fundamentals, 2010
- 4. "Air conditioning engineering", Jones W.P., 5thedition, Elsevier Butterworth-Heinemann, 2001

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG718) MICRO IRRIGATION ENGINEERING (DEPARTMENT ELECTIVE-I)

B. Tech IV Year I Semester

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Course objectives:

• 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.

Course outcomes:

Studies will be familiar with

- Recognize importance of various micro irrigation systems and designs.
- Various basic terms related to development of irrigation in India and AP and classification if irrigation projects.
- Be proficient about planning and design of micro irrigation systems
- Various basic terms related to micro irrigation.
- *Proficient about water saving techniques.*

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 spacing's, 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,

 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 Flow 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.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, Paid-up 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.

TEXT BOOKS:

- 1. Irrigation theory and practice, A.M. Michel (2008), Vikas publication house Pvt.ltd.
- 2. Micro-irrigation theory and practice, R.Suresh (2009), Standard publisher's distributors.

- 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

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG719) TRACTOR DESIGN AND TESTING (DEPARTMENT ELECTIVE-I)

B. Tech IV Year I Semester

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Course objectives:

- 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.
- To develop an ability to identify, formulate and solve engineering problems.

Course outcomes:

Studies will be familiar with

- Be proficient in the use of software for analysis and design.
- *Be proficient in an ability to identify, formulate and solve engineering problems.*
- Various basic terms related to machine design aspects.

UNIT – I:

Design and development of agricultural tractors- Classification and section of tractors. Parameters to be considered for design of tractors and trends in tractor. Study of parameters for balanced design of tractor for stability, weight distribution, weight transfer in tractors and location of centre of gravity

UNIT – II:

Traction theory, hydraulic lift and hitch system design. Complete drive train, transmission types, friction brakes and clutches. Bevel gears, gear design. Differentials and transmission shaft. Design of single disc, multi disc and cone clutches. Design of Rolling friction and anti-friction bearings.

UNIT – III:

Steering system-Qualities of steering system, steering geometry, design of Ackerman steering. Working of hydraulic or power steering- maintenance. Steering and front end trouble shooting. Study of special design features of tractor engines and their selection.

UNIT – IV:

Design of cylinder, piston, piston pin, crankshaft, seat and controls of an agricultural tractor. Tractor hydraulic systems-principle of hydraulics, working of hydraulic system, components of hydraulic circuits and different values. Tractor hydraulic systems, principle of hydraulics, working of hydraulic system, components of hydraulic circuits and different values.

UNIT –V:

Hydraulic controls- Position control system. Draft control system. Maintenance and repair of hydraulic system. Tractor engines-types, special design features, technical terms and specifications. Tractor testing- Introduction, testing and evaluation system in India, test facility in India. Types of tests- field test, lab test, power test and different types of dynamometers engine performance curves.

TEXT BOOKS:

- 1. Barger, E.L., Liledahl, J.B., Carleton, W.M.andMckibben, E.G. (2005). Tractor and their power units. Wiley Eastern pvt.Ltd, New York.
- 2. Theory,construction and calculations of Agricultural machines vol-1.E.S. Boson, O.V. Verniaev, I.I. Sirnov and E.G. Sultan shakh, 2016. Scientific publishers.
- 3. Pandya, N.C. and Shah, C.S. (2009). Elements of Machine Design.Charotar Publishing House, Anand.

- 1. Kurtz, G.L., Thompson and Claer, P. (2012). Design of Agricultural Machinery. John Wiley & Sons, New York.
- 2. Radhey Lal and Datta, A.C. (1978).Problems in Agricultural Engineering. Sathya Prakashan, Allahabad.
- 3. Raymond N, Yong E.A. and Nicolas S.1984. Vehicle Traction Mechanices, Elesevier Scitific publications, USA.
- 4. Maleev V.L., 1964. Internal Combustion Engines, Tata McGraw-Hill, USA

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG721) REMOTE SENSING & GIS APPLICATION (DEPARTMENT ELECTIVE-I)

B. Tech IV Year I Semester

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Course objectives:

- To provide students the Photogrammetric techniques, concepts, components of Photo grammetry.
- To introduce the students to the basic concepts and principles of various components of remote sensing. To provide an exposure to GIS and its practical applications in Civil Engineering Analyze the energy interactions in the atmosphere and earth surface features

Course outcomes:

On completion of the course the students will have knowledge on

- Principles of Remote Sensing and GIS
- Analysis of RS and GIS data and interpreting the data for modeling applications

UNIT – I

INTRODUCTION TO PHOTOGRAMMETRY: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

REMOTE SENSING: Basic concepts and foundation of remote sensing – elements involved in remote\ sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. **TYPES OF DATA REPRESENTATION**: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

$\mathbf{UNIT} - \mathbf{IV}$

GIS SPATIAL ANALYSIS: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

$\mathbf{UNIT} - \mathbf{V}$

WATER RESOURCES APPLICATIONS: Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics. Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

- 1. Remote Sensing and GIS by B. Bhatta, Oxford University Press, New Delhi.
- 2. Fundamentals of remote sensing by Gorge Joseph, Universities press, Hyderabad

- 1. Advanced Surveying: Total Station GIS and Remote Sensing by Satheesh Gopi, Pearson Publication.
- 2. Basics of Remote sensing & GIS by S. Kumar, Laxmi Publications.
- 3. Remote sensing and GIS by M. Anji Reddy, B.S. Publications, New Delhi.
- 4. GIS by Kang, Tsung Chang, TMH Publications & Co.,

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

16CE145) ELEMENTS OF ROAD TRAFFIC SAFETY

(OPEN ELECTIVE)

B. Tech IV Year I Semester

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Course Objectives:

• The main objective of this course is to make student aware about the accident statistics globally and in India specifically, its causes and measure to overcome the situation. The traffic regulation, parking problems, understanding of road signs, signals and marking are also taught; so that the student is well informed about all safety measures that a traffic engineer need to understand.

