SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY::PUTTUR
(AUTONOMOUS)
DEPARTMENT OF AGRICULTURAL ENGINEERING

Induction Program (Mandatory)	3 weeks duration
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch & Innovations

I B. Tech. – I Semester

Sl. No.	Course Code	Name of the Subject	L	T	P/Drg	C
1	20HS0830	Algebra and Calculus	3	-	-	3
2	20HS0848	Engineering Physics	3	-	-	3
3	20ME0351	Basic Electrical & Mechanical Engineering	3	-	-	3
4	20CS0501	C Programming and Data Structures	3	-	-	3
5	20ME0303	Basic Thermodynamics	3	-	-	3
6	20HS0850	Engineering Physics Lab	-	-	3	1.5
7	20ME0352	Basic Electrical & Mechanical Engineering Lab	-	-	3	1.5
8	20CS0502	C Programming and Data Structures Lab	-	-	3	1.5
		Contact Periods / Week	15	-	9	**19.5**
				Total/Week 24		

I B. Tech. – II Semester

Sl. No.	Course Code	Name of the Subject	L	T	P/Drg	C
1	20HS0831	Differential Equations and Complex Analysis	3	-	-	3
2	20HS0804	Engineering Chemistry	3	-	-	3
3	20HS0810	Communicative English	3	-	-	3
4	20ME0301	Engineering Graphics	1	-	4	3
5	20CE0163	Basics of Engineering Mechanics	3	-	-	3
6	20HS0805	Engineering Chemistry Lab	-	-	3	1.5
7	20HS0811	Communicative English Lab	-	-	3	1.5
8	20ME0302	Workshop practice lab	-	-	3	1.5
9	20HS0816	Indian Constitution	2	-	-	-
		Contact Periods / Week	15	-	13	
				Total/Week 28		**19.5**

II B. Tech. – I Semester

Sl. No.	Course Code	Name of the Subject	L	T	P/Drg	C
1	20ME0315	Heat & Mass Transfer	3	-	-	3
2	20CE0164	Mechanics of Solids	3	-	-	3
3	20CE0104	Surveying & Geomatics	3	-	-	3
4	20AG0701	Principles of Agronomy & Soil Science	3	-	-	3
5	20AG0702	Greenhouse Technology	3	-	-	3
6	20CE0106	Strength of Materials Lab	-	-	3	1.5
7	20CE0107	Surveying Laboratory	-	-	3	1.5
8	20AG0703	Principles of Agronomy & Soil Science Lab	-	-	3	1.5
Skill Oriented Course						
9	20CE0110	Geographic Information System	1	-	2	2
Mandatory Course						
10	20HS0864	Human Values and Professional Ethics	3	-	-	-/3*
		Contact Periods / Week	19	-	11	**21.5/ 24.5***
			Total/Week 30			

*Note: Applicable from 2021-22 Batch onwards

II B. Tech. – II Semester

Sl. No.	Course Code	Name of the Subject	L	T	P/ Drg	C
1	20HS0833	Numerical Methods, Probability & Statistics	3	-	-	3
2	20CE0160	Fluid Mechanics & Hydraulic Machinery	3	-	-	3
3	20ME0310	Theory of Machines	3	-	-	3
4	20AG0704	Farm Machinery & Equipment-I	3	-	-	3
5	20HS0812	Managerial Economics and Financial Analysis	3	-	-	3
6	20CE0112	Fluid Mechanics & Hydraulic Machinery Lab	-	-	3	1.5
7	20AG0705	Farm Machinery & Equipment-I Lab	-	-	3	1.5
8	20ME0311	Computer Aided Machine Drawing lab	-	-	3	1.5
Skill Oriented Course						
9	20ME0366	Computer Aided Modeling Lab- I	1	-	2	2
		Contact Periods / Week	16		11	**21.5**
			Total/Week 28			
Internship 2 Months (Mandatory) during summer vacation						

III B.Tech.–I Semester

Sl. No.	Course Code	Name of the Subject	L	T	P/Drg	C
1	20CE0161	Soil Mechanics	3	-	-	3
2	20AG0707	Farm machinery& Equipment-II	3	-	-	3
3	20AG0708	Agricultural Process Engineering	3	-	-	3
Professional Elective Course (PEC)–I						
4	20AG0706	Soil and Water Conservation Engineering	3	-	-	3
	20AG0721	Land scape Irrigation Design and Management				
	20AG0722	Plastic Application in Agriculture				
Open Elective (OE)-I						
5	20CE0170	Fundamentals of Civil Engineering	3	-	-	3
	20EE0227	Generation of Energy through Waste				
	20ME0322	Non- Conventional Energy Sources				
	20EC0451	Introduction to Communication Systems				
	20CS0550	Relational Database Management System				
	20HS0813	Management Science				
6	20AG0709	Farm Machinery & Equipment-II Lab	-	-	3	1.5
7	20AG0710	Agricultural Process Engineering Lab	-	-	3	1.5
Skill advanced course/soft skill course						
8	20ME0323	Computer Aided Modeling Lab-II	1	-	2	2
Mandatory Course						
9	20HS0817	Essence of Indian Traditional Knowledge	2	-	-	-
10	20AG0711	Summer Internship 2 Months	-	-	-	1.5
		Contact Periods/Week	18		8	**21.5**
		Total/Week 26				

III B.Tech.–II Semester

Sl. No.	Course Code	Name of the Subject	L	T	P/Drg	C
1	20AG0712	Tractor Systems & Controls	3	-	-	3
2	20AG0713	Dairy and Food Engineering	3	-	-	3
3	20AG0714	Irrigation & Drainage Engineering	3	-	-	3
Professional Elective Course (PEC)–II						
4	20AG0723	Agricultural Engineering Structures	3	-	-	3
	20AG0724	Solid Waste & By-Product Utilization				
	20AG0725	Watershed Development				
Open Elective (OE)-II						
5	20CE0147	Fundamentals of Urban Planning	3	-	-	3
	20EE0235	Industrial Instrumentation				
	20ME0354	General Mechanical Engineering				
	20EC0452	Elements of Embedded Systems				
	20CS0551	Java Programming				
	20HS0814	Intellectual Property Rights				
6	20AG0715	Dairy and Food Engineering Lab	-	-	3	1.5
7	20AG0716	Irrigation & Drainage Engineering Lab	-	-	3	1.5
8	20AG0717	Agricultural Engineering (Virtual Lab)	-	-	3	1.5
Skill advanced course/soft skill course						
9	20HS0859	English for Corporate Communication Skills Lab	1	-	2	2
Mandatory Course						
10	20HS0801	Environmental sciences	2	-	-	-
Contact Periods/Week			18		11	21.5
			Total/week 29			
Industrial/Research Internship 2 Months (Mandatory)						

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20HS0830) ALGEBRA AND CALCULUS
(Common to All branches)

COURSE OBJECTIVES
The objectives of this course:

1. *To illuminate the students in the concepts of calculus and linear algebra.*
2. *To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.*
3. *To estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Develop the use of matrix algebra techniques that is needed by engineers for practical applications.*
2. *Utilize mean value theorems to real life problems.*
3. *Familiarize with functions of several variables which is useful in optimization.*
4. *Learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems.*
5. *Interpret the physical meaning of different operators such as gradient, curl and divergence.*
6. *Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.*

UNIT I
Matrices: Rank of a matrix by echelon form, solutions of system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley- Hamilton theorem.

UNIT II
Mean value theorems: Rolle"s theorem-Lagrange"s Mean value theorem-Taylor"s and Maclaurin"s theorems (without proof);
Partial Differentiation: Chain rule, Total derivatives, Jacobians, functional dependence, Maxima and Minima of functions of two variables, method of Lagrange multipliers with three variables only.

UNIT III

Integral Calculus: Evaluation of definite and improper integrals (single variable), Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Evaluation of Triple integrals (Cartesian).

UNIT IV
Vector differentiation: Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNITV
Vector integration: Line integral-circulation-work done, surface and volume integrals.
Integral theorems: Green‟s theorem in the plane (without proof), Stoke‟s theorem (without proof), Divergence theorem (without proof) and applications of these theorems.

TEXT BOOKS

1. Grewal B S, *Higher Engineering Mathematics*, 44[th]Edition, Khanna Publishers, 2017.

2. Ramana B V, *Higher Engineering Mathematics*, Mc Graw Hill Education, 2010.

REFERENCES

1. Rukmangadachari. E & Keshava Reddy E, *Engineering Mathematics,* Volume-I,II&III, Pearson Publishers, 2010.
2. Satyanarayana Bh, Pradeep Kumar T.V & Srinivasulu D, *Linear Algebra and Vector Calculus*, Studera Press, New Delhi, 2017, ISBN: 978-81-930333-8-8.
3. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Engineering Mathematics,* Volume-I,II&III, 12[th]Edition, S.Chand publication, 2014.

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I B.Tech – I Sem.

(20HS0848) ENGINEERING PHYSICS
(Common to CE & AGE)

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3	-	-	3

COURSE OBJECTIVES

The objectives of this course:

1. *To identify the importance of optical phenomenon i.e. interference and diffraction related to its engineering applications.*
2. *To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes and crystal structure determination by X-rays.*
3. *To familiarize the basic concepts of acoustics and ultrasonics with their Engineering applications.*
4. *To recognize the various basic terms related to Mechanics of Solids.*
5. *To understand the fundamental concepts of Superconductivity and Nano Science & Technology.*

COURSE OUTCOMES (COs)

On successful completion of this course, student will be able to

1. **Analyz**e the differences between interference and diffraction with applications.
2. **Apply** the Bragg‟s Law for crystal structure for the determination by X-rays.
3. **Explain** applications of acoustics and ultrasonics in various engineering fields.
4. **Explain** the importance of various mechanical properties of solids.
5. **Explain** the basic properties and applications of superconductors in various fields.
6. **Illustrate** methods for synthesis and characterization of nanomaterials and **apply** basic principles of nanomaterials in various engineering applications.

Unit – I : WAVE OPTICS

Interference - Principle of Superposition-Interference of light- Conditions for sustained Interference - Interference in thin films (reflected light)-Newton‟s Rings-Determination of Wavelength of light- Engineering Applications of interference.

Diffraction – Introduction- Fraunhofer Diffraction-Single Slit – Double Slit -Diffraction Grating – Grating Spectrum -Determination of Wavelength of Light - Engineering Applications of diffraction.

Unit – II :CRYSTALLOGRAPHY & X-RAY DIFFRACTION

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice –Crystal systems – Packing fractions of SC, BCC and FCC

X- Ray Diffraction - Directions and planes in crystals – Miller indices – Inter planar spacing in cubic crystals – X-ray diffraction - Bragg"s law – Powder Method

Unit – III : ACOUSTICS AND ULTRASONICS

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

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

Unit – IV: MECHANICS OF SOLIDS

Elasticity and isotropic materials- Stress, Strain and Hooke"s Law- Types of Stresses- Types of strains: longitudinal strain, volume strain and shearing strain- Internal energy due to strain – Behaviour of wire under the load- Elastic constants of Isotropic solids- Young"s modulus, Rigidity modulus and Bulk modulus, Poisson"s ratio of materials - Beams- Classification-Types of support -problems.

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, Nanoscience and Nanotechnology – Surface area to volume ratio and Quantum confinement- Classifications of Nanomaterials – Properties of nanomaterials: Mechanical, Magnetic, Optical - Synthesis of nanomaterials- Top Down Process- Ball Milling; Bottom Up Process: Sol-Gel method–Applications of nanomaterials.

TEXT BOOKS

1. M.N.Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy" *A Text book of Engineering Physics*",S.Chand Publications, 11th Edition,2019

2. K. Thyagarajan , "*Engineering Physics*" , Mc Graw Hill Education Private Ltd, New Delhi.

REFERENCES

1. MK Harbola ,” *Engineering Mechanics*” , , Cengage Learning Publications ,2nd ed. 2012.

2. JL Meriam, LG.Kraige and JN.Bolton, “*Engineering Mechanics – Dynamics*”, Wiley Publications, 7th ed.2018.

3. SH Crandall, NC Dahl & TJ Lardner ,”*An Introduction to the Mechanics of Solids*”, Tata Mc Graw Hill Education. 3rd ed.2017 (with SI Units).

4. M K Varma, “*Introduction to Mechanics*”, Taylor & Francis Group, 4th Ed,-2019.

5. D.K. Bhattacharya and A. Bhaskaran, “*Engineering Physics*”- OxfordPublications, 2015.

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20ME0351) BASIC ELECTRICAL & MECHANICAL ENGINEERING
(Common to CE & AGE)

COURSE OBJECTIVES

The Objective of this course is to

1. *Know about Basics of Electrical Engineering*
2. *State the principles of DC motors and its classifications*
3. *Impart the aspects of the various manufacturing processes.*
4. *Understand the basic fundamentals of mechanical engineering.*
5. *Study the basics of Automobiles, Energy conversion devices, R&AC.*

COURSE OUTCOMES

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

1. *State various laws in Electrical Engineering and explain the operation of networks*
2. *Recognize the importance of different network theorems and explicate its applications in two port networks.*
3. *Interpret the principle operation of DC motors and derive an EMF equation for the transformers.*
4. *Classify various casting and metal joining processes in the manufacturing processes.*
5. *Distinguish the types of machines in the manufacturing and elucidate the machining operations.*
6. *Categorize the automobile engines and refrigeration & Air-conditioning systems .*

PART A

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.

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. - Applications.

TRANSFORMERS: Principles of Operation, EMF equation, Losses and Efficiency, Regulation of Transformer.

PART B

UNIT – IV

Casting & Metal Joining Processes:

Types of casting processes - Permanent mould casting - Centrifugal casting - Investment casting. **Metal joining processes** – Principle of soldering, brazing and adhesive bonding - Position of welding, Classification of welding - Arc welding - Gas welding - Applications.

UNIT – V

Machine Tools:

Introduction – Lathe, Shaping, Slotting, Planning, Drilling, Boring and Milling machines Principle of working.CNC Machining, classification and fundamentals of operation & Introduction to programming.

UNIT – VI

Basics Of Automobile Engineering: Layout of automobiles – Components of four wheeler automobile, rear wheel drive, front wheel drive, Classifications of Automobiles.

Refrigeration & Air Conditioning: Introduction to Refrigeration & Air conditioning – Classifications of Refrigeration systems-Vapour compression and Vapour absorption systems – Types of Air conditioning systems.

TEXT BOOKS

1. M.S.Naidu and S. Kamakshiah , *Basic Electrical Engineering*, TMH Publishers, 2007.
2. D.P.Kothari & I.J. Nagrath*, Theory and Problems of Basic Electrical Engineering*, PHI, 2008.
3. R. K. Jain and S. C. Gupta, *Production Technology* , Khanna Pulishers, 16th Edition, 2001.
4. R.K.Rajput, *Thermal Engineering*, Laxmi Publications, 6th Edition, New Delhi, 2010.

REFERENCES

1. T.Thyagarajan*, Fundamentals of Electrical Electronics Engineering*, SCITECH Publications, 5th Edition-2007.
2. D.P. Kothari & I.J.Nagrath, *Theory and Problems of Basic Electrical Engineering*, PHI.
3. Kirpal Singh, *Automobile Engineering*, Standard Publishers, 1st Edition-2012.
4. Roy J. Dossat, *Principles of Refrigeration*, 4th Edition, Pearson Education Asia, 2009.

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I B.Tech - I Sem.

L	T	P	C
3	-	-	3

(20CS0501) C PROGRAMMING and DATA STRUCTURES
(Common to CE, CSC, CSM, CIC, CSIT & AGE)

COURSE OBJECTIVES

The objectives of this course:

1. *Teach the syntax and semantics of a C Programming language*
2. *Demonstrate the use of Control structures of C Programming language*
3. *Illustrate the methodology for solving Computational problems*
4. *Explain the approach to algorithm analysis*
5. *Introduce different data structures for solving the problems*

COURSE OUTCOMES (COs)

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

1. *Recognize the programming elements of C language*
2. *Select the control structure for solving the problem*
3. *Apply modular approach for solving the problem*
4. *Solve mathematical problems using C Programming language*
5. *Develop the applications using stacks and queues*
6. *Construct the linked lists for various applications and perform sorting techniques*

UNIT- I

Introduction to C Language - C Language Elements, Variable Declarations and Data Types, General Form of a C Program, Input and Output Statements, Operators, Expressions, Precedence and Associativity, Type Conversions.
Statements :Decision Statements ,Loop Control Statements, break, continue, goto statement.

UNIT- II

Arrays - Declaring and Referencing Arrays, Array Subscripts, Multidimensional Arrays.
Functions - Library Functions, Communications among Functions, Using Array Elements as Function Arguments, Scope, Storage Classes ,Type Qualifiers, Recursion , Preprocessor Commands.
Strings - String Basics, String Library Functions

UNIT- III

Pointers - Pointer Declaration, Pointers and Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Pointer to Functions, Pointers and Strings.
Structure and Union – Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

UNIT- IV

Data Structures - Overview of Data Structure, Types of data structures, Stacks: Introduction-Definition-Representation of Stack-Operations on Stacks- Applications of Stacks. Queues: Introduction, Definition- Representations of Queues- Various Queue Structures- Applications of Queues.

Linked List -Single linked list, Circular linked list, Double linked list, Circular Double linked list, Applications of linked lists.

UNIT- V

Searching & Sorting:

Linear Search, Binary Search, Exchange Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort.

TEXT BOOKS:
1. J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, *Programming in C and Data Structures*,Pearson Education.
2. B.A.Forouzan and R.F. Gilberg, *C Programming & Data Structures*,Third Edition, Cengage Learning.

REFERENCES:
1. Stephen G. Kochan,*Programming in C* , III Edition, Pearson Education.
2. J.A. Jones & K. Harrow ,*C Programming with problem solving*,Dreamtech Press.
3. Dr.N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand, *C and Data Structures*, a snapshot oriented treatise with live engineering examples.
4. E.Balaguruswamy, *C and Data Structures*, Tata McGraw Hill.
5. A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein ,*Data Structures using C* , Pearson Education / PHI, Eighth Edition.

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I B.Tech – I Sem.

L	T	P	C
3	0	-	3

(20ME0303) BASIC THERMODYNAMICS

COURSE OBJECTIVES

The objective of the course is to

1. *Know the basic terms of thermodynamics, work and heat interactions, balance of energy between system and its surroundings.*
2. *Understand the fundamental laws of thermodynamics and its applications to various gas process and cycles.*
3. *State and explain the Laws of gas and thermodynamic processes.*
4. *Explain various thermodynamic cycles with the help of P-V and T-S Diagrams.*
5. *Analyze the performance of Rankine Cycle.*
6. *Elucidate various methods of improving cycle performance.*

COURSE OUTCOMES
On successful completion of the course, the students will be able to

1. *State and explain the open and closed systems as well as develop and apply   continuity equation for them.*
2. *Describe the Basic concepts of thermodynamics such as temperature, pressure, system, Properties, process, state, cycles and equilibrium.*
3. *Explain the Basic laws of thermodynamics and their applications.*
4. *Interpret the Concepts of enthalpy, entropy and other thermodynamic properties of ideal gas Process.*
5. *Analyze Thermodynamic cycles and behavior of pure substances, usage of steam tables and Mollier chart in solving steam related problems.*
6. *Summarize various types of boilers, their construction, working and their applications.*

UNIT – I
Basic Concepts: Definitions of system, boundary, surrounding and control volume. Types of Thermodynamic systems, Properties of system-definitions for properties-pressure, volume, temperature, enthalpy, internal energy, density with their units, Point and Path Functions State, Process and Cycle, Quasi Static Process, Thermodynamic Equilibrium.

Work & Heat Transfer: Work transfer, Types of work transfers, Heat transfer, Comparison of Work and Heat transfers.

Zeroth Law of Thermodynamics: Zeroth Law of Thermodynamics. Heat and temperature – concept of thermal equilibrium

UNIT – II
   First Law of Thermodynamics:

   First law of thermodynamics- simple problems on heat and work conversions in process and cycle. Steady flow energy equation (SFEE), Limitations of First law of thermodynamics.

   Second Law of Thermodynamics:

   Heat Engine, Statements of Second law and their equivalence, Refrigeration and Heat Pump, Reversibility and Irreversibility, availability and unavailability – concept of change in entropy- expression for change in entropy.

UNIT – III
   Law of Perfect Gas: Ideal Gas, Equation of State, Avogadro"s Law, Internal Energy and Enthalpy of Ideal Gas, Entropy Change of Ideal Gas, Mixture of Gases- Dalton"s Law of Partial Pressure, Specific Heats, Internal Energy and Enthalpy of Gas.

   Thermodynamic Processes on Gases: Flow process, Non Flow Process, P–V and T-S diagrams on Isochoric process, Isobaric, Isothermal process, Isentropic process, Polytrophic process.
   Problems on Non flow Processes.

UNIT – IV
   Thermodynamic Cycles: Carnot Cycle, Otto Cycle, Diesel Cycle, Dual Cycle, Sterling Cycle, Ericson Cycle Problems.