Course Outcomes:

After completion of this course the student:

- 1. Can clearly understand the accident scenario, causes and measure to be taken
- 2. Can know the traffic regulations
- 3. Can understand the parking problems and can give solutions
- 4. Can get an awareness of traffic signs, signals and road markings
- 5. Can understand the need of street light and their proper disposition on road

UNIT – I

ROAD ACCIDENTS – CAUSES & PREVENTION: Road Accidents & Traffic Engineering – Accident Situation in India – International Comparison of Road Accidents – Road & its Effects on Accidents – The Vehicle – The Driven – Skidding – Speed in Relation of Safety – Weather & its Effects on Accidents – Pedestrian Safety -Cyclists – Motor Cycle & Scooter Rider – Parking & Its Influence on Accident – Legislation, Enforcement, Education & Propaganda – Cost of Road Accidents

UNIT – II

REGULATIONS OF TRAFFIC: Basic Principals of Regulation – Regulation of Speed – Regulation of Vehicles – Regulations Concerning the Driver – Regulations Concerning Traffic – Parking Regulations – Enforcement of Regulations

PARKING: Traffic & Parking Problems – Ill-Effects of Parking – Zoning & Parking Space Requirement Standards – Design Standards for On-Street Parking Facilities – Traffic Regulatory Measures for On-Street Parking – Off-Street Parking Facilities – Peripheral Parking Schemes – Loading & Unloading Facilities – Truck Terminals – Long Distance Bus Terminals

UNIT – III

TRAFFIC SIGNS: Importance of Traffic Signs – Need for International Standardization – The Situation in India – General Principals of Traffic Signing – Types of Traffic Signs – Danger Signs (Warning Signs or Cautionary Signs) – Prohibitory Signs – Mandatory Signs – Informatory Signs – Indication Signs – Direction Signs, Advance Direction Signs & Place Identification Signs – Overhead Sings – Route Marker Sings – Location, Height & Maintenance of Traffic Sings

$\mathbf{UNIT} - \mathbf{IV}$

TRAFFIC SIGNALS: Advantages & Disadvantages of Traffic Signals – Signal Indications – Signal Face – Illustration of the Signals – Number & Location of Signals Faces – Amber Period, Red/Amber Period & Inter Green Period – Fixed Time Signals & Vehicle Actuated Signals – Determination of Optimum Cycle Length & Signal Settings for an Intersection with Fixed Time Signals – Warrants for Signals – Co-ordinated Control of Signals – Signal Approach Dimensions – Area Traffic Control – Delay at Signalized Intersection

UNIT – V

ROAD MARKINGS: Function – Types of Road Marking – General Principals of Longitudinal Pavement Markings – Material & Color – Centre Lines – Traffic Lane Lines – No Overtaking Zone Markings – Pavement Edge Lines – Carriageway Width Reduction Transition Marking

Obstruction Approach Markings – Stop Lines – Pedestrian Crossings – Cyclist Crossings – Route
Direction Arrows – Word Messages – Markings at Approaches to Intersections – Parking Space
Limits – Object Markings

STREET LIGHTING: Need for Street Lighting – Definition of Common Terms – Some Laws of Illumination – Mounting Height – Spacing – Lantern Arrangements – Type of Lamps – Lamp Installation of _T_ Junctions & Cross Roads – Illumination of Traffic Rotaries – Lighting of Bends – Lighting of Dual Carriageways – Lighting of Roads Carrying Only Local Traffic – Lighting Bridges – Tunnel Lighting – Maintenance of Lighting Installation

TEXT BOOKS:

1. Traffic Engineering & Transport Planning by K. R. Kadiyali 8th Edition, Khanna Publishers

REFERENCES:

1. Highway Engineering by Dr S.K. Khanna & Dr. C.E.G. Justo, 8thEdition, New Chand & Bros, Roorkee

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

(16EE239) NEURAL NETWORKS & FUZZY LOGIC

| B. Tech IV Year I Semester | L | Т | Р | С |
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Course Objectives:

• This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.

• It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components.

• The Neural Network and Fuzzy Network system application is presented. This subject is very important and useful for doing Project Work.

• The main objective of this course is to provide the student with the basic understanding of neural networks and fuzzy logic fundamentals.

Course Outcomes:

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

- Understand the basic concept of biological neural networks
- Understand the basic concept of artificial neural networks
- Create Neural Network models.
- Understand the basic concepts of fuzzy logic.
- Create Fuzzy models.

UNIT - I:

FUNDAMENTALS OF ARTIFICIAL NEURAL NETWORKS Neural networks - introduction, artificial neural network, advantages, biological neural network, architectures of artificial neural networks -activation functions, important terminologies of ANN, McCulloch - Pitts neuron model, learning strategies - supervised, unsupervised, reinforced.

UNIT - II:

SUPERVISED, UNSUPERVISED NETWORKS Learning rules - Hebbian learning rule, perceptron learning rule, delta learning rule, widow - hoff learning rule, Back propagation neural network-architecture, training algorithm, learning factors - initial weights, leaning constant, Perceptron Neural Network- architecture, training algorithm. Applications of Neural Networks (any one problem).

UNIT - III:

ASSOCIATIVE MEMORIES Associative memories: concepts, Bidirectional Associative Memory (BAM) - architecture, discrete BAM - testing algorithm, analysis of hamming distance, energy function and storage capacity. Discrete Hopfield network architecture and training algorithm.

UNIT - IV:

CLASSICAL AND FUZZY SETS Introduction to classical sets-properties–Fuzzy vs crsip-Fuzzy sets, Membership functions, basic fuzzy set operation ,properties of fuzzy sets- Fuzzy relations –Fuzzy Cartesian product, operations on fuzzy relations.

UNIT -V:

FUZZY LOGIC SYSTEMS Fuzzification – Fuzzy quantifiers, fuzzy inference, fuzzy rule based system - development of rule base and decision making system - Defuzzification to crisp sets - Fuzzification and Defuzzification methods. Applications of Fuzzy logic systems (any one problem)

TEXTBOOKS:

- 1. S.N. Sivanandam, S.N. Deepa, Principles of Soft computing, Wiley India private Ltd., 2nd edition, 2013.
- 2. Timothy J Ross, Fuzzy Logic with Engineering Application, McGraw Hill Inc.1997.

- 1. Jacek M. Zurada, Introduction to Artificial Neural Networks, Jaico Publishing House.
- 2. Simon Haykin, Neural Networks A Comprehensive Foundation, Prentice- Hall Inc, 1999.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16EC443) MATLAB PROGRAMMING (OPEN ELECTIVE)

B. Tech IV Year I Semester

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Course Objectives:

• Understand the MATLAB Desktop, Command window and the Graph Window Be able to do simple and complex calculation using MATLAB Be able to carry out numerical computations and analyses Understand the mathematical concepts upon which numerical methods Ensure you can competently use the MATLAB programming environment Understand the tools that are essential in solving engineering problems

UNIT-I

Introduction to MATLAB, MATLAB Interactive Sessions, Menus and the toolbar, computing with MATLAB, Script files and the Editor Debugger, MATLAB Help System, Programming in MATLAB.

UNIT-II

Arrays Arrays, Multidimensional Arrays, Element by Element Operations, Polynomial Operations Using Arrays, Cell Arrays, Structure Arrays.

UNIT-III

Functions & Files Elementary Mathematical Functions, User Defined Functions, Advanced Function Programming, Working with Data Files.

UNIT-IV

Programming with MATLAB Program Design and Development Relational Operators and Logical Variables Logical Operators and Functions Conditional Statements for Loops while Loops the switch Structure Debugging MATLAB Programs Applications to Simulation, Problems

UNIT-V

Plotting Functions Additional Commands and Plot Types Interactive Plotting in MATLAB Three-Dimensional Plots Summary, Problems

TEXT BOOKS:

- 1. G.H.Golub and C.F.Van Loan, —Matrix Computations^{II}, 3rd Ed., Johns Hopkins University Press, 1996.
- 2. B.N.Datta, —Numerical Linear Algebra and Applicationsl, Brooks/Cole, 1994 (out of print)
- L. Elden, —Matrix Methods in Data Mining and Pattern Recognition^{II}, SIAM Press, 2007 Misc.

- 1. NA-digest, http://www.netlib.org/na-digest-html
- 2. Society for Industrial and Applied Mathematics (SIAM), see http://www.siam.org
- 3. Google —MATLAB Primer or —MATLAB Tutorial and you should be able to access lots of free MATLAB.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16CS511) DATABASE MANAGEMENT SYSTEMS

| (OPEN ELEC | JTIVE) | | | |
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| B. Tech IV Year I Semester | L | Т | Р | С |
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Course Objective:

- To provide the student with clear conceptual understandings related to databases.
- After this course, the student should gain knowledge in the relational model, SQL, database design storage & indexing, failure recovery and concurrency control.

Course Outcome:

- Students can design the simple database, and can use the SQL instructions in developing the database applications.
- Can apply the ER concepts to design the databases.
- Advanced concepts like triggers, assertions and constraints can be applied effectively in designing the business applications

UNIT-I

Introduction - Database System Applications, Purpose of Database Systems, View of Data - Data Abstraction, Instances and Schemas, Data Models, Database Languages - DDL, DML, Database Architecture, Database Users and Administrators, History of Data base Systems. Introduction to Data base design: ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model - Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views destroying/ altering Tables and Views

UNIT-II

Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus - Tuple relational Calculus - Domain relational calculus - Expressive Power of Algebra and calculus. Form of Basic SQL Query - Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values -Logical connectives - AND, OR and NOT - Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases. Page 129 of 146 R16 B.Tech – ECE

UNIT-III

Introduction to Schema Refinement - Problems Caused by redundancy, Decompositions - Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms - FIRST,

SECOND, THIRD Normal forms - BCNF - Properties of Decompositions - Loss less join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design - Multi valued Dependencies - FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

UNIT-IV

Transaction Management - Transaction Concept - Transaction State - Implementation of Atomicity and Durability - Concurrent - Executions - Serializability - Recoverability - Implementation of Isolation -Testing for serializability. Concurrency Control - Lock - Based Protocols - Timestamp Based Protocols -Validation - Based Protocols - Multiple Granularity Recovery System-Failure Classification-Storage Structure-Recovery and Atomicity - Log - Based Recovery - Recovery with Concurrent Transactions -Buffer Management – Failure with loss of nonvolatile storage - Advance Recovery systems - Remote Backup systems.

UNIT-V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing -Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations. Tree Structured Indexing: Intuitions for tree indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendible vs Linear Hashing.

TEXT BOOKS:

- 1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, McGraw Hill Education, 3rd Edition, 2003.
- 2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw Hill, VI edition, 2006.