   Pure Substances: P-V, P-T, T-S diagrams of Pure Substances, Mollier Diagram, Dryness fraction Enthalpy and Entropy of Steam using Steam Tables. Problems.

UNIT – V
   Vapour Power Cycle- Rankine cycle- Schematic Layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat Addition, Rankine cycle Efficiency, Problems on simple Rankine cycle.

   Methods of Improving cycle performance-Regeneration, Reheat, Problems on Reheat and Regenerative cycle.

TEXT BOOKS
   1. P.K Nag , *Engineering Thermodynamics,* Tata Mcgraw Hill Publishers, 5th Edition 2013.
   2. Yunus Cengel And Michael Boles, *Thermodynamics: An Engineering Approach* Mcgraw Hill Education, 8th Edition, 2014

REFERENCES

1. P. Chattopadhyam, *Engineering Thermodynamics* Oxford University Press, 1st Revised Edition 2011

2. J.P. Holman, *Thermodynamics* –Mcgraw-Hill Book Company, 2nd Edition, 1975.

3. YVC Rao, *An Introduction to Thermodynamics* Universities press, Revised 1st Edition, 2009

NOTE: Steam tables, Mollier Diagrams should be supplied

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I B.Tech – I Sem.   (20HS0850) ENGINEERING PHYSICS LAB
(Common to CE & AGE)

L	T	P	C
-	-	3	1.5

COURSE OBJECTIVES

1. *To explore the application of Interference and Diffraction by doing concerned experiments.*

2. *Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.*

3. *To understand the concept of Rigidity modulus, energy gap and B-H curve.*

4. *Develop an ability to apply the knowledge of physics experiments in the later studies.*

5. *Recognize the significance of Laser by studying its characteristics and its application in finding the particle size.*

COURSE OUTCOMES (COs)

On successful completion of this course, student will be able to

1. **Operate** various optical instruments.

2. **Estimate** wavelength of laser and particles size using laser.

3. **Plot** the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.

4. **Evaluate** the acceptance angle of an optical fiber and numerical aperture.

5. **Determine** energy loss by B-H curve.

6. **Evaluate** rigidity modulus of a given wire**.**

Suggested list of experiments from the following: (Perform any TEN experiments from the following)

1. Determination of wavelengths of various colors of Mercury vapor lamp using Diffraction Grating – Normal Incidence method.

2. Determination of Dispersive power of prism.

3. Rigidity Modulus – Torsional Pendulum

4. Determination of thickness of thin object by wedge method.

5. Determination of radius of curvature of Plano convex lens – Newton"s Rings.

6. Determination of wavelength of a given laser source by using diffraction grating.

7. Determination of particle size (Lycopodium particles deposited on glass plates) using Laser source.

8. Determination of energy gap of a semi conductor using p – n junction diode.

9. B- H curve.

10. Magnetic field along the axis of current carrying coil – Stewart & Gee"s Method.

11. Determination of frequency of tuning fork - Melde"s Apparatus.

12. Determination of Spring constant – Coupled Oscillator.

13. Determination of di electric constant of dielectric material using charging and discharging of capacitor.

14. Determination of Numerical Aperture of an Optical fiber.

15. Measurement of resistance with varying temperature –Thermistor.

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan "*A Text book of Practical Physics*", S Chand Publishers,2017

2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

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I B.Tech – I Sem.

L	T	P	C
-	-	3	1.5

(20ME0352) BASIC ELECTRICAL & MECHANICAL ENGINEERING LAB
(Common to CE & AGE)

COURSE OBJECTIVES

Objective of this course is to

1. *Impart Basic knowledge on Electrical Equipment's.*
2. *Familiarize student with Pattern making, Casting & Moulding.*
3. *Enable student to know about Lap & Butt joint.*
4. *Make the student learn about Drilling & Tapping operation.*
5. *Enable the student to learn about Shaping, Slotting, Cylindrical & Surface Grinding operation.*

COURSE OUTCOMES

Students undergoing this course can

1. *List few Basics in Electrical Engineering.*
2. *Explain steps in Pattern making, Casting & Moulding.*
3. *Produce a Lap & Butt joint using Arc welding.*
4. *Carryout Drilling & Tapping operation on a given workpiece.*
5. *Describe Cylindrical & Surface grinding operation.*
6. *Understand about Shaping & Slotting Operation.*

LIST OF EXPERIMENTS

PART – A

BASIC ELECTRICAL ENGINEERING LAB

1. Verification of Superposition Theorem.
2. Verification of Thevenin"s Theorem.
3. Determination of Open circuit and Short circuit parameters
4. Swinburne"s Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt   Machine Working as Motor and Generator).
5. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
6. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at Given Power Factors).

PART – B

BASIC MECHANICAL ENGINEERING LAB

1. Experiment on Pattern Design & Making, Casting & Moulding.
2. Experiment on Arc Welding: Lap & Butt Joint.
3. Demonstration on general purpose machines: Milling machine, Planning machine, slotting machine, Cylindrical Grinder, Surface grinder and Tool & Cutter grinder.
4. Experiment on Drilling& Tapping.
5. Experiment on Lathe
6. Experiment on Shaping & Slotting.

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(20CS0502) C PROGRAMMING and DATA STRUCTURES LAB
(Common to CE, CSC, CSM, CIC, CSIT & AGE)

COURSE OBJECTIVES
 The objectives of this course:
1. *Explain basic constructs of C language*
2. *Explain problem solving techniques*
3. *Develop applications in C using strings, pointers, functions, structures*
4. *Explain the different operations that can be performed on data structures*
5. *Introduce the different search and sorting algorithms*

COURSE OUTCOMES (COs):
On Successful completion of this course, the student will be able to
1. *Read, understand and trace the execution of programs written in C language*
2. *Develop C programs for simple applications making use of basic constructs, arrays and strings*
3. *Develop C programs involving functions, recursion, pointers, and structures*
4. *Select the data structure appropriate for solving the problem*
5. *Illustrate the working of stack and queue*
6. *Implement searching and sorting algorithms*

LIST OF EXPERIMENTS:

1. Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*,/,% and use Switch Statement)
2. a) Write a C program to find the sum of individual digits of a positive integer.
   b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
3. a) Write a C program to calculate the following Sum:
      Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
   b) Write a C program to find the roots of a quadratic equation.
4. a) Write a C program to determine if the given string is a palindrome or not
   b) Write a C program to determine whether the given number is Armstrong number or not.
5. a) Write a C program to generate Pascal's triangle.
   b) Write a C program to construct a pyramid of numbers.

6. a) Write a C program to find both the larges and smallest number in a list of integers.
   b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices

ii) Multiplication of Two Matrices

7. Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.

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

iii) To solve Towers of Hanoi problem.

8. Write a C program to swap(exchange) values of two integer variables using pointers

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

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

b) To delete n Characters from a given position in a given string.

10. a) Write a C program to check whether the entered string is palindrome or not.

b) Write a C program to read student roll no, name and marks in six subjects for n number of students and give class of each student.

11. Write a C programs that implement stack (its operations) using Arrays

12. Write a C programs that implement queue (its operations) using Arrays

13. Write a C program that uses functions to perform the following operations on singly linked list.

i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

14. Write a C program that uses functions to perform the following operations on doubly linked list:

i) Creation   ii) Insertion   iii) Deletion   iv) Traversal in both ways

15. a) Write a C program to perform Linear Search on the elements of a given array.

b) Write a C program to perform Binary Search on the elements of a given array.

16. a) Write a C program to sort the elements using Bubble sort.

b) Write a C program to sort the elements using Insertion sort.

TEXT BOOKS:

1. J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, *Programming in C and Data Structures*,Pearson Education.

2. B.A.Forouzan and R.F. Gilberg, *C Programming & Data Structures*,Third Edition, Cengage Learning.

REFERENCS:

1. P. Padmanabham ,*C programming and Data Structures*, Third Edition, BS Publications

2. E Balaguruswamy ,*C and Data Structures*,TMH publications.

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(20HS0831) DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS
(Common to CE, EEE, ME, ECE&AGE)

COURSE OBJECTIVES
The objectives of this course:

1. *To enlighten the learners in the concept of differential equations and multivariable calculus.*
2. *To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.*
3. *Provide a setting that prepares students to read and learn mathematics on their own.*

COURSE OUTCOMES (COs)

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

1. *Classify the differential equations with respect to their order and linearity.*
2. *Solve the differential equations related to various engineering fields.*
3. *Identify solution methods for partial differential equations that model physical processes.*
4. *Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions.*
5. *Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.*
6. *Recognize and apply the Cauchy's integral formula and the generalized Cauchy's integral formula (relationship between the derivative and the contour integral of a function).*

UNIT I
First and Higher Order Ordinary Differential Equations: Exact, linear and Bernoulli"s equations - Second and higher order linear differential equations with constant coefficients with R.H.S term of the types e^{ax}, *sinax, cosax,* polynomials in x, $e^{ax} V(x)$.

UNIT II
Equations Reducible to Linear Differential Equations: Method of variation of parameters - Cauchy"s and Legendre"s linear equations- simultaneous linear equations with constant coefficients - Applications to L-C-R Circuit problems.

UNIT-III
Partial Differential Equations:
Formation of P.D.E by elimination of arbitrary constants and arbitrary functions-Method of Separation of variables-Solutions of one dimensional Wave equation, Heat equation and two dimensional Laplace"s equation under initial and boundary conditions.

UNIT-IV
Complex Variable – Differentiation:
Differentiation, analytic functions, Cauchy-Riemann equations in Cartesian and polar co-ordinates (without proof), harmonic functions, conjugate harmonic functions, Milne Thompson"s method-Conformal mappings, Transformation by e^z, ln z, z^2, sin z and cos z-Mobius transformations and their properties.

UNIT-V
Complex Variable – Integration:
Line integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof)- Taylor"s series, zeros of analytic functions, singularities, Laurent"s series- Residues, Cauchy Residue theorem (without proofs), Evaluation of definite integral involving sine and cosine.

TEXT BOOKS

1. Grewal B. S, *Higher Engineering Mathematics*, 44[th]edition, Khanna

   Publishers,2017.

2. Ramana B. V, *Higher Engineering Mathematics*, Mc Graw Hill Education, 2010.

REFERENCES

1. Rukmangadachari. E & Keshava Reddy E, *Engineering Mathematics,* Volume-I,II&III, Pearson Publishers, 2010.
2. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Engineering Mathematics,* Volume-I,II&III, 12[th]Edition, S.Chand publication, 2014.
3. Garg Nishu Gupta R.L, *Engineering Mathematics,* Volumes-I &II, Pearson Education, 2014.

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(20HS0804) ENGINEERING CHEMISTRY

Course Objectives

1. *To familiarize engineering chemistry and its applications.*
2. *To train the students on the principles and applications of electrochemistry.*
3. *To understand the physical and mechanical properties of polymers helps in selecting suitable materials for different purpose.*
4. *To understand about the materials which are used in major industries like steel and metallurgical manufacturing industries*
5. *Be exposed to the importance of nano and engineering materials used in their daily life and Industry.*

Course Outcomes

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

1. *Explain the principles of reverse osmosis and electro dialysis.*
2. *Apply Nernst equation for calculating electrode and cell potentials.*
3. *Differentiate between thermoplastics and thermosetting plastics.*
4. *Explain the setting and hardening of cement and concrete phase.*
5. *Explain the synthesis of colloids with examples.*
6. *Acquire spotlight to the nano materials and basic engineering materials used in academics, industry and daily life.*

Unit 1: Water Technology

Introduction, Soft Water and Hardness of water, Estimation of hardness by EDTA Method. determination of dissolved oxygen by Winkler"s method . Boiler troubles**.-** priming ,foaming, scale and sludge, boiler corrosion Municipal Water Treatment,. Specifications for drinking water - Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards. Softening of water by Zeolite and Ion-exchange Processes; Desalination of Brackish water by Reverse osmosis (RO) and Electrodialysis.

Unit 2: Electrochemistry and Applications

Introduction to Electrochemical cell, Nernst equation, Cell potential calculations. Primary cells - Zn-Air Battery. Secondary cells – Lead acid Battery and Lithium Ion cell (Rechargeable) - working of the batteries including cell reactions. Fuel cells: Hydrogen- Oxygen, Methanol-Oxygen Fuel cell– basic principle, working and application of of the cells

Corrosion: Introduction to corrosion, Types of corrosion - Chemical corrosion, Electrochemical corrosion and Differential aeration cell corrosion. Factors affecting the corrosion. Cathodic protection and Anodic protection, Electroplating (Nickel and Copper) and Electro less plating.

Unit 3: Polymers and Fuel Chemistry

Introduction to Polymers, Functionality of Monomers, Nomenclature of Polymers, Types of Polymerization, Mechanism of Addition Polymerization. Thermoplastics and Thermosetting plastics - Preparation, Properties and Applications of PVC and Bakelite. Elastomers: Preparation, Properties and Applications of Buna-S, Buna-N and Thikol Rubber.
Fuels: Types of Fuels, Calorific value, Analysis of Coal. Liquid fuels: Refining of Petroleum, fractional distillation, Fuels for IC-Engines, Knocking and Anti-knocking agents, Octane and Cetane number, Alternative Fuels- Propane, Ethanol and Bio - Fuels.

Unit 4: Basic Engineering Materials

Composites: Constituents, Classification- Particle, Fibre and Structural reinforced composites - properties and Engineering applications of Composites. Refractories: Classification, Properties of Reractories.
Lubricants: Classification, Mechanism, Properties of Lubricating Oils Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, pour point and its Applications. Building Materials - Manufacture of Portland cement, Constituents, Phases and reactivity of clinkers, Setting and Hardening of Cement.

Unit 5: Surface Chemistry and Applications

Introduction to Surface Chemistry, Colloids, Micelle formation, Characteristics of Colloids, Synthesis of Colloids – Condensation Method, Dispersion Method. Stabilization of Colloids - Solid-Gas Interface, Solid-Liquid Interface, Adsorption Isotherm, BET equation (no derivation), Applications of Colloids.
Nano Chemistry: Introduction, Chemical and Electrochemical methods of preparation of Nano-Metals and Metal oxides, Nanomaterials characterization of surface by physicochemical methods: SEM, TEM, X-ray diffraction, Applications of Nanomaterials.

Text Books:
1. Jain and Jain, Engineering Chemistry, 16 Ed., Dhanpat Rai Publishers, 2013.

2. Peter Atkins, Julio de Paula and James Keeler, Atkins" Physical Chemistry, 10 Ed., Oxford University Press, 2010

References:
1. Engineering Chemistry by GVSubba Reddy, KNJayaveera and C. Ramachandraiah, McGraw Hill Higher Education,, New Delhi 2019.
2. K Sesha Maheswaramma and Mridula Chugh, Engineering Chemistry, 1 Ed., Pearson India Education Services Pvt. Ltd, 2016.
3. Dr. S.S. Dara and Dr S.S Umare, A Text book of Engineering Chemistry, 1 Ed., Chand & Company Ltd., 2000
4. D. J. Shaw, Introduction to Colloids and Surface Chemistry, 4 Ed., Butterworth-Heineman, 2013.

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(20HS0810) COMMUNICATIVE ENGLISH
(Common to CE,CSE,CSIT, CSM, CIC & AGE)

COURSE OBJECTIVES

The objectives of this course:

1. *Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers.*
2. *Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials*
3. *Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.*
4. *Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information.*
5. *Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able

1. *To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.*
2. *To ask and answer general questions on familiar topics and introduce oneself/others.*
3. *To employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.*
4. *To recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.*
5. *To form sentences using proper grammatical structures and correct word forms.*
6. *To use effective sentence structure for their professional activities.*

UNIT – I

Part 1
Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Writing:** Beginnings and endings of paragraphs - introducing the topic; Letter writing. **Grammar and Vocabulary:** Parts of speech, Function words, Content words; Tenses**. Soft**

Skills: Attitude is Everything; Positive attitude Positive thinking- thought provoking ideas – creative thinking.

Part 2
Half a Rupee Worth by R K Narayan from Engage with English.

UNIT – II
Part 1
Listening: Answering a series of questions about main idea and supporting ideas afterlistening to audio texts. **Speaking:** Discussion in pairs/ small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Mechanics of writing – punctuations.**Grammar and Vocabulary:** Voice; Cohesive devices; Articles.Types of sentences – Simple, Complex, and Compound.
Soft skills: The factors of human mindset; self-confidence- self-belief, self-learning – self motivation.
Part 2
The Thakur's Well byPremchand from Paths to Skills in English

UNIT – III
Part 1
Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing Report Writing. **Grammar and Vocabulary: S**ubject-verb agreement; If- clauses; Direct andIndirect speech. wh-questions.
Soft skills: Emotional intelligence; Work efficiency- peace of mind- Broad nature in ideas-having patience in multiple ways.
Part 2
I am not that Woman by Kishwar Naheed.

UNIT – IV
Part 1
Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** conversational English in academic contexts (formal and informal).**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of synonyms and antonyms.
Soft skills: Time management; the priority of the task – the task you take- Urgent and importance- not urgent, important- not important, urgent- Not important, not urgent.
Part 2
*What is my name?*By Sathyavathi from Paths to Skills in English.

UNIT – V
Part 1

Listening: Identifying key terms. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).
Soft skills: Goal setting; Immediate goal – Short goal- midterm goal – Life goal.
Part 2
The Power of Prayer by A P J Abdul Kalam from Paths to Skills in English.

Text Book

1. PushpaRelia .P & Sanjay Mihhra .K *EnglishAll Round: Communication Skills for Undergraduation Learners*Vol. I, OrientBlackSwan Publishers, First Edition, 2019.
2. Prof.Sundaravalli.G et al.*Paths to Skills in English*, Orient Blackswan,Publishers, First Edition2015

REFERENCES

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver.*Pathways: Listening, Speaking and Critical Thinking*. HeinleyELT;2nd Edition, 2018.
3. Hewings, Martin. *Cambridge Academic English (B2)*.CUP, 2012.
4. Eric H. Glendinning et al *Study Reading: A Course in Reading Skills for Academic Purposes*,Cambridge University Press; 2 edition, 14 October 2004.
5. Pattabiram, B.V, *Soft Skills*, Sonmez Publication, 2011(2nd Edition).
6. VirendranathYandamuri, *Soft Skills for Engineer*, Yaswin Publication, 2nd Edition, 2009.

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(20ME0301) ENGINEERING GRAPHICS
(Common to all branches*)*

COURSE OBJECTIVES

The objective of the course is to

1. *Draw simple curves like ellipse, cycloid and Involutes.*
2. *Describe the Orthographic projections of points, lines and planes.*
3. *Construct the projection of solids like cylinders, cones, prisms and pyramids*
4. *Sketch the development of the surfaces for practical cut sections of cylinders, cones, prisms and pyramids*
5. *Depict the isometric and Orthographic Projections of simple objects.*

COURSE OUTCOMES

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

1. *Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and Involutes.*
2. *Know the projection of points and implement the same in the construction of projection of lines and planes.*
3. *Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.*
4. *Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.*
5. *Understand the basic principles of isometric and Orthographic Projections*
6. *Construct the isometric and orthographic projections of simple objects.*

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections – Eccentricity method, Rectangle Method, Parallelogram Method, Cycloids- Epi & HypoCycloids and Involutes.

UNIT – II

Projections of Points: Principles of Orthographic Projections-Conventions - Projections of Points.

Projections of straight lines: Inclined to both the planes (Trapezoidal Method & Rotating line method) - simple problems only, Traces

UNIT – III

Introduction to plane surfaces: Surface Inclined to one plane **-** Surface inclined to both reference planes

Projections of Solids: Introduction– Projections of right regular solids-Prisms, Pyramids in different positions (Inclined to one plane only).

UNIT – IV

Section of solids: Sectional Views of Right regular Solids - Prisms, Pyramids

Development of surfaces: Development of surfaces of Right Regular Solids - Prisms, Pyramids.

UNIT – V

Orthographic Projections: Principles of Orthographic projection, Conversion of objects from 3D to 2D

Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids, Conversion of 2D to 3D.

TEXT BOOKS

1. K. L. Narayana, P.Kannaiah , *A text Book of Engineering Drawing*, Scitech Publishers, 23rd Reprint Edition, 2010.
2. N. D. Bhatt, *Engineering Drawing*, Charotar Publishers, 49th Edition, 2008.

REFERENCES

1. K. Venugopal, *A text Book of Engineering Drawing and Graphic,* New Age Publishing, 5th Edition, 2008.
2. Warren J. Luzadder & Jon M, *Fundamentals of Engineering Drawing,* Peach Pit Press, 11th Edition, 1992.
3. Dhananjay A Jolhe, *Engineering Drawing with An introduction to AutoCAD,* McGraw Hill Education; 1st Edition, 2017.

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(20CE0163) BASICS OF ENGINEERING MECHANICS
(Common to AGE & ME)

COURSE OBJECTIVES

1. To learn about forces and force systems and their applications
2. To learn about friction and to use the concept of Friction.
3. To learn how to find centroid of different objects using Mathematical formula.
4. To learn how to find Moments of Inertia of different objects using Mathematical formula.

COURSE OUTCOMES (COs)

On completion of this course, the student will be able to
1. Construct free body diagrams and develop appropriate equilibrium equations
2. Understand the concepts of friction and to apply in real life problems
3. Determine the centroid for composite sections
4. Determine the centre of gravity for the given sections
5. Determine the Moment of Inertia for composite sections
6. Describe the equilibrium conditions and analyze the various types of frames.

UNIT-I
FORCES & FORCE SYSTEMS: Fundamental Principles – Resolution and Composition of Forces and Equilibrium of Particles – Lami"s Theorem – Principle of Transmissibility – Principles of Continuum – Types of Force Systems –Resultant of Coplanar, Concurrent and Non-Concurrent Force Systems - Varignon"s Theorem – Equilibrium of Coplanar Force Systems – Types of Beams and Supports – Support Reactions.

UNIT-II
FRICTION: Types of Friction– Laws of Friction–Limiting Friction–Cone of Limiting Friction - Ladder Friction - Wedge, Screw jack and differential Screw Jack

UNIT-III
CENTROID: Centroids of Simple Figures (From Basic Principles) – Centroids of Composite Figures
CENTRE OF GRAVITY: Centre of Gravity of Simple Body -Centre of Gravity of Composite Bodies- Pappus Theorem

UNIT-IV
MOMENT OF INERTIA: Definition – Parallel Axis Theorem and Perpendicular Axis Theorem– Polar Moment of Inertia – Radius of Gyration – Moment of Inertia of Basic Shapes - Composite Sections - Simple Solids.
UNIT-V

ANALYSIS OF PERFECT TRUSSES: Types of Trusses – Perfect, Deficient and Redundant Trusses - Cantilever Trusses and Simply Supported Trusses – Analysis of Trusses using Method of Joints and Methods of Sections.

TEXT BOOKS

1. Bhavikatti SS, *A Text Book of Engineering Mechanics*, New Age International, 3rd Edition, 2016.
2. Dr. R. K. Bansal, *Engineering Mechanics*, Laxmi Publications, 4th Edition, 2011

REFERENCES

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

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(20HS0805) ENGINEERING CHEMISTRY LAB

COURSE OBJECTIVES

1 .*Learn to estimate the chemical impurities present in water such as hardness, alkalinity, chlorine*, etc.
2. *Understand and experience the formation of inorganic complex and analytical technique for trace metal determination.*
3. *Be trained to use the instruments to practically understand the concepts of electrochemistry.*
4. *Bridge theoretical concepts and their practical engineering applications, thus highlighting the role of chemistry in engineering.*
5. *Learn and understand the practical implementation of fundamental concepts*

COURSE OUTCOMES

On successful completion of this course, student will be able to

1. *Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.*
2. *Prepare advanced polymer materials*
3. *Estimate the Iron in cement*
4. *Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.*
5. *Think innovatively and improve the creative skills that are essential for solving engineering problems.*
6. *At the end of the course the students learn the alkalinity, acidity and viscosity of the any solutions.*

List of Experiments

1. Conductometric Titration of Strong acid vs Strong base

2. Conductometric Titration of Weak acid vs. Strong base

3. Determination of Hardness of a Groundwater sample.

4. pH metric titration of Strong acid vs. Strong base,

5. Potentiometry - Determination of Redox potentials and emfs

6. Determination of Strength of an Acid in Pb-Acid battery

7. Preparation of a Polymer

8. Determination of viscosity of an oil by Redwood viscometer .

9. Determination of percentage of Iron in Cement sample by Colorimetry

10. Determination of acidity of water sample.

11. Determination of Alkalinity of water sample.

12. Determination of Percentage Moisture content in a Coal sample

TEXT BOOKS:

1. J. Mendham et al, *Vogel's Text book of Quantitative Chemical Analysis,* Pearson Education, Sixth Edition, 2002.

2. G.V. Subba Reddy, Chandra Sekhar and Jayaveera, *Chemistry Practical – Lab Manual,* McGraw Hill Higher Education, 2015.

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(20HS0811) Communicative English Lab
(Common to CE,CSE,CSIT, CSM, CIC & AGE)

COURSE OBJECTIVES

The objectives of this course

1. Students will be exposed to a variety of self-instructional, learner friendly modes oflanguage learning.

2. Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.

3. Students will learn better pronunciation through stress, intonation and rhythm.

4. Students will be trained to use language effectively to face interviews, group discussions, and public speaking

5. Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.

COURSE OUTCOMES

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

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.

2. Apply communication skills through various language learning activities.

3.Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.

4.Evaluate and exhibit acceptable etiquette essential in social and professional Settings.

5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

6. Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.

LIST OF EXPERIMENTS

1. 1. **PHONETICS**

      Definition - Articulation - Phonetic Chart - Pure Vowels and Diphthongs.

1. 2. **MINIMAL PAIRS**
      Definition - Minimal Pairs 1 -Minimal Pairs 2

2. 1.**CLUSTERS AND MARKERS**

Consonant Clusters - Initial Consonant Cluster -Final Consonant Clusters -
Past Tense Markers - Plural Markers.

2. 2. **ICE BREAKING ACTIVITY**

Ice Breakers Overview - Ice Breakers Activity - Why Ice Breaker.

3. 1.**SYLLABLE**

Syllable Overview -Syllable Types.

3.2. **STRESS**

Syllable Stress - Stress Pattern -Stress and Rhythm - Word Stress - Sentence
Stress.

4. Accent & Intonation

Intonation overview- Intonation making lists – Intonation questions – Intonation – yes
or no questions – notes.

5. JAM

Jam tips - Sample topics.

6. Listening skills

Listening skills - Effective listening - Listening importance - Barriers to listening.

7.1. ROLE PLAY 1

Greetings - Giving compliments - Making requests – Hobbies - Asking permission –
Thanking.

7.2. ROLE PLAY 2

Comparing and contrasting - Agreeing and dis agreeing - Expressing opinions - Likes
and dis likes - Formal and informal – Suggestions - Polite requests - Meeting people.

7.3. ROLE PLAY 3

Phone calls – Directions.

8. Description

Describing a person- Adjectives to describe – Giving direction – Asking giving
direction – describing a product – Describing products – Personal narrative – narrative
writing Notes.

9. Book review

Introduction – Book review over view- Book review tips – Book review notes.

10. Information Transfer

Information writings –Text to Diagram- Diagram to Text.

Minimum requirements forCommunicative EnglishLab

1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.
2. Communicative English Labwith 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, LAN with minimum 60 multimedia systems with the following:

Specifications

i)   a) Intel(R) core (TM) i3
        b) Speed 3.10 GHZ
        c) RAM – 4 GB
        d) Hard Disk – 320 GB
ii)   Headphones with High quality

Software

Walden Info Tech Software

References

1. *A Textbook of English Phonetics for Indian Students,* second edition T. Balasubramanian. (Mcmillian) 2012.
2. *A Course in Phonetics and spoken English*, DhamijaSethi, Prentice-hall of India Pvt. Ltd, 2000.
3. *Speaking English Effectively,* second Edition Krishna Mohan & NP Singh 2011 (Mcmillian).
4. *A Hand Book of English Laboratories,* E.Sureshkumar ,P.Sreehari, Foundation books, 2011.
5. *Effective Technical Communication*, M Ashraf Rizvi, Director, Jaipuria Institute of Management, Lucknow. McGraw Hill Education; Second edition (27 July 2017).

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I B.Tech – II Sem.

L	T	P	C
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(20ME0302) WORKSHOP PRACTICE LAB
(Common to all branches)

COURSE OBJECTIVES

To make the student

1. *Familiarize with the different types of wood and carpentry joints.*
2. *Develop Tapered Tray and Conical funnel using sheet metal.*
3. *Acquire practical knowledge on Fitting and Electrical Wiring.*

4. *Learn about various peripherals of a computer.*
5. *Know about installation of MS Windows & Linux.*
6. *Gain knowledge on Productivity tools & Networking.*

COURSE OUTCOMES

Upon Completion of the course the students will be able to

1. *Describe the different types of wood and carpentry joints.*
2. *Produce Tapered Tray and Conical funnel using sheet metal.*
3. *Understands about Fitting and Electrical Wiring.*
4. *Identify various peripherals of a computer.*
5. *Explain the procedure to install MS Windows & Linux.*
6. *Understand about Productivity tools & Networking.*

PART A

LIST OF EXPERIMENTS

CARPENTRY: Familiarity with different types of woods and tools used in wood working and make following joints

1. T-Bridle joint
2. Corner Dovetail joint

SHEET METAL WORKING: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal jobs using GI sheets.

1. Tapered tray
2. Conical funnel

FITTING: Familiarity with different types of tools used in fitting and do the following fitting exercises

1. Step Fitting
2. V-Fit

ELECTRICAL WIRING: Familiarity with different types of basic electrical circuits and

makes the following connections

1. Parallel and series
2. Two way switch
3. Go down lighting
4. Tube light
5. Three phase motor
6. Soldering of wires

PART B

Task 1:

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

Task 2:

A practice on disassembling the components of a PC and assembling them.

Task 3:

1. Basic DOS commands, Installation of MS windows.
2. Basic Linux Commands, Installation of Linux.

Task 4:

Hardware Troubleshooting (Demonstration): Identification of a problem and fixing the solution (improper assembly or defective peripherals). Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues

Productivity tools

Task 5:

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

2. **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, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

3. **Spread sheet:** 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.

Task 6:

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.

TEXT BOOKS

1. V Ramesh Babu*, Engineering Work shop practice for JNTU*, VRB Publishers Pvt. Ltd., 2009.
2. Peter Norton, *"Introduction to Computers"*, McGraw Hill, 7th Edition, 2017.
3. Joan Lambert, Joyce Cox, *MOS study guide for word, Excel, Power point & amp; Outlook Exams*, PHI. 1st Edition, 2011.

REFERENCES

1. P. Kannaiah & K.L. Narayana, *Work shop Manual,* SciTech Publishers, 2010.
2. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education.2009.
3. Rusen, *Networking your computers and devices*, PHI, 2009.
4. Bigelows, *Trouble shooting, Maintaining & amp; Repairing PCs*, TMH, 2010.

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I B. TECH-II Sem.

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(20HS0816) Indian Constitution
(Common to All Branches)

COURSE OBJECTIVES

The objectives of this course:

1. *To know the premises informing the twin themes of liberty and freedom from a civil rightsperspective.*
2. *To address the growth of Indian opinion regarding modern Indian intellectuals 'constitutional role.*
3. *To address entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*
4. *To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.*
5. *To acquire knowledge for various competitive examinations.*

COURSE OUTCOMES (COs)

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

1. *Explain the key concepts of political economy.*
2. *Analyse the significant developments in the political ideologies.*
3. *Describe the salient features of the constitution of India interpret, integrate and critically.*
4. *Analyse the political economy of Indian international relations and gain knowledge in Judiciary system.*
5. *Apply their knowledge and skills acquired to write various competitive examinations.*
6. *Analyse the constitutional rights in relating to Practical life.*

UNIT-I

Constitution: Definition, Introduction, Meaning of the term,- Indian Constitution: Sources and Features

UNIT-II

Historical Perspective of Indian Constitution; The Government Act of 1919and1935 - A Dual Form of Government – The Constitutional Reforms of Simon commission –Formation of Drafting Committee – The Role of Constitution Assembly. Salient features and characteristics of the Constitution of India: Structure of the Indian Union: Federalism, Centre- State relationship.

UNIT-III

Scheme of the Fundamental Rights: Concept of Fundamental Rights in India, Justifiability of Fundamental Rights - Reach of Fundamental Rights -The scheme of the Fundamental Duties and its Legal Status: Fundamental Duties in India – Article 51A - Introduction to Fundamental Duties in India – Importance of Fundamental Duties.The Directive Principles ofState Policy - Its importance and implementation - The Potential of Directive Principles of State Policy for the Judicial Enforcement of Socio-Economic Rights.

UNIT-IV

Parliamentary Form of Government in India: Origin, growth and development of the parliamentary system in India – Chief Characteristics of Indian Parliament – Constitutional Powers and Functions of Indian Parliamentary system. The President of India: Qualifications of President - Election of President, Tuner of President - Status, Powers and Functions of President. The Historical Perspectives of the Constitutional Amendments inIndia: Types of Amendments & Constitutional Amendment Process in India - Indian Polity-Judiciary System Introduction to Indian Judiciary System - Independent Indian Judiciary - Indian Judiciary Structure - Powers and Functions of Indian Judiciary

UNIT-V

Local Self Government – Constitutional Scheme in India - District‟s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zilla Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials, Importance of grass root democracy.
Election Commission: Role and Functions of Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

TEXT BOOKS

1. Government of India Ministry of Law and Justice (Legislative Department) *The Constitution of India, 1950 (Bare Act)*Government Publication, 2015
2. Dr.Busi S.N, *Dr.B.R.Ambedkar framing of Indian Constitution*, 1st Edition, Government Publication 2015

REFERENCES
1. Jain M. P*Indian Constitution Law* LexisNexis Publishers 7th Edition.2014.
2. Basu D.D *Introduction to the Constitution of India* Lexis Nexis,8th Edition 2015
3...BakshiP.M Constitution *of India* Universal Law Publishing.15th Edition,2018

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II B.Tech - I Sem

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(20ME0315) HEAT & MASS TRANSFER

COURSE OBJECTIVES

The Objective of this course to
1. *Elucidate the fundamental mechanisms of heat transfer*
2. *Teach the governing laws of heat transfer by conduction, convection and radiation*
3. *Train the students in using the analytical and empirical methods for estimating heat transfer under different conditions*
4. *Explicate the rudimentary aspects in heat transfer with phase change.*
5. *Introduce different approaches for solving sizing and rating problems in Heat Exchanger design*

COURSE OUTCOMES

On successful completion of this course, the student will be able to
1. *Explain the fundamental principles associated with heat transfer phenomena and demonstrate their application in a wide range of application areas.*
2. *Develop solutions for transient heat convection in simple geometries Carryout analysis on different types of links, position, velocity, acceleration.*
3. *Obtain numerical solutions for radiation heat transfer problems.*
4. *Understand the fundamentals of heat exchangers.*
5. *Understand the basic laws of Mass transfer.*
6. *Design an appropriate heat exchanger, like condenser, evaporator, radiator etc., for a given heat transfer requirement using LMTD and NTU- methods*

UNIT I
Basic Concepts: Modes of Heat Transfer – Conduction - Fourier Law of Conduction Heat Transfer by convection and radiation - General Differential equation of Heat Conduction for Cartesian coordinates cylindrical coordinates and spherical coordinates.

UNIT II
One Dimensional Steady State Heat Conduction: Conduction through Plane Wall, Cylinders and Spherical systems – Composite Systems –Critical radius of insulation.
Extended Surfaces: Types of Fins, Effectiveness and Efficiency of Fins.
Transient Heat conduction: Heat conduction in solids-Lumped Parameter Analysis Infinite, solids with finite, semi-infinite solids.

UNIT III
Convection: Dimensionless numbers and their physical significance. Classifications of Convection.
Free Convection: Empirical correlation of free convection, Flow over Vertical Plate, Horizontal Plate, Inclined Plate, Horizontal cylinders and Spheres.
Forced Convection: Laminar flow over a flat plate, Boundary layer definition and characteristics - Empirical correlations for forced convection -External Flow – Flow over Plates - Cylinders Spheres and Bank of tubes.

UNIT IV

Boiling & Condensation: Types General aspects, Boiling Regimes – Factors affecting nucleate boiling- Boiling correlations. Drop wise and film wise condensation -Laminar film condensation on a vertical plate, correlations in condensation.

Radiation: Introduction, Surface emission properties - Absorptivity, Reflectivity and Transmissivity, Concept of a black body. Laws of Radiation – Stefan Boltzmann Law, Kirchhoff''s Law, Plank''s Law, Wiens Displacement Law

UNIT V
Heat Exchanger: Types of Heat Exchangers- LMTD method - Overall Heat Transfer Coefficient– Fouling Factors – Heat Exchanger Effectiveness-NTU Method
Mass Transfer: Introduction, Modes of Mass transfer - Fick''s law – Mass Transfer coefficient – Convective Mass Transfer and its correlations

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

REFERENCES
1. Holman, J.P., Heat and Mass Transfer, Tata Mc Graw Hill, 2000.
2. P.K. Nag, Heat Transfer, Tata Mc Graw Hill, New Delhi, 2002
3. Frank P. Incropera and David P. Dewitt, Fundamentals of Heat Mass Transfer, John Wiley & Sons, 1998
4. Thomas Bevan, Theory of Machines, Pearson (P) publisher, 3rd Edition, 2009

NOTE: Heat transfer Data books are permitted for Examination

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II B.Tech – I Sem.

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(20CE0164) MECHANICS OF SOLIDS
(Common to Mechanical & Agricultural Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *To learn about simple stresses and strains and their applications*
2. *To learn how to find shear forces and bending moments and construction of SFD & BMD*
3. *To understand about the concept of simple bending, shear stress distribution & deflection of beams*

COURSE OUTCOMES (COs)

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

1. *Summarize the basic principles of elasticity, theory of failures and apply them to estimate the stress and strain for axial members*
2. *Draw shear force and bending moment diagrams under different loading conditions*
3. *Study the theories related to the bending stress, shear stress distribution and torsional stress for beams of different cross sections and their applications*
4. *Describe the slope and defection of beam and calculate the slope and defection for statically determinate beams by using different methods*
5. *Classify different type of column and derive Euler's equation for long columns with different end conditions*
6. *Analyze the pressure vessels subject to internal and external fluid pressure*

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 andvolumetric strain – Elastic moduli and the relationship between them – Bars of varying section – Composite bars – Temperature stresses – Principal Stress – Mohr‟s Circle

Theories of Failures: Various theories of failures like Maximum Principal stress theory – Maximum principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

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.

Theory of Simple Bending: Derivation of flexure formula: M/I = f/y = E/R – Section Modulus

UNIT – III

Shear Stress Distribution: Derivation of formula – Shear stress distribution in rectangular,

triangular, circular, I and T sections

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 – IV

Deflections of Beams: Slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods for finding slope and deflection for cantilever and simply supported beams with point load, udl, gradually varying and combination loads

Columns: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns– assumptions – derivation of Euler's critical load formulae for various end conditions

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. Dr. R. K. Bansal, *A Textbook of Strength of Materials*, Laxmi Publications,6th Edition, 2017
2. Er.R.K.Rajput, *Strength of Materials (Mechanics of solids)*, S.Chand Publishing,6th Edition, 2015

REFERENCES

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
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II B.Tech – I Sem.

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(20CE0104) SURVEYING & GEOMATICS

COURSE OBJECTIVES

The objectives of this course

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

COURSE OUTCOMES (COs)

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

1. *Classify and explain the surveying and its principles*
2. *Use the principles of Chain and Compass survey to construct traverse and correct the error of chain and tape while measuring distances*
3. *Prepare LS & CS profiles and counter map using levelling instrument*
4. *To measure horizontal and vertical angles using theodolite and tacheometric surveying and their by compute the horizontal and vertical distances*
5. *To* c*alculate, design and set various types of horizontal curves*
6. *To describe the working principles of EDM and total station*

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

Chain & Compass Surveying: Chain and its accessories- Corrections for tape- Obstacles in Chaining - Compass Surveying - Units of angle measurement - Meridians, Azimuths, Bearings - Magnetic declination and dip - Prismatic and Surveyor compass – Temporary adjustment - Local attraction and corrections to angles and bearing of lines

UNIT – II

Levelling: Basic definitions - Methods of leveling - Leveling instruments: Dumpy level- Leveling staff - Temporary adjustments of dumpy level - Level Field Book – Booking and reduced levels – Methods – Simple leveling - Compound leveling - Check leveling- Reciprocal leveling - Profile leveling - Cross sectioning - Curvature and Refraction - Difficulties in leveling - Errors in leveling

Contouring: General - Contour Interval - Characteristics of contours - Methods of locating contours - Direct and indirect methods - Interpolation of contours - Contour Gradient - Uses of contour maps

UNIT – III

Theodolite: Basic definitions - Fundamental lines and desired relations – Types of Theodolite- Temporary adjustments - Measurement of a horizontal angle - Repetition and Reiteration methods - Measurement of Vertical angle - Sources of errors in Theodolite survey – Single and Double plane method

Tacheometric Surveying: Instrument- Different systems of Tacheometric 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 out simple curves - Rankine,,s method-Two theodolite method- Compound curves – Elements of compound curve - Reverse curve – Elements of Reverse curve - Relationship between various elements

UNIT – V

Electronic Distance Measurements: Introduction – Basic concepts of Electromagnetic waves - Basic definitions - Phase of the Wave, Units, and Types of waves - Measurement of transit time - Computing the distance from the phase differences - Modulation - EDMinstruments - Electronic Theodolite

Total Station: Models, Fundamental measurements, Recording, Traversing, and Data retrieval - Global Positioning System

TEXT BOOKS
1. Punmia B.C, *Surveying Vol-I & II*, Laxmi Publications, New Delhi, 15th Edition, 2016
2. Arora K. R, *Surveying Vol-I*, Rajsons Publications Pvt. Ltd, 10th Edition, 2008

REFERENCES
1. Kanetkar. T.P. & S.V. Kulkarni, *Surveying and Levelling, Part I & II*, Puna Vidyarthi Girha, Prakashan, 23rd Edition, 2006
2. R. Subramanian, *Fundamentals of Surveying and Levelling*, Oxford University Press, India, 1st Edition, 2014
3. Basak N.N, *Surveying and Leveling,* Tata McGraw Hill Publishing Company Ltd, 2nd Edition, 2014

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II B.Tech – I Sem.