- 1. Database Systems, 6th edition, Ramez Elmasri, Shamkat B. Navathe, Pearson Education, 2013.
- 2. Database Systems Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
- 3. Introduction to Database Systems, C.J. Date, Pearson Education.
- 4. Database Management Systems, G.K. Gupta, McGraw Hill Education
- 5. Introduction to Programming with Java, J.Dean &R.Dean, McGraw Hill education.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16MB752) INTELLECTUAL PROPERTY RIGHTS (OPEN ELECTIVE)

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UNIT – I

INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II

TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III

LAW OF COPY RIGHTS: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV

TRADE SECRETS: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation. Unfair competition: Misappropriation right of publicity, False advertising.

UNIT - V

NEW DEVELOPMENT OF INTELLECTUAL PROPERTY: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.

REFERENCES:

1. Intellectual property right - Unleashing the knowledge economy, prabuddhaganguli, Tata McGraw Hill Publishing Company Ltd.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16ME313) NON- CONVENTIONAL ENERGY SOURCE

| (OPEN ELECTIVE) | | | | |
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| B. Tech IV Year I Semester | L | Τ | Р | С |
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Course Objectives:

• To Understand and analyze the pattern of renewable energy resources Suggest methodologies / technologies for its utilization Economics of the utilization and environmental aspects.

Course Outcomes:

• Upon completion of this course, the students can able to Identify the new methodologies / technologies for effective utilization of renewable energy sources.

UNIT I:

INTRODUCTION -World Energy Use – Classification of Energy_s-Reserves of Energy Resources – Environmental Aspects of Energy Utilization– Need of Renewable Energy–Renewable Energy Scenario in Andrapradesh, India and around the World.

UNIT II:

SOLAR ENERGY -Solar Radiation – Measurements of Solar Radiation - Flat Plate and Concentrating Collectors – Solar direct Thermal Applications – Solar thermal Power Generation - Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications.

UNIT III:

WIND ENERGY - Wind Data and Energy Estimation – Types of Wind Energy Systems – Performance – Site Selection – Details of Wind Turbine Generator – Safety and Environmental Aspects.

UNIT IV:

BIO – **ENERGY**- Biomass direct combustion – Biomass gasifiers – Biogas plants – Digesters – Ethanol production – Bio diesel – Cogeneration - Biomass Applications

UNIT V:

OTHER SOURCES OF ENERGY - Tidal energy – Wave Energy – Open and Closed OTEC Cycles – Small Hydro-Geothermal Energy – Hydrogen and Storage - Fuel Cell Systems – Hybrid Systems.

TEXT BOOKS:

1. Rai. G.D., "Non-Conventional Energy Sources", Khanna Publishers, New Delhi, 2011. 2. Twidell, J.W. & Weir, A., "Renewable Energy Sources", EFN Spon Ltd., UK, 2006.

- 1. Sukhatme. S.P., "Solar Energy", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
- 2. Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", Oxford University Press, U.K., 1996.
- 3. Tiwari. G.N., Solar Energy "Fundamentals Design, Modelling & Applications", Narosa Publishing House, New Delhi, 2002.
- 4. Freris. L.L., "Wind Energy Conversion Systems", Prentice Hall, UK, 1990.
- 5. Johnson Gary, L. "Wind Energy Systems", Prentice Hall, New York, 1985
- David M. Mousdale "Introduction to Biofuels", CRC Press, Taylor & Francis Group, USA 2010
- 7. Chetan Singh Solanki, Solar Photovoltaics, "Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2009.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16ME317) THERMAL ENGINEERING (LAB)

| B. Tech IV Year I Semester | L | Т | Р | C |
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Course Objectives:

• To understand the applied thermodynamic concepts, the construction and the working principles of various engineering devices such as IC Engines, steam generators, steam nozzles, steam turbine.

Course Outcomes:

Students undergoing this course are able to

- Apply basic knowledge of the principles of thermal systems.
- •To apply the thermodynamic concepts into various thermal application like IC engines, Steam Turbines, Compressors and Refrigeration and Air conditioning systems.

LIST OF EXPERIMENTS

- 1. Port timing diagram of Two stroke engine
- 2. Valve timing diagram of four stroke engine
- 3. Performance Test on a 4 -Stroke Diesel Engines.
- 4. Performance Test on 2-Stroke Petrol engine.
- 5. Retardation and motoring test on 4- stroke engine.
- 6. Heat Balance of an I.C. Engine.
- 7. Air/Fuel Ratio and Volumetric Efficiency of an I.C. Engines.
- 8. Performance Test on Variable Compression Ratio Engines, economical speed test.
- 9. Performance Test on Reciprocating Air Compressor Unit.
- 10. Study of Boilers Dismantling / Assembly of Engines to identify the parts and their Position in an engine.

TEXT BOOKS:

- 1. Thermal Engineering, Rajput, R. K., Laxmi Publications, 6th Edition, New Delhi, 2010.
- 2. Internal Combustion Engines / V. Ganesan- TMH, 4th Edition, 2012

- 1. A Course in Thermal Engineering, Domkundwar, A., Dhanpat Rai & Co., New Delhi, 2003.
- 2. I.C engines fundamentals J.B Heywood, , Mc Graw Hill International Edition .1999.
- Fundamentals of I.C Engines, P.W Gill. J.H Smith & E.J Ziurgs, Oxford& I B H Publication 1990, New Delhi.
- 4. Thermodynamics & Heat Engines vol-II, R.YADAV, Central Publishing House, 1996.
- 5. Steam & Gas Turbines, R.YADAV, Central Publishing House, 1996.
- 6. International Combustion Engines, V.Ganesan, Tata McGraw Hill, Second Edition, 1999.
- 7. Thermal Engineering, P.L Ballaney, Khanna Publication, 15thEdition, 2002.
- B. Gas Turbine Theory, H.Cohen, GFC. Rogers, HIH Saravanamutto, Addition Wesley Longman Ltd, 4th edition, 1996.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG720) FIELD OPERATION AND MAINTENANCE OF TRACTORS AND FARM MACHINERY (LAB)

B. Tech IV Year I Semester

L T P C

Course 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.