L	T	P	C
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(20AG0701) PRINCIPLES OF AGRONOMY & SOIL SCIENCE

COURSE OBJECTIVES:

1. *To enable the students to understand the farming principles to grow agricultural field crops.*

2. *All farming practices whose knowledge will help the students to understand the soil, crop and machine specific parameters for design and development of farm machinery equipment and implements.*

3. *To impart knowledge on soil genesis, soil forming processes, structure, soil organic matter, soil chemical properties, etc*

4. *A comprehensive idea to students how to design implements in relation to soils.*

5. *How to treat the soils for soil health and structure improvements, soil conservation, irrigation and drainage applications.*

COURSE OUTCOMES (COs)

1. *Knowledge about Indian Agriculture and importance, present status, scope and future prospect.*
2. *Identification of Soil formation, classification, physical, chemical properties and important crops and crop seeds.*
3. *Comprehensive knowledge on rocks and minerals, their composition and the types of soils formed from different parent materials.*
4. *Understand the role of soil forming factors and processes in soil formation*
5. *Compare various soil physical, chemical and biological properties and their impact on plant growth.*
6. *The knowledge gained in this course will be useful in understanding the behavior of soils in crop production and management*

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. Reddy Yellamanda T and Shankar Reddy G H. 2016. Principles of Agronomy. Kalyani Publishers Ludhiana.
2. Dilip Kumar Das 2019.Introductory Soil Science. Kalyani Publishers Ludhiana.

REFERENCES:

1. Rao V S. 1992. Principles of Weed Science. Oxford and IBH Publishing Co. Ltd. New Delhi.
2. Hillel D. 1982. Introduction to Soil Physics. Academic Press, London.
3. Indian Society of Soil Science. 2015. Fundamentals of Soil Science. IARI, New Delhi.
4. Arnon L. 1972. Crop Production in Dry Regions. Leonard Hill Publishing Co. London.
5. Yawalkar K S and Agarwal J P. 1977. Manures and Fertilizers. Agricultural Horticultural Publishing House, Nagpur.

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(20AG0702) GREENHOUSE TECHNOLOGY

COURSE OBJECTIVES

The objectives of this course

1. *To understand the various types of greenhouses and its effect on environment*

2. *To study the various climatic factors required for growing different varieties of crops*

3. *To study the structural design and planning of greenhouse and also to use the greenhouses for off season usage and also to manage them commercially.*

COURSE OUTCOMES (COs)

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

1. *Be proficient about identify the types and structures of existing greenhouse.*

2. *Students will learn the different systems for climate control in greenhouse and their management.*

3. *Familiar with the techniques of light management and CO2 enrichment used for increasing and control crop production.*

4. *Learn the site selection and structural design of greenhouse*

5. *Understand the different types of material used in greenhouse*

6. *Learn about the economy of greenhouse construction*

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.

REFERENCES:

1. Green house Technology and Management. Radha Manohar K and Igathinathane C (2007), B.S. Publication, Hyderabad.
2. Green house Technology for controlled environment. TiwariG.N and Goyal (2009), Narosa Publishing R.K.House, New Delhi.
3. The complete Book of Greenhouse Gardening. Cavendish M (1991), Marshalcavandish Books Ltd , London

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(20CE0106) STRENGTH OF MATERIALS LAB

COURSE OBJECTIVES

The objectives of this course

1. Able to conduct test on engineering materials

2. To determine the elastic properties such as compression, tension, torsion and modulus of elasticity

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. Conduct tension test on mild steel bar and plot stress strain curve

2. Conduct compression test on wood, brick and concrete and can calculate their compression test

3. Conduct impact test on metal specimens

4. Find hardness of different materials

5. Determine modulus of elasticity of given material of beam by studying deflection for different loads

6. Determine tensile and torsional strength of mild steel bars and find stiffness of a helical spring

LIST OF EXPERIMENTS

1. Bending test on simple support beam by using central load and eccentric load

2. Water absorption and Compression test on brick

3. Compression test on wood

4. Compression test on concrete

5. Shear test on wood

6. Impact test on metal specimen (Izod and Charpy)

7. Compression test on helical spring

8. Tension test on mild steel bar

9. Torsion test on mild steel bar

10. Continuous beam – deflection test

11. Hardness test on metals (Rockwell and Brinell Hardness Number Tests)

12. Verification of Maxwell"s Reciprocal theorem on beams

Any ten experiments may be conducted

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(AUTONOMOUS)

II B.Tech – I Sem.

L	T	P	C
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(20CE0107) SURVEYING LABORATORY

COURSE OBJECTIVES

The objectives of this course is

1. To train the students in plotting of land by chain, tape and plane table survey

2. To train the students in determining the distance between two inaccessible points by prismatic compass and plane table and theodolite methods

3. To train the students in plotting of maps by conducting leveling survey, tacheometric methods and total station

COURSE OUTCOMES (COs)

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

1. Calculate the area of given polygon by chain and plane table surveying

2. Determine the elevation of various points using leveling instruments

3. Compute the angles, distance and height by compass, theodolite, tacheometry and total station

4. Setting out the curve by theodolite and tacheometry

5. Describe the concept of foundation marking

6. Use total station for carrying basic operations

LIST OF EXPERIMENTS

1. Determination of area of polygon by chain and cross staff survey.

2. Measurement of bearings of sides of traverse with prismatic compass and computation of correct included angle.

3. Determination of area of polygon by Plane table surveying- Radiation method

4. Measurement of distance between two inaccessible points by Plane table surveying – Intersection method

5. Determination of elevation of various points with dumpy level by collimation method (Fly Leveling)

6. Determination of elevation of various points with level by rise & fall method (Check Leveling)

7. Measurement of horizontal angles by method of repetition and reiteration.

8. Trigonometric leveling – Measurement of heights and distances (Single plane method)

9. Heights and distance measurement using Principles of tacheometric surveying

10. Setting out a simple curve by Rankine‟s method

11. Setting out works for a single bedroom residential buildings (Foundation marking)

12. Determination of area using digital Planimeter

13. Determination of area using total station

Any ten experiments may be conducted

REFERENCES

1. Roy S.K., *Fundamentals of Surveying,* Prentice Hall of India, 2nd Edition, 2004

2. Arora K.R., *Surveying, Vol I & II*, Standard Book house, 10th Edition, 2008.

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II B.Tech – I Sem.

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(20AG0703) PRINCIPLES OF AGRONOMY &SOIL SCIENCE LAB

COURSE OBJECTIVES:

1. *To enable the students to understand the farming principles to grow agricultural field crops.*
2. *All farming practices whose knowledge will help the students to understand the soil, crop and machine specific parameters for design and development of farm machinery equipment and implements.*
3. *To impart knowledge on soil genesis, soil forming processes, structure, soil organicmatter, soil chemical properties, etc*
4. *A comprehensive idea to students how to design implements in relation to soils.*
5. *How to treat the soils for soil health and structure improvements, soil conservation, irrigation and drainage applications.*

COURSE OUTCOMES (COs)

Studies will be familiar with

1. *Students will know principles of agriculture practices, modern systems of farming of agricultural crops and best cropping management suitable in local climate.*
2. *Basic idea about seasonal cropping patterns and use of fertilizers, common agricultural practices*
3. *The student will Identification of crops and their varieties, seeds, manures, fertilizers and weeds.*
4. *To use laboratory techniques to determine soil physical properties, including texture, bulk density, particle density, and porosity.*
5. *To use laboratory techniques to determine soil chemical properties, including pH, electrical conductivity, cation exchange capacity, and macronutrient levels:*
6. *To use soil surveys and laboratory techniques to identify characteristics of an unknown soil sample.*

LIST OF EXPERIMENTS:

AGRONOMY

1. Identification of crops and their varieties, seeds, manures, fertilizers and weeds;

2. Study of tillage implements, primary and secondary

3. Study of Fertilizer application methods;

4. Study of methods of sowing

5. Practice of sowing.

6. Study of Different weed control methods;

7. Identification of weeds

8. Visit to Regional Agricultural Research Station (RARS)

SOIL SCIENCE

1. Identification of rocks and minerals;

2. Collection and processing of soil sample

3. Determination of soil pH and EC

4. Determination of organic carbon of soil;

5. Determination of Nitrogen,

6. Determination of Phosphorus and Potassium;

7. Determination of gypsum requirement of sodic soils;

8. Determination of soil moisture content by gravimetric method

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

TEXT BOOKS:

1. Reddy Yellamanda T and Shankar Reddy G H. 2016. Principles of Agronomy. Kalyani Publishers Ludhiana.
2. Dilip Kumar Das 2019.Introductory Soil Science. Kalyani Publishers Ludhiana.

REFERENCES :

1. Rao V S. 1992. Principles of Weed Science. Oxford and IBH Publishing Co. Ltd. New Delhi.
2. Hillel D. 1982. Introduction to Soil Physics. Academic Press, London.

3. Indian Society of Soil Science. 2015. Fundamentals of Soil Science. IARI, New Delhi.

4. Arnon L. 1972. Crop Production in Dry Regions. Leonard Hill Publishing Co. London.

5. Yawalkar K S and Agarwal J P. 1977. Manures and Fertilizers. Agricultural Horticultural Publishing House, Nagpur.

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II B.Tech – I Sem.

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(20CE0110) GEOGRAPHIC INFORMATION SYSTEM

COURSE OBJECTIVES

Objective of this course is to introduce concepts of GIS through QGIS open source software

COURSE OUTCOMES (COs)

After the completion of the course student should be able to
1. *Describe fundamental concepts related to GIS*
2. *Work with vector data*
3. *Work with raster data*
4. *Perform data digitalization and process*
5. *Work with attributes, external files*
6. *Prepare map*

LIST OF EXPERIMENTS
1. Understanding coordinate systems, raster and vector data
2. Preparing QGIS environment
3. Working with vector data
4. Applying styles
5. Working with raster data
6. Data digitalization and processing
7. Working with attributes
8. External files and spatial interpolation
9. Maps and visualization

Software Used: QGIS

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III B.Tech I SEM

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(20HS0864) HUMAN VALUES AND PROFESSIONAL ETHICS

Course Objectives:
The Objective of the course is to

1. *Create awareness on Human Values.*
2. *Impart knowledge on an Engineering Ethics*
3. *Instill morality, accountability in an engineering experimentation*
4. *Create awareness on an assessment of safety, risk and rights*
5. *Develop knowledge on global issues*
6. *Create an awareness on Human Values and Engineering Ethics, Engineers social responsibility in an experimentation, appreciate the rights of others and ethics in global issues.*

Course Outcomes:
Online completion of the course the student will be able to

1. *Identify and analyze human values in their relevant field*
2. *Assess their own engineering ethics and have the social consciousness*
3. *Get knowledge on codes of ethics and on an utilitarian thinking*
4. *Identify safety, risks and an ethical concern in research and intellectual contexts*
5. *know necessity of computer and an environmental ethics, give a picture on weapons development*
6. *Upon completion of the course, the student should be able to apply the ethics in society, discuss an 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 – Necessity of 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--Engineering Projects VS. Standard Experiments, Engineers as responsible Experimenters– Conscientiousness- Comprehensive Perspective - Moral Autonomy - Accountability, Industrial Standards, 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

TEXTBOOKS:

1. R S Nagarajan, *Professional Ethics and Human Values*, New Age International (P) Limited Publishers,3rd Edition,2006
2. M.Govindarajan, S.Natarajananad, V.S.SenthilKumar,*Engineering Ethics includes Human Values* -PHI Learning Pvt. Ltd- 2nd Edition,2009

REFERENCES:
.
1. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, *Engineering Ethics – Concepts and Cases,* Cengage Learning, 2nd Edition, 2009
2. John R Boatright, *Ethics and the Conduct of Business*, Pearson Education, New Delhi, 1st Edition,2003
3. Edmund G Seebauer and Robert L Barry, *Fundamentals of Ethics for Scientists and Engineers*, Oxford University Press, Oxford, 4th Edition,2001
4. PSR Murthy, *Indian Culture, Values and Professional Ethics*, BS Publication, 2nd Edition, 2013

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B. Tech II Year II Semester

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(20HS0833)NUMERICAL METHODS, PROBABILITY &STATISTICS
(Common to CE, ME & AGE)

COURSE OBJECTIVES
The objectives of this course is to
1. *To introduce the tools of differentiation and integration of functions of numerical methods that is used in various techniques dealing engineering problems.*
2. *To develop the essential tool of Probability & Statistics in a comprehensive manner.*
3. *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
On successful completion of the course, the students will be able to
1. *To develop the mathematical skills of the students in the areas of numerical methods.*
2. *Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.*
3. *Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.*
4. *A good understanding of the laws of probability axioms and rules.*
5. *Understanding of moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.*
6. *Calculate and interpret the correlation and Regression between two variables.*

UNIT I
Solution of algebraic and transcendental equations:
Solution of polynomial and transcendental equations: Bisection method, Newton-Raphson method and Regula-Falsi method.
Interpolation:
 Finite differences, Interpolation using Newton‟s forward and backward difference formulae.

UNIT- II
Numerical solution of Ordinary differential equations:
Taylor‟s series(first and second order), Euler‟s method, Modified Euler‟s method and Runge-Kutta method of fourth order for solving first order differential equations.
Numerical integration:
Trapezoidal rule, Simpson‟s 1/3rd and 3/8 rules.

UNIT III
Basic Statistics:
Measures of Central tendency, Moments, skewness and Kurtosis.

Basic Probability:
Probability spaces, Addition theorem, conditional probability, independence, Multiplication theorem, Baye‟s theorem.

UNIT IV
Random variables:
Discrete and Continuous random variables- distribution functions, densities and their properties. Expectation of Discrete and Continuous Random Variables.

UNIT V

Probability Distributions and Correlation:
Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions.
Correlation and regression – Rank correlation.

TEXT BOOKS
1. Grewal B S, *Higher Engineering Mathematics*, 44th edition, Khanna Publishers, 2017.
2. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Probability & Statistics*, S.Chand publications, 2018.

REFERENCES
1. Rukmangadachari. E & Keshava Reddy E, *Engineering Mathematics,* Volume-III, Pearson Publishers, 2010.
2. Ramana B. V, *Higher Engineering Mathematics*, Mc Graw Hill Education, 2010.
3. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Engineering Mathematics-III,* S.Chand publication, 2014.
4. Gupta S.P, *Statistical methods*, S.Chand publications, 2011.

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II B.Tech – II Sem.

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(20CE0160) FLUID MECHANICS & HYDRAULIC MACHINERY

COURSE OBJECTIVES

The objective of the course is to understand the

1. *Basic concepts of Fluid properties and fluid statics*
2. *Applications of fluid kinematics and dynamics*
3. *Behaviour of pipe flow and losses in pipe flow*
4. *Concepts of flow measurements and boundary layer flows*
5. *Working principles of hydraulic machinery*

COURSE OUTCOMES (COs)

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

1. *State Newton's Law of Viscosity, discuss and calculate fluid properties*
2. *Define Pascal's Law and applies it for measuring pressure devices*
3. *Classify various fluid flows and derive Continuity, Euler's, Bernoulli's, Impulse Momentum, Darcy Weisbach Equation and applying them for fluid flow problems and pipe flow problems*
4. *Analyze impact of jets on vanes and develop velocity triangle*
5. *Discuss operation principals of hydroelectric power plant*
6. *Explain the principals of turbines and pumps*

UNIT-I
Fluid Properties: Definition of a fluid – Physical properties of fluids- Density, Specific weight, Specific volume, Specific gravity, viscosity, Compressibility, Vapour pressure, Surface tension and capillarity.
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 differential manometers.

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.
Fluid Dynamics: Euler's equation of motion– Bernoulli's energy equation – Impulse momentum equation – Force on a bend – Energy gradient line – Hydraulic gradient line.

UNIT-III
Flow Measurement: Velocity measurement by Pitot tube and Pitot static tube – Discharge measurement by Venturimeter and orifice meter.
Analysis of Pipe Flow: Loss of head through pipes **-** Darcy Weisbach equation - Minor losses in pipe flow - Pipes in Series - Pipes in Parallel.

UNIT- IV

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat inclined and curved vanes - Jet striking centrally and at tip - Velocity triangles at inlet and outlet - Expressions for work done and efficiency.

Introduction to Hydroelectric Power Plant: Types of hydroelectric power plant **-** Heads and efficiency of power plants – Components of a hydroelectric dam.

UNIT -V

Hydraulic Turbines: Classification of turbines – Heads and efficiencies of turbines -Pelton Wheel turbine - Modern Francis turbine – Kaplan turbine - Main components and working principle- Expressions for work done and efficiency – Draft tube.

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 – Minimum starting speed – Multistage pumps – Pumps in series and parallel – Expression for specific speed.

TEXT BOOKS

1. Dr.P.N.Modi & Dr.S.M.Seth, *Hydraulics and Fluid Mechanics Including Hydraulics Machines,* Standard Book House, 20th Edition, 2015
2. Dr.R.K.Bansal, *A Textbook of Fluid Mechanics and Hydraulic Machines*, Laxmi Publications, 9th Edition, 2017

REFERENCES

1. Streeter, Wylie, Bedford, *Fluid Mechanics,* McGraw Hill Education, 9th Edition, 2017.
2. C.S.P. Ojha, R. Berndtsson & P.N. Chandamouli, *Fluid Mechanics and Machinery,* Oxford University Press, 1st Edition, 2010.
3. S. C. Gupta, *Fluid Mechanics and Hydraulic Machines*, Pearson India Education Services Pvt. Ltd, 1st Edition, 2006
4. Rama Durgaiah D., *Fluid Mechanics and Machinery*, New Age International, 1st Edition, 2007

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(20AG0704) FARM MACHINERY & EQUIPMENT-I

COURSE OBJECTIVES:

1. Students to recognize the importance of tillage operation in agricultural production.

2. To explain the role of earth moving machinery during land preparation process.

3. To identify the various types of seeding, inter cultivation tools and plant protection equipment used in agricultural production.

COURSE OUTCOMES (COS)

After completion of this course the student will be able to

1. What is the importance of the Farm Mechanization in agriculture?

2. Classify the types of tillage and tillage tools.

3. Determine the various forces acting on tillage tools

4. Distinguish the various methods involved in sowing, inter cultivation and plant protection operation.

5. Categorize the various types of sowing, inter cultivation and plant protection equipment.

6. Utilize the transplanting concepts in agriculture field.

UNIT – I:

Introduction to Farm Mechanization - Farm mechanization –. Objectives, scope, status, advantages and bottlenecks – importance and challenges – constraints. Sources of farm power, merit and demerits 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.

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 & Cultivators. Forces acting on tillage tools, Problems on forces analysis, Draft measurement of tillage equipment‟s, Draft and unit draft related problems. Field capacities of different implements and their economics. Problems on field capacities andcost of cultivation.

UNIT – III

Earth Moving Equipment - Terminology, Earth moving equipment‟s, construction and their working principles, Earth moving equipment- shovels, bulldozers, **scraper**, trenchers and elevators.

UNIT – IV

Seeding Method - Sowing – Methods, Seed drill, Different types of seed metering mechanism, different types of furrow openers. Calibration of Seed Cum Fertilizer Drills. Adjustment of Seed Cum Fertilizer Drills. Planter and their types. Transplanting- different types of Transplanting machinery and their working principle, adjustmentsin transplanting equipment. Fertilizer application equipment – Fertilizer meeting mechanism, calibration of fertilizer equipment. Inter cultivation equipment"s- Hoes, dry land weeder and wet land weeder.

UNIT – V

Plant Protection Equipment -. 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.

TEXT BOOKS:

1. Kepner R A, Bainer R and Barger E L, Principals of Farm Machinery CBS Publishers and Distributors, Delhi, 2016.
2. Jagadeshwar Sahay, Elements of Agricultural Engineering, Agro Book Agency, Patna, 2015.

REFERENCES:

1. Borshahov Mansurov Sergecv, Land Reclamation Machinery, Mir Publishers, Moscow, 1988.
2. Michael A. M and OJha T. P, Principals of Agricultural Engineering Vol.I, Jain Brothers, New Delhi, 2010.
3. Smith H P, Farm Machinery and Equipment, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2011.

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II B.Tech - II Sem

L	T	P	C
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(20ME0310) THEORY OF MACHINES

COURSE OBJECTIVES
Students undergoing this course understand
1. The principle of gyroscopic effect, construction and purpose of turning moment diagram.
2. The working and uses of clutches and Dynamometer.
3. The working principal Design and application of Governor's.
4. The concept of dynamic balancing in different types of engines.
5. The concept of free and forced vibration and their analysis.

COURSE OUTCOMES
Students undergoing this course are able to
1. Know the Effect of gyroscopic couple, it's reactions and design flywheel for a machinery.
2. Study and realize the uses of clutch and it's application
3. Design an Governor in an optimized size with maximum effort
4. Balance any machinery with rotating parts in any plane
5. Balance rotating and reciprocating parts in engine to reduce vibration and noise.
6. Relate the cause of vibration and calculate it's magnitude to reduce it.

UNIT -I
Precession- Gyroscopes, effect of precession motion on the stability of moving vehicles- motor car, motor cycle, aero planes and ships.
Turning Moment Diagrams and Fly Wheels: Turning moment diagrams for steam engine, IC Engine and multi cylinder engine. Crank effort - Coefficient of Fluctuation of energy, Coefficient of Fluctuation of speed – Fly wheels and their design, Fly wheels for Punching Machines.

UNIT-II
Clutches - Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch
Brakes and Dynamometers - Simple block brakes, Band brake, internal expanding brake, braking of vehicle. Dynamometers – absorption and transmission types- Prony brake, Rope brake, Epicyclic-train & torsion dynamometers- General description and methods of operation.

UNIT-III
Governors - Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with auxiliary springs. Sensitiveness, isochronism and hunting. Effort and power of a governor.

UNIT-IV
Balancing - Balancing of rotating masses - single and multiple – single and different planes Balancing of Reciprocating Masses: Primary and Secondary balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – V-engine, multi cylinder in- line and radial engines for primary and secondary balancing.

UNIT-V

Mechanical Vibrations - Free and forced vibration of single degree of freedom system, Role of damping, whirling of shafts and critical speeds. Simple problems on free, forced and damped vibrations. Vibration Isolation & Transmissibility. Transverse vibrations of beams with concentrated and distributed loads. Dunkerly's method,. Torsional vibrations - two and three rotor systems.

TEXT BOOKS

1. R.S. Khurmi, Theory of Machines, Khanna Publishers, 2003.
2. S. S. Ratan, Theory of Machines, Tata McGraw Hill, 2nd Edition, 2005

REFERENCES

1. Ghosh A. and Mallick A.K, Theory of Mechanisms and Machines, Affiliated East-West Press, 2nd Edition, 1988.
2. Thomas Bevan, Theory of Machines, CBS Publishers, 3rd Edition, 1984
3. J.S Rao. & R.V Dukkipati, Mechanism and Machine Theory, Newagepublishers, 2nd edition 1992

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(20HS0812) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:
1. *To familiarize the students with the concepts of microeconomics and make them understand the concept of demand and supply analysis in business applications*
2. *To understand the pricing and output decisions under different market structures*
3. *To understand the basic financial statements and techniques of financial statement analysis*

Course Outcomes:

After the completion of the course student would be able to:
1. *Understand the nature of managerial economics and the role of it in business firms*
2. *Identify the determinants of demand and apply cost analysis under different market conditions*
3. *Integrate the concepts of price and output decisions of business firms*
4. *Appreciate the importance of market structures and implement appropriate price and output decisions*
5. *Assess the financial statements of a firm and the financial performance of the firm through the financial statements*
6. *Measure operating, investing and financial performance of a firm*

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 long- run 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.

REFERENCES:
1. *Financial Accounting and Analysis* PremchandBabu, 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

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(20CE0112) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

COURSE OBJECTIVES

The objectives of this course

1. To learn the concepts of Venturimeter & Orifice meter

2. To learn the concepts of notch's

3. To learn the basic concepts of turbines

4. To learn the basics concepts of different types of pumps

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. Calibrate Venturimeter & Orifice meter

2. Calculate losses in flows

3. Estimate the efficiency of different pumps

4. Study the performance of different turbines

5. Study importance of liquid properties and its methods of determination

6. Calculate forces and pressure due to fluid action under different conditions

LIST OF EXPERIMENTS

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. Impact of jet on vanes.
7. Performance test on Pelton wheel turbine.
8. Performance test on Francis turbine.
9. Efficiency test on centrifugal pump.
10. Study on Hydraulic jump.

Any eight experiments may be conducted

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(20AG0705) FARM MACHINERY & EQUIPMENT-I LAB

COURSE OBJECTIVES:

1. *Illustrate the importance of tillage operation in agricultural production.*

2. *To explain the role of earth moving machinery during land preparation process.*

3. *To identify the various types of seeding, inter cultivation tools and plant protection equipment used in agricultural production*

COURSE OUTCOMES (COs)

Studies will be familiar with

1. *List out the various types of sowing, inter cultivation and plant protection equipment.*

2. *Classify the types of sprayer and duster.*

3. *Determine the performance of MB plough, disc plough, disc harrow and cultivator*

4. *Compare the different types of seed drills.*

5. *Categorize the various types of sowing, inter cultivation and plant protection equipment.*

6. *Measure the nozzle discharge and field capacity of sprayer and duster.*

LIST OF EXPERIMENTS:

1. Study the constructional details and performance testing of Mould board plough

2. Study the constructional details and performance testing of Disc plough

3. Study the constructional details of Disc harrows and cultivators.

4. Study the constructional details of rotavator

5. Maintenance and adjustments of primary and secondary tillage implements.

6. Numerical problems related to tillage implements – Field capacity, field efficiency and size of Tractor etc.

7. Study the constructional details of different types of seed drills.

8. Calibration and performance testing of seed cum fertilizer drill.

9. Numerical problems on seed cum fertilizer drills – calibration, cost of operation and field capacity etc.

10. Study the constructional details and the performance testing of inter cultivation implements.

11. Study of sprayers and measurement of nozzle discharge and field capacity.

12. Study of dusters and measurement of nozzle discharge and field capacity.

TEXT BOOKS:

1. Kepner R A, Bainer R and Barger E L, Principals of Farm Machinery CBS Publishers and Distributors, Delhi, 2016.
2. Jagadeshwar Sahay, Elements of Agricultural Engineering, Agro Book Agency, Patna, 2015.

REFERENCES:

1. Borshahov Mansurov Sergecv, Land Reclamation Machinery, Mir Publishers, Moscow, 1988.
2. Michael A. M and OJha T. P, Principals of Agricultural Engineering Vol.I, Jain Brothers, New Delhi, 2010.
3. Smith H P, Farm Machinery and Equipment, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2011.

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II B.Tech - II Sem

L	T	P	C
-	-	3	1.5

(20ME0311) COMPUTER AIDED MACHINE DRAWING LAB

COURSE OBJECTIVES:
The Objective of this course is to
1. *Make the student understand and draw the conventional representation of various materials and Machine components.*
2. *Enable the students to learn and draw various types of thread profiles.*
3. *Familiarize the student in drawing Machine elements such as Bolt, Nut and Keys.*
4. *Develop the imagination and drafting skills of students.*
5. *Impart knowledge in drawing various part and Assembly drawings.*

COURSE OUTCOMES:
On successful completion of this course, the Student will be able to
1. *Understand and draw the conventional representation of various materials and machine components.*
2. *Design various thread profiles.*
3. *Explain the step to draw Machine elements such as Bolt, Nut and Keys.*
4. *Design a component with given part drawings.*
5. *Explain the procedure to draw part drawings from a given assembled diagram.*
6. *Know the various commands and tool bars used in CAD software.*

LIST OF EXPERIMENTS:

1. **Exercises on Machine drawing conventions using drafting software.**
   - Conventional representation of materials.
   - Conventional representation of machine components.

2. **Exercises on Machine drawing thread profiles using drafting software.**
   - Types of thread profiles-Square, Metric, ACME, Worm, Buttress.

3. **Exercises on drawing of machine elements using drafting software.**
   - Bolted joints-Hexagonal bolt and nut, Square bolt and nut.

4. **PART DRAWINGS:**
Drawing parts of the following assembled drawings
   - Knuckle Joint

5. **ASSEMBLY DRAWINGS:**
Drawing assembled views for the following drawings
   - Tool Post
   - Connecting rod
   - Screw jack
   - Stuffing box

Software Used: AUTOCAD /CATIA / SOLID EDGE

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II B.Tech – II Sem

L	T	P	C
1	-	2	2

(20ME0366) COMPUTER AIDED MODELING LAB- I

COURSE OBJECTIVES
Objective of this course is to
1. Impart brief knowledge on SOLID EDGE software.
2. Familiarize student with various commands used to sketch a part.
3. Make the student draw various part drawings using SOLID EDGE software.
4. Learn various assembly commands used to assemble the component.
5. Make the student assemble various part drawings of the component.

COURSE OUTCOMES
Students undergoing this course can
1. Describe the interface of SOLID EDGE software.
2. Explain various commands used to sketch a part.
3. Understand the use of different commands in Assembly interface.
4. Draw various part drawings using SOLID EDGE software.
5. Summarize various assembly commands used to assemble the component.
6. Produce a component by assembling various part drawings of the component.

LIST OF EXPERIMENTS

1. Introduction to *SOLID EDGE* Software.

2. Installation of SOLID EDGE Software

3. Basic commands practice

4. Conversion of different file formats

5. Part drawing practices

6. Assembly drawing Practices

7. Modeling of Component in 3D – EXTERNAL THREADING

8. Modeling of Component in 3D – HELICAL SPRING

9. Modeling of Component in 3D – ELBOW

10. Assembly of Component in 3D – CROSSHEAD

11. Assembly of Component in 3D – PIPE VICE

12. Assembly of Component in 3D – PLUMMER BLOCK

Software Used: AUTOCAD /CATIA / SOLID EDGE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR (AUTONOMOUS)

B. Tech III Year I Semester	L	T	P	C
	3	-	-	3

(20CE0161) SOIL MECHANICS

Course Objectives

The objectives of this course

1. *To explain how three phase system is used in soil and how are soil properties estimated using three phase system, carry out soil classification*
2. *To explain role of water in soil behavior and how soil stresses, permeability and quantity of seepage including flow net are estimated*
3. *Ability to apply the principle of shear strength and settlement analysis for foundation system*
4. *To explain mechanism of compaction and its parameters*

Course Outcomes

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

1. **Describe** *volumetric ratios, weight/mass relationships, index properties of soils,* **establish** *interrelationships and* **classify** *soils.*
2. **State** *Darcy's Law,* **define** *permeability, effective and* **determine** *the effective stress for different soil profiles*
3. **Derive** *equation for vertical stress for different load based Boussinesq's equation, calculate the vertical stress using Newmark's charts and Boussinesq's equation*
4. **Explain** *the phenomenon of compaction, factor affecting compaction, laboratory test to determine the compaction and field methods of compaction*
5. **Derive** *Terzaghi's equation for one dimensional consolidation and* **estimate** *consolidation settlements for various soils under various drainage conditions*
6. **Learn** *Mohr-Coulomb's theory of shear strength of soil and* **conduct** *various shear strength tests under different drainage conditions*

UNIT – I

Introduction of Soil Mechanics: History of development of Soil Mechanics - Field of Soil Mechanics- Soil formation – Soil structure and clay mineralogy –Relative density – Phase diagram of soils – Mass - Volume relationships-Weight-Volume relationships– Interrelationships – Relative density **Index Properties of Soils:** Moisture content- Specific gravity- Insitu density- Grain sizeanalysis – Sieve and hydrometer methods- Consistency limits – Texture of soils - I.S. classification.

UNIT II

Permeability of Soil: Soil permeability - Capillary rise – Adsorbed water – Flow of water through soils- Darcy's law - Constant head permeability test-Falling head permeability test- Factors affecting permeability -Permeability of layered soils

Effective Stress: Principle of effective stress- Total, Neutral and Effective stresses –Quick sand condition – Seepage through soils – Flow Net for Two-dimensional flow: Characteristics and uses

UNIT – III

Stress Distribution in Soils: Boussinesq's equation for point load - Line load – Strip load – Rectangle load – Circular load and areas of different shapes -Westergaard's equation- Pressure bulbs– Newmark's Influence chart

Compaction: Compaction phenomenon - Standard proctor test and Modified proctor test- - Field compaction method and control - Factors affecting compaction - Effects of compaction on soil properties

UNIT – IV

Consolidation: Types of compressibility – Immediate settlement, Primary consolidation and Secondary consolidation - Stress history of clay; e Vs P and e Vs log(P) Curves – Normally consolidated soil, Over consolidated soil and Under consolidated soil – Pre-consolidation pressure and its determination – Terzaghi's one-dimensional consolidation theory – Coefficient of consolidation: Square root time and Logarithm of time fitting methods

UNIT – V

Shear Strength: Stress at a point- Mohr's circle of stress- Mohr's-Coulomb failure theory- Measurement of shear strength, Direct shear test, Tri-axial compression test- Unconfined compression test, Vane shear test: Problems on shear strength - Shear characteristics of Cohesive soils and Cohesion less soils -Strength envelops- Shear strength of sands – Dilatancy – Critical void ratio – Liquefaction- Shear strength of clays

TEXT BOOKS:

1. C. Venkataramiah*, Geotechnical Engineering, New* age International Pvt. Ltd, 6th edition 2018

2. K.R. Arora , *Soil Mechanics and Foundation Engineering,* Standard Publishers and Distributors, Delhi, 7th edition,2019.

REFERENCES:

1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain , *Soil Mechanics and Foundation*, Laxmi, publications Pvt. Ltd., New Delhi, 2017

2. V.N.S. Murthy, *Soil Mechanics and Foundation Engineering,* CBS Publishers and Distributor's, 2016

3. Manoj Dutta & Gulati S.K, *Geotechnical Engineering by*, Tata McGraw-Hill Publishers New Delhi, 2010.

4. Gopal Rajan and A.S.R. Rao, *Basic and Applied Soil Mechanics*, New Age Publications, 2nd revised edition, 2014.

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B. Tech III Year I Semester

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(20AG0707) FARM MACHINERY & EQUIPMENT-II

Course objectives:
1. *To enable the students to understand the basic principles of cutting mechanisms harvesting machines*
2. *To know about the various types of available harvesting machines.*
3. *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.*

Course outcomes:
On successful completion of this course, student will be able to
1. *Simple terms related to crop and machine.*
2. *Apply basic knowledge of the forage harvesting machineries.*
3. *Apply basic knowledge of the crop harvesting machineries.*
4. *Various basic terms related to harvesting machineries and thresher.*
5. *Apply basic knowledge on the fruit harvesting machineries.*
6. *Understand about testing of farm machine*

UNIT – I:
MOWERS – Conventional type of mower, components of mower, types- integral Rear mounted mowers, side or central mounted tractor mower, semi-mounted mowers. Safety precautions in operation and adjustments of mowers, cutter bar and its parts, alignment and registration of cutter bar and self-propelled windrower
FORAGE HARVESTING EQUIPMENT - Field forage harvesters, types of field forage harvesters, forage wagons

UNIT –II:
HARVESTING – Crop harvesting machinery, manual harvesting and its classification. Principles and types of cutting mechanisms – principle of cutting mechanism, types - impact cutting & shear cutting.
HARVESTERS – Reapers- Animal drawn reaper, Tractor mounted Vertical conveyer reaper and Reaper binders – Care and maintenance. 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. Corn harvesting equipment- Types of corn pickers - Snappers, picker husker & picker sheller.

UNIT – III:
ROOT CROP HARVESTING EQUIPMENT – Groundnut harvester & potato harvesters and adjustments.

FRUIT HARVESTERS - Principles of fruit harvesting tools and machines – Harvesting methods manual harvesters – hold on and twist type.

UNIT – IV:
COTTON HARVESTING EQUIPMENT – Cotton stripper, types of cotton strippers. Cotton pickers – types of pickers, drum type and chain belt spindle arrangements in cotton pickers. Sugar cane harvesters – self-propelled sugar cane harvester.

UNIT – V:
THRESHING – Principles of threshing, threshing methods, threshing by manual, threshing by animals, threshing by machines, Olpad threshers, Power thresher – types of power threshers. Components of power thresher. Cleaning unit- Aspirator, blower, winnower, winnowing fan, cylinder adjustment. Wheat thresher and groundnut thresher.

Testing of farm machine- Introduction, Standardization efforts, Type of testing systems, national testing, prototype testing, testing for quality marketing

TEXT BOOKS:
1. Principals of Farm Machinery. Kepner R.A., Bainer R and Barger E.L, 1987.CBS Publishers and Distributors, Delhi.
2. Engineering principles of Agricultural machines, Ajith k Srivatsava, Carrol E. Goering, Roger P. Rohrbach, 1993, ASAE Publishers.

REFERENCES:
1. Farm Machinery and Equipment. Smith H.P. 1971. Tata McGraw-Hills Publishing Co., Ltd., New Delhi.
2. Testing and Evaluation of Agricultural Machinery. Mehta M.L., Verma S.R. Misra S.K. and Sharma V.K. Daya Publishing House, New Delhi.
3. Principals of Agricultural Engineering — Michael A. M and OJha T. P 2010. Vol.I, Jain Brothers, New Delhi.

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B. Tech III Year I Semester

L	T	P	C
3	-	-	3

(20AG0708) AGRICULTURAL PROCESS ENGINEERING

Course Objectives:

1. *To train the students on unit operations of agricultural process engineering*
2. *To acquaint with the engineering properties of agricultural materials*
3. *Enable the students to understand the concepts of cleaning of cereals, size reduction and rice milling*

Course Outcomes:

On successful completion of this course, student will be able to

1. *Be proficient in the scope of the process engineering and the use of processing machinery*
2. *Understand the physical properties, rheological properties and frictional properties of agricultural materials*
3. *Summarising the thermal properties, electrical properties and the terms related to the machine design aspects*
4. *Some of the basic concepts related to cleaning and size reduction equipments*
5. *To acquaint the students with the milling of rice, parboiling technologies and milling of pulses and oilseeds*
6. *Understand the filtration equipments*

UNIT-I

Physical characteristics of different food grains: fruits and vegetables – importance, Shape and size – criteria for describing shape and size, Roundness and sphericity – Volume and density – Specific gravity – Bulk density Porosity – surface area – measurement of the same,

Rheology – basic concepts, ASTM standard definition of terms, Rheological Properties – Force deformation behavior, stress and strain behavior, Visco elasticity – time effects, Friction – basic concepts, effect of load sliding velocity, Rheological models - Kelvin and Maxwell models, electrical equivalence of mechanical models, Rheological equations – Generalized Maxwell and Kelvin models

UNIT-II

Frictional Properties: Friction in agricultural materials – measurement – rolling resistance – angle of internal friction and angle of repose, Aerodynamics of agricultural products – drag coefficient – frictional drag and profit drag or pressure drag and terminal velocity.

Electrical properties – Di electrical properties, Thermal Properties – specific heat – thermal conductivity-thermal diffusivity, Application of engineering properties in handling and processing equipment and also storage structures.

UNIT- III

Scope and importance of crop processing: Principles and methods of food processing- cleaning and grading of cereals.

Theory of separation: Types of separators, Cyclone separators, Size of screens applications, Separator

based on length, width and shape of the grains, specific gravity, density, Air-screen grain 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, Cleaning and separation equipment's.

UNIT- IV
Size reduction –principle of comminution/ size reduction, mechanisms of comminution of food, particle shape, average particle size, Characteristics of comminuted products, crushing efficiency, Determination and designation of the fineness of ground material, screen analysis, Empirical relationships (Rittinger's, Kick's and Bond's equations), Work index, energy utilization, Methods of operating crushers, Classification based on particle size, Nature of the material to be crushed, Size reduction equipment – Principal types, crushers (jaw crushers, gyratory, smooth roll), Hammer mills, 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- V
Rice milling: Principles and equipment's, 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

TEXT BOOKS:
1. Post Harvest Technology of Cereals, Pulses and oil seeds, Chakraverty A 1988. Oxford and IBH Publishing Co. Ltd.,Calcutta.
2. Unit Operations of Agricultural Processing, Sahay KM and Singh KK 1994, Vikas Publishing House Pvt. Ltd., NewDelhi.

REFERRENCES:
1. Unit Operations of Chemical Engineering, McCabe WL, Smith JC and Harriott P 2017 McGraw-Hill Book Co.,Boston.
2. Transport Processes and separation Process Principle, Geankoplis C J 2015 Prentice-Hall Inc., NewJersey. Unit operations in Food processing, Earle R L 1983. Pergamon Press, NewYork.