Course outcomes:

Studies will be familiar with

- Be proficient about various systems maintenance in tractor like fuel, lubrication electrical hydraulic etc.
- Proficient about periodical maintenance of agricultural vehicles.
- Proficient about maintenance of agricultural machinery before and after use.

LIST OF EXPERIMENTS

- 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.
- Maintenance of lubrication system Frequent troubles and Remedies Troubles in Lubrication system – Excessive oil consumption – Care and maintenance of lubrication system.
- Maintenance of transmission system General maintenance Differential trouble shooting Frequent troubles and Remedies.
- 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.
- 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.

- 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.
- Emission of smoke Over heating of engines maintenance of clutch brakes hydraulic Problems.
- 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.

TEXT BOOKS:

- 1. Gupta, R.B., and Gupta, B.K. (2016). Tractor Mechanic, Theory, Maintenance and Repair .Sathya Prakashan and Tech India Publications, New Delhi.
- Jain, S.C., and Rai, C.R. (2012). Farm Tractor -Maintenance and Repair. Tata McGraw-Hill Publishing Company Ltd, New Delhi.
- Liljedahl John, B., Casleton Walter, M., Turnquist Paul, K., and Smith David, W. (2004). Tractors and Their Power Units, JohnWiley& Sons, New-York.
- Mathus, M.L., and Sharma, R.P. (2014). A Course in Internal Combustion Engines. DanpatRai&Sons, Delhi.
- 5. Mehta, M.L., Verma, S.R., Misra, S.K., and Sharma, V.K. (2005). Testing and Evaluation of Agricultural Machinery. National Agricultural Technology Information
- Donnel Hunt (2013). Farm Power Machinery and Management. Iowa State University Press, Ames, USA.

- 1. Ghosh, P.K, and Swain, S. (1993). Practical Agricultural Engineering.NayaProkash,Calcutta.
- 2. Gill Paul, W., Smith James, H., and Ziurys Eugene, J. (2007). Fundamentals of

Internal Combustion Engines. Oxford & IBE Publishing Company, New Delhi.

- 3. Kepner, R. A., Bainer Roy, and Barges, E.C. (2005). Principals of Farm Machinery.CBS Publishers and Distributors, Delhi-17.
- Michael, A. M. and Ojha, T.P. (2013). Principles of Agricultural Engineering. (Vol. II). Jain brothers, New Delhi.
- Smith Harris Pearson, H.E., and Lambent Herry Wilkes, M.S. (2011). Farm Machineryand Equipment, . Tata McGraw-Hill Publishing Company Ltd., New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

(16MB751) ENTREPRENEURSHIP DEVELOPMENT

| B. Tech IV Year II Semester | L | Т | Р | С |
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Course objective:

• The objective of the course is to make the students aware of the importance of entrepreneurship opportunities available in the society for the entrepreneur.

Course outcomes:

• Creates thorough understanding of the entrepreneurship concepts among the young engineering students to venture into creating jobs rather than seeking jobs.

UNIT-I:

INTRODUCTION TO ENTREPRENEURSHIP: Concept of Entrepreneurs, Enterprise and Entrepreneurship; Characteristics, Qualities, Functions of entrepreneur and Advantages of Entrepreneurship; Role of entrepreneurship in Economic development, Challenges faced by entrepreneurs. Understanding of Social Entrepreneurship, Women Entrepreneurship, Corporate Entrepreneurship and Entrepreneurship, Rural and Urban Entrepreneurship.

UNIT-II:

SMALL BUSINESS AND ITS IMPORTANCE: Introduction, Need, Classification of Micro, Small and Medium Enterprises (MSMEs), Role of MSMEs, Problems of MSMEs, Steps for Starting MSMEs, The role of government in supporting MSMEs in India.

FORMS OF BUSINESS ORGANISATION: Sole Proprietorship, Partnership, Joint Hindu Family, Joint Stock Company and Co-operative Society. Special forms of business ownership: Licensing, Franchising and Leasing.

UNIT-III:

INNOVATION AND IDEA GENERATION IN ENTREPRENEURSHIP: Concept of Invention and Innovation, Types of innovation, Sources of Innovation, Importance of innovation in Entrepreneurship. Sources of new ideas, Methods of generating ideas. Business Start-ups, Sources of information for Start-up Entrepreneurs in India.

INTELLECTUAL PROPERTY RIGHTS (IPRS): Patents, trademarks, copyrights, and trade secrets. Problems of Start-ups without IPRs.

UNIT-IV:

ENTREPRENEURIAL MOTIVATION: Concept of Motivation and Factors influencing the entrepreneurs; Motivational Theories-Maslow_s Need Hierarchy Theory, McClelland_s Acquired Need Theory. Entrepreneurship Development Programs (EDPs) - Need and Role of EDPs. Opportunities for entrepreneurship in present scenario. Successful entrepreneurs.

SOURCE OF FINANCING: Debt capital, seed capital, venture capital, Loans available for starting ventures in India, Role of government agencies in small business financing.