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B.Tech III Year I Semester

L	T	P	C
3	-	-	3

(20AG0706) SOIL AND WATER CONSERVATION ENGINEERING
(PEC-I)

Course objectives:

1. *To enable the students to acquire knowledge on different soil loss estimation models, run off estimation by rational, curve number, cook'setc.*
2. *Land use, capability classification, Land treatment works like contour bunding, terracing, bench terraces, contour trenches and their types and complete design calculations.*
3. *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:

On successful completion of this course, student will be able to

1. *Various basic terms related to Soil Erosions, Rainfall-Runoff relationships.*
2. *Some of the basic concepts related to soil conservation.*
3. *Simple terms related to soil loss estimation models.*
4. *Recognize importance of various soil conservation structures and their designs.*
5. *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 wasteweir – Construction of contourbunds 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:

1. Soil and Water Conservation Engineering. Scwab G.O. Frevert R.K. Edminster T.W. and Barnes K.K. 1981 John Wiley and Sons New York.
2. Manual of Soil and Water Conservation Practicals. Gurmel Singh. Venkataramanam C. Sastry G and Joshi BP. 2017.Oxford and IBH Publishing Co. Ltd., NewDelhi.
3. Chow, V. T. (2009). Open Channel Hydraulics. Mc Graw 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.

REFERENCES:

1. Land and Water Management Engineering. Murthy V V N (2013). Kalyani Publishers, NewDelhi.
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

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B.Tech III Year I Semester

L	T	P	C
3	-	-	3

(20AG0721) LANDSCAPE IRRIGATION DESIGN AND MANAGEMENT
(PEC-I)

Course Objectives:

1. *Impart Knowledge on historical importance of Indian gardens and conventional methods of landscape irrigation*
2. *To train the students on different types of modern landscape irrigation methods and their design unit operations of agricultural process engineering*
3. *Also to enrich the students and familiarize the students in modern landscape irrigation methods and their design*

Course Outcomes:

On successful completion of this course, student will be able to

1. *Acquire knowledge on historical importance of Indian gardens and conventional methods of landscape irrigation*
2. *Be proficient in types of modern landscape irrigation methods and their design*
3. *Understand the types of drip irrigation methods adopted in landscaping and their design*
4. *Some of the basic concepts related to landscape and its suitability*
5. *To acquaint the students with modern landscape irrigation system and its economics*

UNIT – I:

INTRODUCTION –Historical importance of Indian gardens and history of gardening in different areas. Famous gardens of India and study of their methods of irrigation systems. Definition of landscape - conventional methods of landscape irrigation - study of hose irrigation system – components. Study of components of portable sprinkler with hose pipes. Merits and demerits of conventional landscape irrigation systems

UNIT – II: Types of modern landscape irrigation methods - merits and demerits , Pop-up sprinklers – spray pop-up sprinklers - components - selection criteria. Design criteria for pop-up sprinkler systems in landscaping, Shrub adopter system – features - accessories

UNIT – III:

Types of drip irrigation methods adopted in landscaping and their components. Design and layout of drip irrigation system in landscaping. Design of bubbler irrigation system - selection and design criteria

UNIT – IV:

Types of landscapes -natural landscapes and human made landscapes , Basic theme of gardens viz. circular, rectangular and diagonal themes . Factors affecting landscape design viz., initial approach, view, human choice, simplicity and topography etc. Suitability of different types of irrigation systems for

landscapes, Study of water requirements for different landscapes - numerical problems on water requirements of landscapes , Study of segments of landscape irrigation systems.

UNIT – V:

Main components of modern landscape irrigation systems and their selection criteria.Types of pipes and pressure ratings in landscape irrigation, Study of economics of pipe selection, pipe sizing and selection criteria. Numerical problems on economics of pipe selection. Study of different automation system for landscape irrigation. Study of main components, types of controllers and their application in automation system. Design and layout of modern landscape irrigation systems

TEXT BOOKS:

1. Michael A.M. 2012. Irrigation: Theory and Practice. Vikas Publishing Vikas Publ. House New Delhi. y Singh Neeraj Partap. 2010.
2. Landscape Irrigation and Floriculture Terminology, Bangalore. y Smith Stepehen W. Landscape Irrigation and Management. Amazon. com.

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B.Tech III Year I Semester

L	T	P	C
3	-	-	3

(20AG0722) PLASTIC APPLICATIONS IN AGRICULTURE
(PEC-I)

Course objectives:

1. *To enables the students for acquiring the knowledge pertaining to use of plastics in soil and water conservation*
2. *Be proficient about effect of plasticulture for controlled environmental condition*
3. *Enrich knowledge on plastics application in aquacultural and animal husbandary.*

Course outcomes:

1. *To impart knowledge about types and quality of plastics used in soil and water conservation, production agriculture and post harvest management.*

2. *To understand the application of plastics in moisture conservation*

3. *Familiar with the different colour of plastic materials used in controlled envinonment cultivation.*

4. *To enrich knowledge on different plastics packaging solutions and plastics nets for crop protection.*

5. *To understand the role of plastics in aquaculture and animal husbandry.*

UNIT- I
Introduction of plasticulture - types and quality of plastics used in soil and water conservation, production agriculture and post harvest management. Quality control measures. Present status 196 Report of the ICAR Fifth Deans' Committee and future prospective of plasticulture in India.

UNIT- II

Water management - use of plastics in in-situ moisture conservation and rain water harvesting. Plastic film lining in canal, pond and reservoir. Plastic pipes for irrigation water management, bore-well casing and subsurface drainage. Drip and sprinkler irrigation systems. Use of polymers in control of percolation losses in fields.

UNIT- III
Soil conditioning - soil solarisation, effects of different colour plastic mulching in surface covered cultivation. Nursery management - Use of plastics in nursery raising, nursery bags, trays etc. Controlled environmental cultivation - plastics as cladding material, green / poly / shade net houses, wind breaks, poly tunnels and crop covers.

UNIT- IV

Plastic nets for crop protection - anti insect nets, bird protection nets. Plastic fencing. Plastics in drying, preservation, handling and storage of agricultural produce, innovative plastic packaging solutions for processed food products. Plastic cap covers for storage of food grains in open. Use of plastics as alternate material for manufacturing farm equipment and machinery.

UNIT- V

Plastics for aquacultural engineering and animal husbandry - animal shelters, vermi-beds and inland fisheries. Silage film technique for fodder preservation. Agencies involved in the promotion of plasticulture in agriculture at national and state level. Human resource development in plasticutlure applications.

TEXT BOOKS

1. Brahma Singh, Balraj Singh, Naved Sabir and Murtaza Hasan. 2014.Advances in Protected Cultivation. New India Publishing Agency, New Delhi.

2. Brown, R.P. 2004. Polymers in Agriculture and Horticulture. RAPRA Review Reports : Vol. 15, No. 2, RAPRA Technology Limited, U.K. y Central Pollution Control Board. 2012.
3. Material on Plastic Waste Management. Parivesh Bhawan, East Arjun Nagar, Delhi-110032. y Charles A. Harper. 2006. Handbook of Plastics Technologies. The Complete Guide to Properties and Performance. McGraw-Hill, New Delhi.

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III B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20CE0170) FUNDAMENTALS OF CIVIL ENGINEERING
[Open Elective (OE)-I]

COURSE OBJECTIVES
The objectives of this course to
1. Impart basic knowledge on Civil-Engineering.
2. Familiarize the materials and measurements used in Civil Engineering.
3. Provide the exposure on the fundamental elements of civil engineering structures.
4. Have knowledge on surveying and the instruments used in it
5. Explain the importance of water treatment and its applications

COURSE OUTCOMES
On successful completion of this course, the student will be able to
1. Explain the usage of construction material and proper selection of construction materials
2. Attain the knowledge of building planning and construction of buildings.
3. Understand various basic methods and techniques of surveying and its applications
4. An ability describe to the various functional units in water treatment and distribution system
5. Describe water quality criteria and standards, and their relation to public health
6. Understand the rigid pavements as per IRC & Describe different components of permanent way in Railway Track

UNIT – I
Introduction to Civil engineering: Introduction - History of Civil Engineering- Sub-Disciplines of Civil Engineering
Building materials : Classification - Properties of Building Materials- Most Common Building Materials- Uses of Building Materials- Bricks- Classification- Size and weight of bricks- Qualities of good brick- Stones- Sources of stones- Common Building Stones in India- Timber- Qualities of good timber- Common timbers used for building work- Steel-Uses of steel in building work.

UNIT – II
Building Construction: Building Components-Basic Requirements of Building Components, Planning Regulations-Foundation-Purpose of Providing a Foundation, Types of Foundations-Mortar- Functions, Types of Mortars and their Preparation-Masonry Works-Stone Masonry, Classification of Stone Masonry, Brick Masonry, Types of Brick Masonry-Concrete-Ingredients of Concrete and their Functions, Mixing of Concrete, Curing of Concrete.

UNIT – III
Surveying : Objectives of Surveying- Principles of Surveying-Equipment's used in surveying-Types of Surveying- Classification of Surveying- Basic methods used in surveying- Linear and angular measurements- chain Surveying, -Levelling - Purpose of Levelling, Major parts in levelling instrument, Technical terms used in levelling -Introduction to Theodolite.

UNIT – IV
Introduction to Water Supply: Importance and Necessity of protected water supply system - Objectives of protected water supply system- Flow chart of public water supply system,
Wastewater Characteristics: Characteristics of sewage – Physical, Chemical and Biological.
Wastewater Treatment: Layout and general outline of various units in a wastewater treatment plant– Primary treatment-Screens–Grit Chamber– Skimming tanks – Sedimentation tanks.
UNIT – V
Transportation Engineering: Introduction- Planning and design aspects of transportation Engineering- different modes of transport- Pavement Design- Types of pavement ,Components and their functions - Railway Engineering - Permanent way components , Cross section of permanent way , Functions and requirements of Rails, Sleepers and Ballast , Types of gauges, Rail fastenings.

TEXT BOOKS :
1. 1.Sateesh Gopi*, Basic Civil Engineering, Pearson publications,* Published by Dorling Kindersley (India) Pvt. Ltd.
2. Madan Mohan Das, Bharga b Mohan Das, Mimi Das Saikia, Et Al. Saikia, *Elements Of Civil Engineering (1st Edition),* Published by Ashoke K PHI Learning Pvt. Ltd.
3. Modi, P.N., *Water Supply & Waste Water Engineering, Vol. I & II*, Standard Book House, New Delhi, 2010.

REFERENCES :
1. S.C.Saxena and S.P.Arora, *A Text Book of Railway Engineering*, Dhanpat Rai Publications, New Delhi, 2011
2. L.R.Kadiyali and Lal, *Principles and Practice of Highway Engineering Design*, Khanna Publications, 7th edition, 2013
3. Punmia, B.C., Jain, A.K., and Jain.A.K, *Water Supply & Waste Water Engineering, Vol. I & II*, Laxmi Publications, 2010
4. Dr. B.C. Punmia, *Ashok Kumar Jain, Arun Kumar Jain,* Surveying-Vol I, Lakshmi Publications(P) Ltd., New Delhi, Seventeen Edition,2016.

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III B.Tech. – I Sem.

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(20EE0227) GENERATION OF ENERGY FROM WASTE
[Open Elective (OE)-I]

COURSE OBJECTIVES

The objectives of this course to

1. *Understand different types of waste as fuel*
2. *Introduce Pyrolysis methods and conversion processes*
3. *Describe the gasification methods for biomass*
4. *Learn the concepts of biomass resources, combustion types and biogas plant technology*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to
1. *Analyse agro based, forest residue and industrial waste conversion processes.*
2. *Manufacture of Pyrolytic oils and gases*
3. *Manufacture of charcoal, yields and applications*
4. *Describe various types of gasifiers operation*
5. *Understand inclined and fluidized bed combustors operation*
6. *Identify types of biogas plants and biomass energy programme in India*

UNIT- I
Introduction to Energy from waste: Classification of waste as fuel – Agro based- Forest residue- Industrial waste- MSW- conversion devices- Incinerators- Gasifiers-Digestors.

UNIT- II
Bio-mass Pyrolysis: Pyrolysis- Types- Slow-Fast- Manufacture of Charcoal- methods- yields and application. Manufacture of Pyrolytic oils and gases – yields and applications.

UNIT- III
Biomass Gasification: Gasifiers- Fixed bed system- Downdraft and Updraft gasifiers- Fluidized bed gasifiers- construction and operation- Gasifier burner arrangement for thermal heating.

UNIT- IV
Biomass Combustion: Biomass stoves- Types- Inclined combustors- Fluidized bed combustors- construction and operation of above biomass combustors.

UNIT- V
Properties of Biogas: Biogas plant Technology and status – Biomass resources and their classification- Biomass conversion processes- thermo chemical conversion – Direct Combustion- Biomass gasification- Pyrolysis and liquefaction – bio-chemical conversion- anaerobic digestion- Types of biogas plants- applications-Biomass Energy Programme in India.

TEXT BOOKS
1. Desai Ashok V, *Non-Conventional Energy*- Wiley Eastern Ltd, 2010.
2. Khandelwal K.C. and Mahdi SS, *Biogas Technology – A Practical Hand Book*, Vol I & II. Tata Mc Graw Hill Publishing Co Ltd., 2008.

REFERENCES
1. Challal D.S., *Food, Feed and Fuel from Biomass*, IBH Publishing Co Pvt Ltd.,1991.
2. GD Roy, *Non-conventional Energy Sourcrs*, Khanna Publishers, 6th Edition
3. Khahid Rehman Hekeem, Mohammad Jawald., Umar Rashid, *Biomass & Bioenergy*, Springer International Publishing Ltd.

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III B.Tech- I Sem

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(20ME0322) NON- CONVENTIONAL ENERGY RESOURCES
[Open Elective (OE)-I]

COURSE OBJECTIVES

The objective of the course is to

1. *Know the importance of energy, resources of renewable energy, their usage and impact on environment.*
2. *Recognize the significance of solar energy, its harnessing technologies & its applications.*
3. *Identify the method of exploiting energy from wind and parameters to be considered for the selection of site for wind turbine installation.*
4. *Explain the concept of bio energy and its conversion devices.*
5. *Differentiate various renewable energies such as tidal energy, fuel cells.*

COURSE OUTCOMES

On successful completion of the course, the student will be able to

1. *State various sources of energies, its availability and explain the importance of them by observing the global energy scenario.*
2. *Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.*
3. *Summarize the wind energy systems and elucidate the impact of it in environmental aspects.*
4. *Describe the biomass conversion process and list out various bioenergy applications.*
5. *Interpret the knowledge of renewable energies such as tidal energy, OTEC.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies.*

UNIT-I

Fundamentals of Energy system: Energy source, various forms of renewable energy, Conservation of energy and Energy scenario, need for non-conventional energy sources, alternative energy sources, Environmental consequences of oil fuel use, Role of new and renewable sources.

Solar Radiation: Environmental Impact of solar power, Direct & Diffuse Radiation, Terrestrial and extraterrestrial solar radiation, Solar radiation on tilted surface- Measurement of Solar Radiation using Pyranometer, Pyrheliometer, and Sunshine recorder.

UNIT-II

Solar thermal conversion: Flat Plate and Concentrating Collectors – Solar direct Thermal Applications– Solar thermal Power Generation

Photo voltaic Conversion: Fundamentals of Solar Photo Voltaic Conversion – Solar Cells –Solar PV Power Generation – Solar PV Applications

UNIT-III

Wind Energy: Wind Formation - Site Selection for Wind Turbine – wind speed and power relations,

power extracted from the wind.

Wind Energy System: Types of Wind Energy Systems – Components of Wind Turbine – Horizontal Vs Vertical axis turbine -Performance –Safety and Environmental Aspects.

UNIT-IV
Bio – Energy: Origin of biomass, Bioenergy conversion technology – Biomass gasifiers: classification of biomass gasifiers, Biogas plants: classification of biogas plant

Bio Fuel: Ethanol production – Biodiesel – Cogeneration - Applications of Biofuel

UNIT-V
Hydrogen Energy: production of Hydrogen-Storage and Transportation of Hydrogen, Safety aspects and Applications of hydrogen.

Other Sources of Energy: Tidal energy – Wave Energy –OTEC Cycles - Open and Closed OTEC cycles, Geothermal Energy- Types of cycles

TEXT BOOKS
1. R. K.Rajput*, Non-conventional Energy Sources and Utilization,* S. Chand Publishers, 2nd Edition, 2014.

2. G. D Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 1st Edition, 2010.

3. Nicholas Jenkins & Janaka Ekanayake, *Renewable Energy Engineering*, Cambridge University Press; 1st Edition, 2017.

REFERENCES
1. Dr. R K Singal, *Non-Conventional Energy Resources*, S.K Kataria & Sons, 4th Edition, 2014.
2. John Twidell & Tony Weir, *Renewable Energy Sources*, Routledge publisher, 3rd Edition, 2015.
3. Sukhatme. S.P, *Solar Energy, Principles of Thermal Collection and Storage,* Tata   McGraw Hill Publishing Company Limited, 6th Edition, 1990.

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III B.Tech – I Sem.

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(20EC0451) INTRODUCTION TO COMMUNICATION SYSTEMS
[Open Elective (OE)-I]

COURSE OBJECTIVES

The objectives of this course to
1. *Study the fundamental concepts of the analog communication system.*
2. *Analyze various analog modulation and demodulation techniques.*
3. *Understand, analyze, and design fundamental digital communication systems.*
4. *Focus on developing digital communication systems.*
5. *Understand basics of various Communication.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to
1. *Demonstrate knowledge in elements of Analog Digital and Wireless Communication Systems.*
2. *Analyze the analog modulated and demodulated systems.*
3. *Understand the principle involved in different modulation techniques.*
4. *Understand the basic principles of baseband and pass band digital modulation schemes.*
5. *Analyze probability of error performance of digital systems and are able to design digital communications.*
6. *Implement various Keying and accessing techniques in real time wireless communication systems.*

UNIT- I
Communication: Introduction, Elements of communication systems, wired Communications systems, Wireless Communications systems, Modulation, Need of modulation, modulation Methods, difference between Analog and Digital communication
Amplitude Modulation & Demodulation: DSB-FC(AM) modulation& its demodulation, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Single sideband (SSB) transmission, Comparison of various amplitude modulation techniques.

UNIT- II
Angle Modulation & Demodulation: Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Phase modulation(PM).

UNIT- III
Noise in Communication Systems: Types of noise, Noise figure.
Analog Pulse Modulation Schemes: Pulse amplitude modulation (PAM), Pulse Width modulation (PWM) and Pulse Position modulations (PPM)

UNIT IV
Digital Communication: Introduction-Elements of digital communication systems, sampling process, quantization, quantization noise.
Source Coding Systems: Pulse-Code Modulation (PCM), Differential PCM (DPCM), Delta modulation

(DM), Comparison of PCM, DPCM, DM.

Pass Band Data Transmission: Introduction, Amplitude shift keying (ASK), binary phase shift keying (BPSK), Binary Frequency shift keying (BFSK) Comparison of ASK, PSK, FSK.

UNIT V

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communication Systems, Examples of wireless communication Systems – Paging Systems, Cordless Telephone, Cellular Telephone Systems, Overview of generation of cellular systems.

Multiple Access Techniques for Wireless Communications: Introduction to Multiple Access, FDMA, TDMA, CDMA, SDMA.

TEXT BOOKS

1. Simon Haykin, *Communication Systems,* Wiley India Edition, 4th Edition, 2011.
2. B.P. Lathi, &Zhi Ding, *Modern Digital & Analog Communication Systems,* Oxford University Press, International 4th edition, 2010.

REFERENCES

1. Sam Shanmugam, *Digital and Analog Communication Systems,* John Wiley, 2005.
2. Bruce Carlson, & Paul B. Crilly, *Communication Systems – An Introduction to Signals & Noise in Electrical Communication,* McGraw-Hill, 5th Edition, 2010
3. Bernard Sklar, *Digital Communications,* Prentice-Hall PTR, 2nd edition, 2001.
4. Herbert Taub & Donald L Schilling, *Principles of Communication Systems,* Tata McGraw-Hill, 3rd Edition, 2009.
5. *MATLAB,* J.G.Proakis, M Salehi, Gerhard Bauch, *Modern Communication Systems Using* CENGAGE, 3rd Edition, 2013.

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II B.Tech. – I Sem.

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(20CS0550) RELATIONAL DATABASE MANAGEMENT SYSTEM
[Open Elective (OE)-I]

COURSE OBJECTIVES

The objectives of this course to
1. *Explain different issues involved in the design and implementation of a database system.*
2. *Explain physical and logical database designs, database modelling, relational, hierarchical, and network models*
3. Introduce data manipulation language to, update, query and manage a database
4. *Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling and designing a DBMS.*

COURSE OUTCOMES

On successful completion of this course, the student will be able to
1. *Develop relational algebra expressions for queries and optimize them.*
2. *Design the databases using E_R method for a given specification of requirements.*
3. *Apply Normalization techniques on given database.*
4. *Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system.*
5. *Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.*
6. *Understand Physical Storage Media and RAID concepts.*

UNIT- I
Introduction: Database System Applications, Purpose of Database Systems, View of Data, Data Abstraction, Data Independence, Data Models, Database Languages, Database Architecture, Database Users and Administrators.

UNIT-II
Introduction to Data base design: ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets.
Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins.

UNIT-III
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.

UNIT-IV

Introduction to Schema Refinement- Problems Caused by redundancy, Normal Forms - FIRST, SECOND, THIRD Normal forms.

Properties of Decompositions: Lossless join Decomposition, Dependency preserving Decomposition - FOURTH Normal Form, FIFTH Normal form.

UNIT- V

Recoverability: System Recovery – Media Recovery –Two Phase locking – Deadlock- Detection, Recovery and Prevention.

Physical Storage and Database Concepts: Overview of Physical Storage Media and RAID.

TEXT BOOK

1. Henry F. Korth and S. Sudharshan, *Database System Concepts*, Sixth Edition, Abraham Silberschatz, Tata McGraw Hill, 2011.
2. Raghurama Krishnan, Johannes Gehrke, *Database Management Systems*, 3rd Edition, McGrawHill Education,2003.

REFERENCES

1. J. D. Ullman, *Principles of Database and Knowledge – Base Systems*, Vol 1 Computer Science Press.
2. Peter Rob & Carlos Coronel , *Database Systems Concepts,* Cengage Learning, 2008.
3. C.J. Date*, Introduction to Database Systems*, Pearson Education.
4. G.K. Gupta, *Database Management Systems*, McGraw Hill Education.

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III B.Tech I Sem

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(20HS0813) MANAGEMENT SCIENCE
[Open Elective (OE)-I]

COURSE OBJECTIVES

The objectives of this course to

1. *Understand the basic concepts, principles and processes of management*
2. *Help the students gain an understanding of the functions, responsibilities of managers*
3. *Get an awareness about the latest developments and contemporary issues in the field of management*

COURSE OUTCOMES

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

1. *Utilize appropriate theoretical frameworks to real life business and managerial problems*
2. *Identify appropriate operational risks and develop appropriate responses to them*
3. *Apply human resource principles to recruit, select and manage employees to achieve organizational goals*
4. *Enact strategy, including contingent plans for the effective management of the organization*
5. *Identify, plan, and implement the projects and evaluate the performance of the projects*
6. *Analyze effective application of latest developments to diagnose and solve organizational problems*

UNIT I

INTRODUCTION TO MANAGEMENT:

Management-Concept and meaning-Nature-Functions-Management as a science and art and both. Schools of management thought-Taylor's scientific theory-Henry Fayol's principles- Weber's Ideal Bureaucracy - Elton Mayo's Human relations-Systems theory- Situational or Contingency theory-Social responsibilities of management.

Organizational structure and design: Features of organizational structure-work specialization-Departmentation -Span of control-Centralization and Decentralization. **Organizational designs**-Line organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of organization.

UNIT II

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study- Statistical Quality Control**:** *C* chart, *P* chart, (simple Problems) Deming's contribution to quality. **Material Management:** Objectives-Inventory-

Functions, types, inventory classification techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management. **Marketing Management:** Concept- Meaning - Nature-Functions of Marketing-Marketing Mix- Channels of distribution -Advertisement and sales promotion- Marketing Strategies

based on Product Life Cycle.

UNIT III
HUMAN RESOURCES MANAGEMENT (HRM):
HRM- Definition and meaning – nature-Managerial and Operative functions-Evolution of HRM-Human Resource Planning(HRP)-Employee Recruitment-sources of recruitment- employee selection-process and tests in employee selection- Employee training and development-On- the- job and Off- the-job training methods-Performance Appraisal systems- Concept-MethodsofPerformanceAppraisal-Placement-EmployeeInduction-WageandSalary Administration-Objectives-Essentials of Wage and Salary Administration-Job Analysis- Process -Job Evaluation-Employee Grievances-techniques of handling Grievances.

UNIT IV
STRATEGIC MANAGEMENT:
Definition& meaning-Setting of Vision- Mission- Goals- Corporate Planning Process- Environmental Scanning-Steps in Strategy Formulation and Implementation-SWOT Analysis. **Project Management (PERT/CPM):**Network Analysis- Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying Critical Path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

UNIT V
CONTEMPORARY ISSUES IN MANAGEMENT:
TheconceptofMIS-MaterialsRequirementPlanning(MRP)-Just-In-Time(JIT)System-Total   Quality Management (TQM)- Six Sigma Concept- Supply Chain Management-Enterprise Resource Planning (ERP)- Performance Management- Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management.

TEXT BOOKS:
1. A.R Aryasri: *Management Science,* TMH,2013
2. Stoner, Freeman, Gilbert, *Management*, Pearson Education, New Delhi, 2012.

REFERENCES:
1. Kotler Philip & Keller Kevin Lane, *Marketing Management*, PHI, 2013.
2. Koontz & Weihrich, *Essentials of Management*, 6/e, TMH, 2005.
3. Thomas N.Duening & John M.Ivancevich, *Management Principles and Guidelines*, Biztantra.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2004.
5. Memoria & S.V.Gauker, *Personnel Management*, Himalaya, 25/e,2005

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(20AG0709) FARM MACHINERY & EQUIPMENT-II LAB

Course objectives:

1. *To enable the students to understand the basic principles of cutting mechanisms harvesting machines*
2. *To know about the various types of available harvesting machines.*
3. *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.*

Course outcomes:

On successful completion of this course, student will be able to

1. *Simple terms related to crop and machine.*
2. *Apply basic knowledge of the forage harvesting machineries.*
3. *Apply basic knowledge of the crop harvesting machineries.*
4. *Various basic terms related to harvesting machineries and thresher.*
5. *Apply basic knowledge on the fruit harvesting machineries.*
6. *Understand about testing of farm machine*

List of Experiments:

1. Study the performance of paddy transplanter
2. Study the constructional details of mowers
3. Repair and maintenance of mowers
4. Study the performance of paddy reaper and reaper binder
5. Repair and maintenance of reapers
6. Study the performance of combine harvester (Paddy)
7. Operation, repair, maintenance and safety precautions of chaff cutters
8. Study the performance of Groundnut digger shaker and windrower
9. Study the performance, repair and maintenance of post hole digger
10. Operation, repair and maintenance of self-propelled sugar cane harvester
11. Study the performance of groundnut pod stripper
12. Study the performance of thresher

TEXT BOOKS:

1. Principals of Farm Machinery. Kepner R.A., Bainer R and Barger E.L, 1987.CBS Publishers and Distributors, Delhi.
2. Engineering principles of Agricultural machines, Ajith k Srivatsava, Carrol E. Goering, Roger P. Rohrbach, 1993, ASAE Publishers.

REFERENCES:

1. Farm Machinery and Equipment. Smith H.P. 1971. Tata McGraw-Hills Publishing Co., Ltd., New Delhi.

2. Testing and Evaluation of Agricultural Machinery. Mehta M.L., Verma S.R. Misra S.K. and Sharma V.K. Daya Publishing House, New Delhi.

3. Principals of Agricultural Engineering — Michael A. M and OJha T. P 2010. Vol.I Jain Brothers, New Delhi.

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III B. TECH - I SEM (AG)

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(20AG0710) AGRICULTURAL PROCESS ENGINEERING LAB

Course Objectives:
1. *To train the students on unit operations of agricultural process engineering*
2. *To acquaint with the mixing equipments*
3. *Enable the students to understand the concepts of cleaning and size reduction*

Course Outcomes:

On successful completion of this course, student will be able to
1. *Be proficient in the scope of the process engineering and the use of processing machinery*
2. *Understand the types of mixers*
3. *Summarizing the psychrometric properties*
4. *Some of the basic concepts related to size reduction equipments*
5. *To acquaint the students with the problems on distillation*
6. *Understand the cleaning equipments*

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

TEXT BOOKS:
1. Post Harvest Technology of Cereals, Pulses and oil seeds, Chakraverty A 1988. Oxford and IBH Publishing Co. Ltd.,Calcutta.
2. Unit Operations of Agricultural Processing, Sahay KM and Singh KK 1994,Vikas Publishing House Pvt. Ltd., NewDelhi.

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(20ME0323) COMPUTER AIDED MODELING LAB-II

COURSE OBJECTIVES

The objectives of this course is to

1. *Impart brief knowledge on Solid edge software.*
2. *Familiarize student with various commands used to sketch a part.*
3. *Make the student draw various part drawings using solid edge software.*
4. *Learn various assembly commands used to assemble the component.*
5. *Make the student assemble various part drawings of the component.*
6. *Understand the uses of different tools used in assemble the component.*

COURSE OUTCOMES

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

1. *Describe the interface of Solid edge software.*
2. *Explain various commands used to sketch a part.*
3. *Understand the use of different commands in Assembly interface.*
4. *Draw various part drawings using solid edge software.*
5. *Summarize various assembly commands used to assemble the component.*
6. *Produce a component by assembling various part drawings of the component.*

List of Experiments

1. Introduction to Solid Edge Software.

2. PART DRAWINGS

a) Modeling of Component in 3D– MACHINE ELEMENTS
b) Modeling of Component in 3D– MACHINE LINK 1
c) Modeling of Component in 3D– MACHINE LINK 2
d) Modeling of Component in 3D– BRACKET
e) Modeling of Component in 3D– DOVETAIL STOP

3. ASSEMBLY DRAWINGS

a) Assembly of Component in 3D- KNUCKLE JOINT
b) Assembly of Component in 3D- SCREW JACK
c) Assembly of Component in 3D- FLANGE COUPLING
d) Assembly of Component in 3D- UNIVERSAL COUPLING

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III B.Tech – I Sem

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(**20HS0817**) **ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**

COURSE OBJECTIVES
The objective of the course is to
1. *Impart basic principles of thought process, reasoning and inference.*
2. *Connect society and nature through sustainability.*
3. *Know Holistic life style of yogic science and wisdom capsules in Sanskrit literature.*
4. *Introduce Indian knowledge system and Indian perspective of modern scientific world-wide.*
5. *Learn the basic principles of Yoga and holistic health care system.*

COURSE OUTCOMES
On successful completion of the course the students will be able to
1. *Connect up the basic principles of thought process.*
2. *Understand Holistic life style of yogic science and wisdom capsules in Sanskrit literature.*
3. *Analyze the society and nature through sustainability.*
4. *Explain Indian knowledge system and Indian perspective of modern science.*
5. *Use the basic principles of Yoga and holistic health care system.*

UNIT-I
➢ Basic structure of Indian Knowledge System: 4 ved
➢ 4 Upaved (Ayurved, Dhanurved, GandharvaVed&SthapthyaAdi.,)

UNIT-II
➢ 6 Vedanga (Shisha, Kalppa, Nirukha, VYkaran, Jyothish&Chand)
➢ 4 Upanga (Dharma Shastra, Meemamsa, Purana&TharkaShastra)

UNIT-III
➢ Modern Science and Indian KnowledgeSystem
➢ Yoga and Holistic Healthcare

UNIT-IV
➢ Philosophical Tradition (Nyaya, ,Sankhya, Yog, Jain &Boudha
➢ Indian Linguistic Tradition –(Phonology, morphology, syntax andsemantics)

UNIT-V
➢ Indian Artistic Tradition - Chitrakala,Vasthukala, Sangeetha, Nruthya
Sahithya
➢ Casestudies

TEXT BOOKS

1. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya VidyaBhavan, Mumbai. 5thEdition,2014.
2. Swami Jitatmanand, *Modern Physics and Vedant*, Bharatiya VidyaBhavan.
3. Swami Jitatmanand, *Holistic Science and Vedant*, Bharatiya VidyaBhavan.
4. Fritzof Capra, *Tao ofPhysics.*
5. Fritzof Capra, *The Wave oflife.*

REFERENCES

1. VN Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International ChinmayFoundation, Velliarnad, Arnakulam.
2. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata GN Jha (Eng. Trans.), Ed. RN Jha, Yoga-darshanam with VyasaBhashya, VidyanidhiPrakashan, Delhi 2016.
3. RN Jha, Science of Consciousness Psychotherapyand Yoga Practices, VidyanidhPrakashan, Delhi 2016.
4. P B Sharma (English translation), Shodashang Hridayan
5. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya VidyaBhavan, Mumbai. 5th Edition, 2014.
6. S.C. Chaterjee& D.M. Datta, An Introduction to Indian Philosophy, University of Calcutta, 1984.
7. K.S. Subrahmanialyer, Vakyapadiya of Bhartrihari, (Brahma Kanda), DeccanCollege Pune 1965.
8. Panini Shiksha, MotilalBanarasidas
9. V.N. Jha, Language, Thought and Reality, Vasudevasharan AGRAWAL Kala yevamSamskruthi, ShithyaBhavanElahabad, 1952.
10. Pramod Chandra, India Arts, Howard Univ. Press, 1983.
11. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.
12. R. Nagaswamy, Foundations of Indian Art, Tamil Arts Academy, 2002.

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B. Tech III Year II Semester

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(20AG0712) TRACTOR SYSTEM AND CONTROLS

Course objectives:

4. *To enables the students for acquiring the knowledge pertaining to transmission system*
5. *Be proficient about different types of clutch and gears*
6. *Enrich knowledge on tractor power outlets like P.T.O., tractor stability testing and ergonomics.*

Course outcomes:

6. *To impart knowledge about different transmission system in tractor.*

7. *Identify different parts of transmission systems.*

8. *Be proficient about identify the different types of clutch and gears of existing tractor.*

9. *To get knowledge on brake, steering and hydraulic system*

10. *Students will learn about the tractor power outlets like P.T.O., and tractor stability testing.*

11. *Familiar with the ergonomics aspect in point of tractors design.*

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 system and final drive system.

UNIT –II:

BRAKE SYSTEM- types, principle of operation, construction, working of mechanical brake, internal expanding, and external contracting, working of disc brake and hydraulic brake.

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.

UNIT – III:

HYDRAULIC SYSTEM IN TRACTOR- principle of operation, types of main functional components, 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. Wheel and tyres- types like solid tyres and pneumatic tyres. 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 implement combination, weight transfer and its importance, determination of maximum drawbar pull, study of tractor stability-types of tractor accident, precaution to overcome tractor accident, condition to avoid sideways overturning during turning, safety devices in tractor.

UNIT – V:

Introduction to tractor testing and performance, preparation of test, types of tractor tests- test procedure, power test, agronomical tests and miscellaneous 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.

TEXT BOOKS:

1. Jagdishwarsahay. 2015. Elements of agricultural engineering. Standard publication, New Delhi.
2. Nakra C.P., 2009, Farm Machines and Equipment's. DhanpatRai Publication, New Delhi.

REFERENCES:

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.

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

III B. TECH - II SEM

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(20AG0713) DAIRY AND FOOD ENGINEERING

Course Objectives:
1. *Knowledge on milk and food processing unit operations offer strength to students*
2. *To handle pasteurization, sterilization, packaging, etc. of dairy products*
3. *Control spoilage of food through process operations such as evaporation, freezing, membrane processing etc.*

Course Outcomes:
On successful completion of this course, student will be able to
1. *Enable the students to understand the methods of food preservation and the dairy development*
2. *Developed the understanding of physic – chemical properties of milk*
3. *Summarizing the methods of pasteurization and its importance*
4. *To acquaint the students with various dairy engineering operations such as homogenization, pasteurization, thermal processing, evaporation, freezing and drying of milk*
5. *Understanding the design and layout of a dairy plant*
6. *Control spoilage of food through process operations such as evaporation, freezing, membrane processing etc.*

UNIT-I

Deterioration in food product and their controls- causes of food spoilage and classification of food with respect to spoilage and consumption. Principles of food preservation, effect pH and water content on growth of microorganisms. Physical, chemical and biological methods of food preservation. Effect of climate change on livestock.

Dairy development in India and dairy technology- Indian dairy industry products Concentrated whole milk products, – Composition of milk, physico-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- introduction, sampling, pasteurization, sterilization, packaging, cleaning grading, evaporation, drying, filtration, clarification , distillation, crystallization, freezing.

UNIT-II

Principle and equipment related to receiving of milk, quality determination, cleaning and disinfection of milk cans and tankers. Process flow charts for product manufacture – Pasteurized milk, Pearson square method and mass balance method for making balances method for milk standardization.

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 (tubular heat exchanger, plate heat exchanger)

Sterilization – UHT method (Direct and indirect heating), sterilization in the package (temperature and pressure patterns), equipment for sterilizing goods in the package (Batch autoclaves, continuously operating sterilizers).

Thermal processing - Thermal death time curve, reaction kinetics of the heat treatment of milk and its use for the assessment of UHT treatment methods

UNIT- III

Homogenization – Emulsifying, types of emulsions, emulsifiers, application, mode of operation, effect on the product. Centrifugation and cream separation- working of disc centrifuge, working of cyclone separator.

Preparation methods and equipment- Manufacture of cheese, paneer, butter and ice cream.

Filling and packaging – Packaging of milk, cultured milk, cheese, butter, concentrated milk, products, dried milk 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, plant utilities requirement – electricity, water and power requirement.

UNIT-IV

Principles of operation and equipment for thermal processing, canning, aseptic processing.

Evaporation – Applications, functions, factors affecting rate of evaporation, basic evaporator construction, factors affecting liquid boiling point, thermodynamics of evaporation (phase change, boiling point elevation, Duhring plot, factor influencing the overall heat transfer coefficient, influence of feed liquor properties on evaporation, factors influencing the economy of evaporation.

Types of evaporation equipment-Natural circulation evaporators – Batch type, horizontal short tube, vertical short tube, natural circulation with external calendria, long tube, forced circulation (General forced circulation, plate, expanding flow, mechanical /agitated thin film)

Drying – Drying methods (radiation, dielectric, spray, foam, spray, roller, fluidized bed, freeze).

UNIT-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,

Filtration - ultra-filtration, processing variables, applications or ultra-filtration in milk processing, reverse osmosis, Membrane separation – Membrane separation methods. Composition and proximate analysis of food products- Carbohydrates, protein, lipids, minerals, Vitamins, methods of controlling water content, effect of water activity, methods of measuring a oxidation reduction potential effect on microorganisms, effect of nutrient content and effect of inhibitory substances Change undergone by food components during processing –Changes during heating, evaporation, drying, freezing, filtration and separation.

TEXT BOOKS:

1. Fundamentals of Food Engineering-Rao, D.G. 2010. PHI learning Pvt. Ltd. New Delhi.
2. Introduction to Food Engineering - Singh, R.P. & Heldman, D.R. 2001. Academic Press.

REFERENCES:

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

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III B. TECH - II SEM (AG)

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(20AG0714) IRRIGATION & DRAINAGE ENGINEERING

Course Objectives

1. *To understand the concept of micro-irrigation*
2. *To design the sprinkler and drip irrigation system*
3. *To understand the concept of planning and design of various methods of land drainage and its impact on environment*

Course Outcomes

Studies will be familiar with

1) *Basic terms related to the development of irrigation in India and AP and classification of different irrigation works*
2) *Basic terms related to soil and water conservation*
3) *Various terms related to soil loss estimation models*
4) *Understand the different types of micro irrigation and its design*
5) *Understand the maintenance of micro irrigation system*
6) *Understand the different types of land drainage and its importance*

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). Saturation capacity, field capacity moisture equivalent and permanent wilting point. Terminology related with movement of water within soils-water intake, percolation, interflow, seepage, permeability, hydraulic conductivity and hydraulic gradient

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 drainspacing 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 Theory and Practice —Michael, A.M. (2008). Vikas Publishing House, New Delhi..

2. Drainage Engineering - Luthin, J. N (2015). John Wiley & Sons, New York.

3. Drainage Principles and Applications Ritzema H. P. (1994). (2 ed.). ILRI Publication

REFERENCES:

1. Principles of Farm Irrigation system Design —John Wiley & Sons (1988), NewYork.

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, NewDelhi.

4. Murthy, C. S. (2002). Water Resources Engineering Principles and Practice —New Age International (P) Ltd. NewDelhi.

5. Murthy, V. (2013). Land and Water Management — Kalyani Publishing, NewDelhi.

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III B. TECH - II SEM (AG)   L   T   P   C
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(20AG0723) AGRICULTURAL ENGINEERING STRUCTURES
(PEC-II)

Course Objectives:

1. *To enable the student to understand the principles and acquire the knowledge on various aspects in farmstead design and construction*

2. *Design and construction of farm structures like dairy barns, barn for poultry, compost pit, fodder silos, farm fencing, implement sheds*

3. *Grain storage structures and the design and construction of silos and farm roads, sewage system, rural living and development*

Course Outcomes:

Studies will be familiar with

1. *To acquaint the students with various aspects of agricultural structures such as farm stead and dairy barn*

2. *To acquaint the students with various aspects of farm roads and storage structures*

3. *Design and construction of farm fences and farm roads*

4. *Summarizing the grain storage structures, types of silos and the loads acting on it*

5. *Classifying the poultry houses, planning and requirements*

6. *Rural living and development, sewage system and design*

UNIT – I

Planning and layout of farmstead - location – definition and arrangement, location of various buildings – Scope, importance and need for environmental control, Farm service buildings - site selection, planning farm service buildings, factors effecting planning of farmstead, Physiological reactions of livestock to solar radiation (dairy cattle, poultry, beef cattle and sheep), Influence of climate and thermoregulation - temperature, relative humidity, direct effect of temperature, direct effect of solar radiation, Environmental factors effecting design of farm residence or animal shelter - temperature, relative humidity, air purity, air movement, light, heat and moisture production

UNIT – II

Livestock production facilities - water and electricity, sanitary requirements, etc. BIS standards for dairy, piggery, poultry and other farm structures, Design, construction and cost estimation of farm structures - animal shelters, dairy barn, compost pit, fodder silo, Cost estimation of different farm buildings - method of building estimates - actual cost - detailed estimates of main items of work.