UNIT-V:

PROJECT PLANNING AND FEASIBILITY STUDY: Meaning of Project, Project Life Cycle, Stages of Planning Process. Project Planning and Feasibility, Project proposal and report preparation.

TEXT BOOKS:

- 1. Entrepreneurship, 8/e, Robert D Hisrich, Mathew J.Manimala, Michael P Peters, Dean A Shepherd, McGraw Hill Education.
- 2. The Dynamics of Entrepreneurial Development and Management, VasanthDesai, Himalaya Publishing House, Mumbai.

- 1. Entrepreneurial Development, S.S. Khanka, S. Chand and Company Limited.,
- 2. Fundamentals of Entrepreneurship, H. Nandan, PHI.
- 3. Entrepreneurship Management text and cases, BholanathDutta, Excel Books.
- 4. Entrepreneurship New venture Creation, Holt, PHI.
- 5. Entrepreneurial Development, Ramachandran, Tata McGraw Hill, New Delhi.
- 6. Entrepreneurial Development, Gupta and Srinivasan, S Chand & Sons, New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG722) FOOD PROCESSING PLANT DESIGN AND LAYOUT (DEPARTMENT ELECTIVE-II) B. Tech IV Year II Semester L T P

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Course objectives:

• 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.

Course outcomes:

Studies will be familiar with

- *Be proficient about Unit areas concept, two dimensional layouts, scale models.*
- Be proficient about Principles of plant layout Storage layout, equipment layout, safety, plant expansion, floor space, utilities servicing, building, materials handling equipment, rail road's and roads.
- Be proficient about Salient features of processing of different plants.
- Be proficient about Location selection criteria Plant location, factors in selecting a plant, selection of the plant site, preparation of the layout
- Food plant sanitation
- pollution control
- Cost analysis Cost indexes, cost factors in capital investment, estimation of total product cost.

UNIT – I:

Plant layout – Definition, meaning, objectives, principles. Plant layout – Factors in planning layouts. Methods of layout planning – Principles of plant layout – Storage layout, equipment layout, safety, plant expansion, floor space, utilities servicing, building, materials handling equipment, rail roads and roads. 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 plants of vegetable crops.

UNIT – II:

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, and materials of construction.

UNIT –III:

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 – IV:

Flow diagrams-Qualitative and quantitative flow diagrams. Selection of equipment - 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 equipment - 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 –V:

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, and 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 BOOKS:

- 1. Plant Layout and Design, James M Moor, Macmillan, New York.
- 2. Dairy and Food Engineering, Farall F W 2018. John Wiley & Sons, New York.

- 1. Milk Plant Layout, Hall H S and Y. Rosen, FAO publications, Rome.
- 2. Principles of Food Sanitation, Marriott N G 1985. Van Nostrand Reinhold Company, New York.
- 3. Food Technology Processing and Laboratory control. Aylward F 2012. Allied Scientific Publishers, Bikaner. Laboratory Control.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY::PUTTUR

(AUTONOMOUS)

(16AG726) INFORMATION TECHNOLOGY FOR LAND AND WATER MANAGEMENT (DEPARTMENT ELECTIVE-II)

| B.Tech IV Year II Semester | L | Т | Р | С |
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| Course Objectives: | 2 | 1 | - | 3 |

- In the present scenario, modern land and water management systems needs to know precise database of weather parameters, water availability & water demand, gross command area, crop water requirements, crop production for different amount of water supply, to prepare water supplying scheduled, water billing etc.
- Scientific researches in irrigation in different countries can be easily accessible by internet than any other publication source.
- This course is mainly aimed the students to get knowledge about information technology, database, multimedia technologies, networking system and communication technology etc.

Course outcomes:

- To understand the basic concept of information technology
- To understand internet application and communication technology in land and water management
- To understand the concept of database systems in land and water management.
- To understand application of remote sensing, GIS and GPS in watershed characteristics.
- Application of mathematical models in irrigation and water resource management

UNIT-I

Information technology (IT) introduction - users needs in terms of land and water information systems and decision-support systems. Information technology concepts and its application potential. Role of IT in natural resources management in modern irrigation sector. Existing system of information generation in land water management and organizations involved in the field of land and water management. Multimedia technologies – introduction – applications. Role of multi-media in the development of natural resources.

UNIT-II

Internet application tools in water management planning. Web technology - introduction – study of websites available for information on land and water resources. Networking system of information – introduction - types – study of water supply networks - global network on water and development information for arid lands (G-WADI). Communication technology - the role of communication technology in land and water information systems - problems and prospects of new information and communication technology.

UNIT-III

Database – introduction - types of database management systems. Different data base systems in land and water management. Development of database concept for effective natural resources management. Application of remote sensing, geographic information system (GIS) and GPS in thematic mapping like soil, water, ground water, resource, drainage etc. Application of remote sensing, geographic information system (GIS) and GPS in natural resource inventory. Application of remote sensing, geographic information system (GIS) and GPS in watershed characterization, watershed prioritization, inventory & assessment of natural resources, wasteland mapping,

UNIT-IV
Application of remote sensing, geographic information system (GIS) and GPS in ground water potential zones, run off estimation, water resources action plan, land resources action plan, site selection for implementation, land resource and evaluation. Use of satellite data for monitoring the changes in land and water. Relational data base management system (RDBMS) - definition- special application in land and water management (FAO). Information system – overview - types of information systems - development – integrated land and water information systems. Decision support systems – elements - support elements, water availability elements, water demand elements, integrated water management elements.

UNIT-V

Expert systems in relation to water management. Agricultural information management systems – models – types of models. Mathematical models in irrigation, optimization and water resource management. Mathematical models in soil and water conservation 264. Application of decision support systems - multi sensor data loggers. Overview of software packages in natural resource management.

TEXT BOOKS

- 1. Climate-Smart Agriculture Source Book. 2013. Food and Agriculture Organization.
- 2. Daniel P. Loucks and Eelco van Beek. 2005. Water Resources Systems Planning and Management An Introduction to Methods
- 3. Dipak De and Basavaprabhu Jirli (Eds.). 2010. Communication Support for Sustainable Development. Ganga Kaveri Publishing House
- 1. FAO. 1998. Land and Water Resources Information Systems. FAO Land and Water Bulletin 7
- Fuling Bian and Yichun Xie (Eds.). 2015. Geo-Informatics in Resource Management and Sustainable Ecosystem. Springer.

REFERENCES

- 1. ICFAI Business School (IBS). 2012. Information Technology and Systems. IBS Centre for Management Research
- 2. Robert Malliva and Thomas Missimer. 2012. Arid Lands Water Evaluation and Management. Environmental Science. Springer
- 3. Sarvanan. R. 2011. Information and Communication Technology for Agriculture and Rural Development. New India Publishing Agency
- 4. Soam, S.K., P.D. Sreekanth and N.H. Rao (Eds.). 2013. Geospatial Technologies for Natural Resources Management. New India Publishing Agency.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG727) DESIGN OF AGRICULTURAL MACHINERY

(DEPARTMENT ELECTIVE-II)

| B. Tech IV Year II Semester | L | Т | Р | С |
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Course objectives:

- 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.
- *To develop an ability to identify, formulate and solve engineering problems.*

Course outcomes:

Studies will be familiar with

- Be proficient in the use of software for analysis and design.
- Be proficient in an ability to identify, formulate and solve engineering problems.
- Various basic terms related to machine design aspects.
- Some of the basic concepts related to Fundamental units, Mass and Weight, inertia, Laws of motion, force, moment of force, couple mass density, torque, work, power and energy.

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, and 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.

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 - IV:

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.

$\mathbf{UNIT} - \mathbf{V}$:

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 BOOKS:

- 1. Machine Design Khurmi R.S. and Gupta J.K. 2005, Eurasia Publishing House Pvt.Ltd.,New Delhi.
- 2. Machine Design-Robert.l.Norton.2018, Person Education.

REFERENCES:

- 1. Machine Design Jain R.K. 1991. Khanna Publishers, New Delhi.
- 2. Machine Design-P.C.Gope. 2012, Prentice hall India learning private limited.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG723) GROUND WATER HYDROLOGY-WELLS AND PUMPS (DEPARTMENT ELECTIVE-III)

B. Tech IV Year II Semester

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Course objectives:

- 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.

Course outcomes:

Studies will be familiar with

- Some of the basic concepts like hydraulic conductivity, transmissibility, storage coefficient, specific yield, etc..
- Be proficient about various pumps available commercially, their selection, operation and maintenance with due importance to find out the cost of operation.
- Be proficient about well type, ground water potential, quality of ground water, artificial groundwater recharge planning, modelling, and ground water project formulation.

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 – diagrammatic representation.

UNIT – II:

Classification of wells, steady and transient flow into partially, fully and non-penetrating tube wells and open wells, familiarization of various types of bore wells common in the State. Design of open well, groundwater exploration techniques, methods of drilling of wells, percussion, rotary, reverse rotary, design of assembly and gravel pack, installation of well screen, completion and development of well, groundwater hydraulics-determination of aquifer parameters by different method such as Theis, Jacob and Chow' s etc. Their recovery method, well interference, multiple well systems.

UNIT – III:

Surface and subsurface exploitation and estimation of ground water potential, quality of ground water, artificial groundwater recharge planning, modelling, and ground water project formulation. Classification of indigenous pumps, Wind powered water lifts, Solar powered and biogas operated water lifts, Reciprocating pumps

UNIT – IV:

PUMPING SYSTEMS: Water lifting devices; different types of pumping machinery, classification of pumps, component parts of centrifugal pumps; pump selection, installation and troubleshooting.

$\mathbf{UNIT} - \mathbf{V}$:

Design of centrifugal pumps, Terminology on Horse Power, performance curves, effect of speed on head capacity, power capacity and efficiency curves, effect of change of impeller dimensions on performance characteristics; hydraulic ram, propeller pumps, mixed flow pumps and their performance characteristics; priming, self-priming devices, rotodynamic pumps for special purposes such as deep well turbine pump and submersible pump.

TEXT BOOKS:

- 1. Chow, V.T. (2009). Hand Book of Applied Hydrology. McGraw Hill, New York.
- 2. Jack, K. and Rend, B. (2001). Sprinkler and Trickle Irrigation. Van Nostra Reinhold, New York.
- 3. James, L.G. (1988). Principles of Farm Irrigation system Design. John Wiley & Sons, New York.
- 4. Michael, A. M. (2018). Water Well and Pump Engineering. Tata McGraw-Hill Pub. Co.Ltd., New Delhi.

REFERENCES:

- 1. Land and Water Management Engineering. Murthy VVN (2013).Kalyani Publishers, New Delhi.
- 2. Introduction to Soil and Water Conservation Engineering. Mal B.C. (2011) Kalyani Publishers, Rajinder Nagar, Ludhiana.
- 3. Irrigation Theory and Practice Michael A M (2008) Vikas Publishing House Pvt. Ltd, New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS) (16AG724) OPERATIONS RESEARCH (DEPARTMENT ELECTIVE-III)

B. Tech IV Year II Semester

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Course Objectives:

• To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems

Course Outcomes:

Students undergoing this course are able to

• Upon completion of this course, the students can able to use the optimization techniques for use engineering and Business problems

UNIT-I

INTRODUCTION TO OR AND LINEAR PROGRAMMING-OR definition– Classification of Models – Types of Operations Research models; Linear Programming- Problem Formulation, Graphical Method, Simplex Method, Big-M Method, Duality, Dual Simplex MethodDegeneracy.

UNIT-II

TRANSPORTATION PROBLEM – Formulation; Different Methods of Obtaining Initial Basic Feasible Solution-North-West Corner Rule, Least Cost Method, Vogel_s Approximation Method Modified Distribution (MODI) Method, Unbalanced Transportation Problem, Degenerate Problem. Assignment Problem – Formulation, Optimal Solution -Traveling Salesman problem.

UNIT-III

GAME THEORY - Introduction – Minimax (Maximin) Criterion and Optimal Strategy, Saddle Point, Solution of Games with Pure Strategy –Games with Mixed Strategies – 2 X 2 Games – Dominance Principle– Solution by Graphical Method of m X 2 & 2 X n games. Queuing Theory- Introduction – Terminology, Service Channel, Arrival Pattern, Population, Departure Pattern(Service Pattern), Queue Discipline, Birth & Death Process, Balking, Reneging, Jockeying; Single Channel Models with Poisson Arrivals, Exponential Service Times with finite queue length and non-finite queue length; Multichannel Models with Poisson Arrivals, Exponential Service Times with finite queue length and nonfinite queue length.

UNIT-IV

SEQUENCING -Assumptions-n-jobs x 2 Machines model, n-jobs x 3 machines models. PERT & CPM: Introduction to Project Management, Activities, Events, Predecessor Relationships, AOA Diagram, Early Start, Early Finish, Late Start & Late Finish Times, Earliest Occurrence and Latest Occurrence of the Event, Total Float, Free Float, Independent Float CPM- Deterministic Model- Critical

Path, Crashing, Optimal Project Duration, Least Possible Project Duration, PERT- Probabilistic Model-Various types of Activity Time Estimates, Standard Deviation and Variance of the Activities and Projects, and Probability of Completing the Project within scheduled time.

UNIT-V

DYNAMIC PROGRAMMING - Introduction – Bellman_s Principle of Optimality – Applications of Dynamic Programming- Capital Budgeting Problem – Shortest Path Problem. Introduction to maintenance– Types of Maintenance, Types of Replacement Problem, Determination of Economic Life of an Asset, and Simple Probabilistic Model for Items which completely fail-Individual Replacement Model, Group Replacement Model.

TEXT BOOKS:

- 1. Operations Research by R Panneerselvam, PHI, 2nd edition, 2012.
- 2. Operations Research by Manohar Mahajan Dhanpat Rai & Co

REFERENCES:

1. Operations Research by S P SHARMA 2. Operations Research by Er. Prem kumar Guptha & Dr.D.S. Hira

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

(16AG725) WATER RESOURCES SYSTEMS PLANNING & MANAGEMENT (DEPARTMENT ELECTIVE-III)

| B. Tech IV Year II Semester | , | L | Т | Р | С |
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Course objectives:

• To introduce the student to the concept of Mathematical approaches for managing the water resources system. • To make the students apply an appropriate system approach to optimally operate a water resource system

Course outcomes:

- The students will be exposed to the economic aspects and analysis of water resources systems by which they will get an idea of comprehensive and integrated planning of a water resources project.
- The students will develop skills in solving problems in operations research through LP, DP and Simulation techniques

UNIT – I

INTRODUCTION: concepts of systems analysis- definition- systems approach to water resources planning and management- role of optimization models- objective function and constraints- types of optimization techniques.

UNIT – II

LINEAR PROGRAMMING –I: Formulation linear programming models-graphical methodsimplex method- application of linear programming in water resources.

LINEAR PROGRAMMING – II: Revised simplex method-duality in linear programming sensitivity and post optimality analysis.

UNIT – III

DYNAMIC PROGRAMMING: Belman's of principles of optimality forward and backward recursive dynamic programming case of dimensionality-application of dynamic programming for resource allocation.

NON-LINEAR OPTIMATIZATION TECHNIQUES: Classical method optimization Kun-Tecker-gradient based research techniques for simple unconstrained optimization.

$\mathbf{UNIT} - \mathbf{VI}$

SIMULATION: application of simulation techniques in water resources.

WATER –**RESOURCES ECONOMICS:** Principles of Economics analysis-benefit cost analysis -socio economic intuitional and pricing of water resources.

UNIT – V

WATER RESOURCES MANAGEMENT: Planning of reservoir system-optimal operation of single reservoir system- allocation of water resources- optimal cropping pattern-and conjunctive use of surface and sub- surface water resources.

TEXT BOOKS:

- 1. Water Resources System Analysis by Vedula & Mujumdar, Tata McGraw Hill Company Ltd.
- 2. Water Resources Economics by James & Lee. Oxford Publishers.
- 3. Optimization technique by S.S. Rao-New Age International publishers.

REFERENCES:

- 1. Optimal design of water distribution networks by P.R. Bhave, Narosa Publishing house.
- 2. Operations research by P. Sankar Iyer, TMH Publications, New Delhi.
- 3. Operations research by N. Ramanathan, TMH Publications, New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

| B. Tech IV Year II Semester | L | Т | Р | С |
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Open Elective

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

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(16AG728) SEMINAR

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

| B. Tech IV Year II Semester | |
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(16AG729) PROJECT WORK