Fencing - design and construction of farm fences, planning of farm fences, Type of farm fences - wooden fencing, woven wire fencing, barbed wire fencing, plain wire fencing and electrical fencing, Cost estimation of farm fences - wooden fencing, woven wire fencing, barbed wire fencing, plain wire fencing and electrical fencing - cost estimation

UNIT – III

Implement shed - requirements of farm machinery and implement shed - requirements of farm work shop, Planning and construction of shed and pump houses - problems and layout, Threshing and drying yards - design and construction of drying and threshing floors.

Barn for cows, buffalo - planning and design of different barns, Types of dairy barns based on construction - housing systems - stable barns, free stalls and milking parlor barn layout.

Poultry houses – Classification - planning and requirements, environmental requirements, Modern poultry houses - deep litter housing, building of poultry houses

UNIT – IV

Storage of grains - causes of spoilage - water activity for low and high moisture food and its limits for storage, Moisture and temperature changes in grain bins - requirements of good storage structures, Types of grain storage structures - Traditional storage structures and their improvements - construction of Bhukari, Morai, Kothari type storage structures, Improved grain storage structures (CAP, hermetic storage, Pusa bin, RCC ring bins), Design consideration for grain storage godowns, Bag storage structures, Shallow and Deep bin. Calculation of pressure in bins, Silo - design and construction of silos in respect of farm uses - types of silos - pit silo, tower silo, trench silo, bunkers. Storage of seeds

UNIT - V

Engineering for rural living and development. Rural roads - design and construction of farm road - Construction cost of different roads, repair and maintenance, Sources of water supply, norms of water supply for human being and animals, drinking water standards and water treatment suitable to rural community, Site and orientation of building in regard to sanitation,

community sanitation system - Sewage system and its design, cost and maintenance, design of septic tank for small family, Estimation of domestic power requirement, source of power supply and electrification of rural housing

TEXT BOOKS:

1. Principles and Practices of Agricultural Structures and Environmental Control Pandey P H 2004. Kalyani publishers, Ludhiana.
2. Principal of Agricultural Engineering Vol. I Michael A M and Ojha T P 2004. Jain Brothers, NewDelhi.

REFERENCES:

1. Sahay, K.M. and Singh, K.K. Unit Operations of Agricultural Processing, Vikas publishing pvt. Ltd,Noida.
2. Jagdishwar Sahay. ‒Elements of Agricultural Engineering‖, Standard PublishersDistributors, 2010.
3. Harry L. Field, John B. Solie, Introduction to Agricultural Engineering Technology – A problem solving approach, Springer Science, NY,USA,2007.

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III B. TECH - II SEM (AG)

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(20AG0724) SOLID WASTE & BY-PRODUCT UTILIZATION
(PEC-II)

Course Objectives:

1. *To impart the knowledge on solid waste conversion technologies*

2. *To create awareness on solid waste utilization and management*

3. *To recommend the bio-energy development process by using biomass wastes.*

Course Outcomes:

Studies will be familiar with

1. *Decide more efficient waste management methodologies /technologies*

2. *Be proficient in execute the effective utilization and conversion of solid waste material into useful fuels*

3. *Distinguish the different biomass conversion technologies used for converting biomass into biofuel*

4. *Design of gasifier technology more effectively*

5. *Illustrate about working principle and constructional details of different types of biogas plant.*

6. *Develop an ability to recognize the different types of briquetting making machines*

UNIT I:
Introduction - Solid waste management (SWM) – common sources of waste – Different types of waste – Waste management and minimization – Recovery of energy from SWM. Recycling – Recycling process – Waste Recycling management – Advantages and Disadvantages of Recycling of a product. Land fill – Composting –Incineration.

UNIT II:
Bio – Energy-.Bioenergy – Biomass – Importance of biomass – Classification of biomass - Properties of biomass sources and characteristics of biomass. Biomass conversion technologies – principles of combustion, pyrolysis and gasification. Bio fuels-raw materials.

UNIT III:

Gasifiers– Operating parameters for the gasifiers – processing of biomass for gasification – chemistry of gasification. Gasifiers – types of gasifiers – producer gas and its utilization.Construction and working of principle of fixed bed down draft, updraft, cross draft and open core gasifiers and fluidized bed gasifiers.

UNIT IV:

Biogas – principle of biogas production – phases of anaerobic digestion – Advantages, disadvantages, utilization of biogas for cooking, lighting and running IC engines. Biogas production – materials used for biogas production – Factors affecting the biogas production – site selection for biogas plant – Filling a biogas plant digester for starting. Biogas plants – classification of biogas plants – Constructional details of biogas plant – KVIC and Janatha type biogas plants – Comparison between fixed dome and floating drum biogas plants. Constructional details of Deenabhandu biogas plant – Maintenance of biogas plants

UNIT V:

Briquetting of biomass – Briquetting machines – Types of briquetting machines – construction and working of briquetting machines – Screw type and piston crank type – uses – shredding machines. Biodiesel production – Principles – Processes for production of biodiesel from Jatropha and pongamia. Ethanol production from sugarcane and corn.

TEXT BOOKS:

1. Non-Conventional Sources of Energy Rai GD 2004. Khanna Publishers, NewDelhi
2. Solid and Hazardous Waste Management. Rao M.N, and Razia Sultana. B.S. Publication, Hyderabad

REFERENCES:

1. Alternate sources of energy Rathore NS 2005. ICAR Publications, NewDelhi
2. Energy Technology Non-conventional, Renewable and conventional. Rao S andParulekar, B.B. Khanna publishers, New Delhi.
3. Sustainable Development through Renewable Energy Sources, Pratap Singh et. al. 2004, Yash Publications,Bikaner.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B. Tech IV Year I Semester	L	T	P	C
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(20AG0725) WATERSHED DEVELOPMENT
(PEC – II)

Course Objective

1. To train the students in the multi disciplinary subject of watershed management for effective conservation of land using engineering and agronomic practices, control of soil loss in watershed, participatory management teams in small as well as large watersheds for increasing the productivity and preparation of necessary project proposals.

Course outcomes:

Studies will be familiar with

1. Recognize importance of watershed.

2. To understand the Geomorphology of watershed and watershed management

3. Be proficient about the Integrated watershed management practices

4. Various basic terms related to watershed .

5. Formulation of project proposal for watershed management programme.

UNIT I

Watershed - Introduction – concept and characteristics - watershed development – watershed area, command area and identification of watershed problems and prospects. Major investigations on topographical survey, soil characteristics, vegetative cover, present land use practices and socio-economic factors.

UNIT II

Watershed management - concept, objectives, factors affecting, watershed planning based on land capability classes. Geomorphology of watersheds - size and shape of watershed, slope, order, number of streams in a basin, stream pattern and other. Evolution of effects of watershed management treatments - statistically, hydrological sediment yield and scatter diagrams. Hydrologic data for watershed planning, watershed codification, delineation and prioritization of watersheds

UNIT III

Sediment yield – factors affecting the sediment yield – measurement and sediment yield index-controlling sedimentation, water budgeting in a watershed . Management measures - rainwater conservation technologies - in-situ and exsitu storage - water harvesting and recycling- advantages and benefits. Dry farming techniques - inter-terrace and inter-bund land management. Forest plantation – terracing, surface cover brushwood and planting

UNIT IV

Integrated watershed management – concept, objectives, components, arable lands - agriculture and horticulture, non-arable lands - forestry, fishery and animal husbandry. Effect of cropping systems, land management and cultural practices on watershed hydrology.

UNIT V

Watershed programme - execution - project implementation and evaluation, follow-up practices - characteristics of forest watersheds, forest plantation, streams and soils .Watershed programme – maintenance and control measurements, monitoring, evaluation and reporting. Participatory watershed management - role of watershed associations, user groups and self-help groups. Planning of project proposal for watershed management programme including cost-benefit analysis. Formulation of project proposal for watershed management programme including cost-benefit analysis

TEXT BOOKS:
1. Soil and water Conservation Engineering. Suresh, R. (2014). Standard Publishers and Distributors.
2. Hydrology and Soil Conservation Engineering: Including Watershed Management. Ghansyam Das (2009). Prentice Hall India Learning Private Limited publisher

REFERENCES:
1. R.P. Singh, Shriniwas Sharma, S.K. Das, M.V. Padmanabhan and P.K. Mishra. 1995. Field Manual on Watershed Management. CRIDA, Hyderabad.
2. Mahnot, S.C. 2014. Soil and Water Conservation and Watershed Management. International Books and Periodicals Supply Service. New Delhi. 4 Sharda, V.N., A.K. Sikka and G.P. Juyal. 2006.

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III B.Tech – II Sem.

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(20CE0147) FUNDAMENTALS OF URBAN PLANNING
[Open Elective (OE)-II]

COURSE OBJECTIVES

The objectives of this course to
1. *Understand the concept of balanced town by ensuring that new and existing facilities are complimentary to each other*
2. *Provide sustainable buildings by considering the environmental, social and economic conditions*
3. *Create awareness about the traffic management within the town*

COURSE OUTCOMES

On successful completion of this course, the student will be able to
1. *Recognize issues related to town planning and discuss the objectives, necessity and stages of town planning*
2. *Summarize importance of zoning, can classify various town planning practices and can conduct surveys for town planning*
3. *Classify the residential building, list the agencies involved in improving house and review the problems associated with residential housing*
4. *Discuss the issues associated with slums and recognize the methods to improve condition of slums*
5. *Interpret norms laid down for public and industrial building and can summarize building bye-laws*
6. *List and discuss various urban roads and the concepts of traffic management in a town*

UNIT – I

Introduction to Town Planning: Objects of town planning - Necessity of town planning - Principles of town planning - Stages of Town Planning - Origin and growth of towns - Development of towns - Modern town planning in India - Socio - Economic aspects of town planning - Selection of site for an ideal town – Cost of town planning.

UNIT – II

Surveys & Planning: Various types of surveys to be conducted for town planning project - Data to be collected in different types of town planning survey - Types of planning - A brief note on urban, rural and regional planning.

Zoning: Definition - Objects and principles of zoning - Advantages of zoning - Special Economic Zone (SEZ) - Maps for zoning.

UNIT – III

Housing: Classification of residential building as per HUDCO norms - Low Cost Housing - Housing policy - Different types of housing agencies involved in housing - Investment in Housing - Housing Problems in India.

Slums: Causes - growth - Characteristics - Effects - Slum clearance and re-housing - Prevention of slum formation - Financial assistance for slum clearance.

UNIT – IV

Public Buildings & Industries: Classification - Location - Design Principles of public building - Grouping of public buildings - Effects of Industries on towns and cities - Classification of industries – Requirements of an industry - Regulation of their location.

Building Bye-Laws: Objectives of bye-laws - Importance of bye-laws - Function of local authority - Responsibility of owner - Applicability of bye-laws - Principles underlying building bye-laws.

UNIT – V

Urban Roads: Objectives – Requirements - Classification - Types of street systems - Through and bypass roads - Outer and inner ring roads - Expressways - Freeways.

Traffic Management: Objectives - Traffic surveys - Traffic congestion - Traffic control - Parking - Road accidents - Traffic capacity of roads - Road intersections - Traffic islands - Roundabouts - Traffic signals - Road signs - Road markings - Street lighting in a town.

TEXT BOOKS

1. Rangwala, *Town Planning,* Charotar Publishing,30th edition, 2018
2. G K Hiraskar, *Fundamentals of Town Planning*, Dhanpat Rai Publications, New Delhi, 17th edition, 2018

REFERENCES

1. Abirb and yopadhyay, *Text book of Town Planning*, Books & Allied (P) Ltd, 2000
2. Peter Hall and Mark Tewdwr-Jones, *Urban and Regional Planning*, Routledge Publications, 5th edition, 2010
3. Catanese A J, *Urban Planning,* McGraw Hill Publications, 2nd edition, 2014

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III B.Tech – II Sem.

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(20EE0235) INDUSTRIAL INSTRUMENTATION
[Open Elective (OE)-II]

COURSE OBJECTIVES

The objectives of this course are to

1. *Analyse the Common errors that occur in measurement systems, and their classification.*
2. *Understand the characteristics of signals, their representation, and signal modulation techniques.*
3. *Learn the Methods of Data Transmission, Telemetry, and Data acquisition.*
4. *Study working principles of different Signal Analyzers and Digital meters.*
5. *Learn about several types of transducers and their use for measurement of non-electrical quantities.*

COURSE OUTCOMES

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

1. *Identify and explain the types of errors occuring in measurement systems.*
2. *Differentiate among the types of data transmission and modulation techniques.*
3. *Apply digital techniques to measure voltage, frequency and speed.*
4. *Analyse the working principles of different Signal Analyzers and Digital meters.*
5. *Understand the operation of several types of transducers.*
6. *Choose suitable Transducers for the measurement of non-electrical quantities.*

UNIT-I

Characteristics of Signals and their representation: Measuring Systems, Performance Characteristics, Static Characteristics, Dynamic Characteristics; Errors in Measurement Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signals and their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation.

UNIT-II

Data Transmission, Telemetry and DAS: Methods of Data Transmission–General Telemetry System .Frequency Modulation (FM), Pulse Modulation (PM), Pulse

Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Data Acquisition Systems –Components of Analog DAS– Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing –Digital DAS–Block Diagram—Modern Digital DAS (Block Diagram)

UNIT-III

Signal Analyzers, Digital Meters: Wave Analyzers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers-Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, QMeter. Peak Reading and RMS Voltmeters, Digital Voltmeters- Successive Approximation, Ramp and Integrating Type- Digital Frequency Meter- Digital Multimeter- Digital Tachometer

UNIT-IV

Transducers: Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle of Operation of Resistive, Inductive, Capacitive Transducers, LVDT, Strain Gauge and its Principle of Operation, Gauge Factor, Thermistors, Thermocouples, Synchros, Piezo electric Transducers, Photovoltaic, Photo Conductive Cells, Photodiodes.

UNIT-V

Measurement of Non-Electrical Quantities: Measurement of strain, Gauge Sensitivity, Measurement of Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level.

TEXTBOOKS:

1. A.K. Sawhney, *A course in Electrical and Electronic Measurements and Instrumentation*, Dhanpat Rai & Co., 2012.
2. D.V.S. Murty, *Transducers and Instrumentation*, Prentice Hall of India, 2nd Edition,2004.

REFERENCE BOOKS:

1. A. Dhelfrick and W.D. Cooper, *Modern Electronic Instrumentation and Measurement technique*, Pearson/Prentice Hall of India., 1990.
2. H.S. Kalsi, *Electronic Instrumentation*, Tata McGraw-Hill Edition, 2010.
2. T.R. Padmanabhan, *Industrial Instrumentation–Principles and Design*, Springer,

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III B.Tech – II Sem.

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(20ME0354) GENERAL MECHANICAL ENGINEERING
[Open Elective (OE)-II]

COURSE OBJECTIVES
Objective of this course is to

1. *Impart knowledge on Engineering materials and Manufacturing Process.*
2. *Understand about Automation, CAD, CAM and CIM.*
3. *Know the various Industrial Robot applications.*
4. *Learn about advanced manufacturing systems like NC, CNC and DNC system.*
5. Study the construction details of the Automobile systems like engines.
6. *Learn about Refrigeration and Air conditioning systems.*

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

1. *List the types of Engineering materials and Manufacturing Processes.*
2. *Apply Automation, CAD, CAM and CIM in the manufacturing.*
3. *Explicate the various Industrial Robot applications.*
4. *Classify various Machining processes like NC, CNS and DNC system and determine the best suitable process to machine a component.*
5. *Recognize the different parts of the automobile system and know the importance of IC Engines in automobiles.*
6. *Distinguish various types of Refrigeration and Air conditioning systems.*

UNIT-I
Material and selection, Mechanical Handling Equipment- belts, conveyors, hosty,

power transmission

UNIT-II
CAD/CAM: Role of computers in manufacturing - CAD, Design process – CAM - CIM, Scope of CIM - Advantages - Benefits.
Introduction to Automation: Automation, Need - Types - Basic Elements - Strategies and Levels of Automation.
UNIT-III
Introduction to Industrial Robotics: Classification of Robot Configurations, functional line diagram - Principle components - Degrees of freedom – Joints - Advantages, Applications.
Machine Tools: Conventional Machine Tools, Types - Traditional Vs NC machining – Advanced Machine Tools, Classifications - NC, CNC and DNC systems – Advantages, Disadvantages.

UNIT-IV
I.C. Engines- Definition of Engine and Heat Engine, I.C Engine Classification –Parts of an IC Engine, Working of Two Stroke and Four Stroke Engines.
Automobile Engineering: Layout of Automobile, Types, Components - Vehicle chassis, frame and body construction

UNIT-V
Refrigeration: Introduction to Refrigeration- Classifications of Refrigeration systems-Vapour compression and Vapour absorption systems.
Air conditioning: Introduction to Air conditioning - Classifications of Air conditioning systems- window air conditioning system, split conditioning system, Central air conditioning system.

TEXT BOOKS
1. Mikel P.Groover *Automation, Production systems and Computer Integrated Manufacturing Systems, Pearson Higher Education, Inc., 3rd Edition, 2014.*
2. R. K. Rajput, *Engineering Materials and Metallurgy*, S. Chand Publishers, 3rd Edition, 2008.
3. C.P. Arora & Domkundwar, *Refrigeration and Air conditioning*, McGraw Hill, 3rd Edition, 2010.

REFERENCES
1. Kirpal Singh, *Automobile Engineering,* Vol.1 & Vol.2, Standard Publishers Distributors, 13th Edition, 2013
2. R.K.Rajput, *Thermal Engineering*, Laxmi Publications, 6th Edition, New Delhi, 2010.
3. R.K. Jain, *Production Technology*, Khanna Publishers, 17th edition, 2012

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(20EC0452) ELEMENTS OF EMBEDDED SYSTEMS
[Open Elective (OE)-II]

COURSE OBJECTIVES
The objectives of this course is to
1. *Understand the fundamental concepts of embedded systems.*
2. *Learn the core of embedded systems.*
3. *Learn to program the open source electronics.*
4. *Understand the principles of Internet of Things (IoT).*
5. *Understand the concepts of Internet of Things (IoT).*

COURSE OUTCOMES
On successful completion of this course, students will be able to
1. *Differentiate between general computing system and the embedded system, also recognize the classification of embedded systems.*
2. *Enumerate and describe the components of an embedded system.*
3. *Learn about open source electronics platform.*
4. *Program an embedded system by interfacing sensors & actuators.*
5. *Identify the basic building blocks of Internet of Things and characteristics.*
6. *Implement their own ideas in various application areas of Embedded systems and IoT.*

UNIT – I
Introduction to Embedded Systems: Definition –Embedded systems vs General computing systems – History – Classification – Purpose - Major application areas – Characteristics – Architecture of embedded system – CPU, RAM & ROM, timers, clocks, address bus & data bus – overview of design process of embedded systems – programming languages and tools for embedded design.

UNIT – II
Typical Embedded System: Core of the embedded system– RISC vs CISC design philosophy– Memory – Harvard and Von-Neuman architecture–sensors and actuators– Other system components – reset, brownout protection, oscillator, RTC, Watch dog timer. Embedded firmware.

UNIT – III
Communication: Communication Interfaces – Onboard (I2C, SPI, UART, 1-wire interface, parallel interface), External (RS-232 & RS-485, USB, IEEE 1394, IrDA, Bluetooth, Wi-Fi, ZigBee, GPRS.

UNIT – IV
Designing of Embedded Systems with Arduino Microcontrollers: Introduction to Arduino platform– Overview of Arduino UNO board–ATMega328/P Block diagram–Pin functions– Introduction to Arduino programming –Interfacing & programming sensors –Interfacing & programming actuators Interfacing & programming serial communication devices.

UNIT – V
Introduction to IOT: Introduction to Internet of Things– reference architecture of IoT– Internet principles – IP addresses, MAC addresses, TCP and UDP ports– Application layer protocols– Data protocols– MQTT, XMPP, CoAP– challenges of IoT, Case studies demonstrating IoT – Home automation, cities, Environment, Agriculture.

TEXT BOOKS
1. Shibu K V, *Introduction to Embedded systems,* Tata McGraw-Hill Education, 1st Edition, 2009.
2. Raj Kamal, *Embedded systems,* Tata McGraw-HillEducation, 2nd Edition, 2011.
3. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach,* Universities Press/Orient Black Swan Pvt. Ltd, 1st Edition, 2015.

REFERENCES
1. Adrian McEwen & Hakim Cassimally, *Designing of Internet of Things*, John Wiley and sons Ltd, 1st Edition, 2014.

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(20CS0551) JAVA PROGRAMMING
[Open Elective (OE)-II]

COURSE OBJECTIVES
The objectives of this course is to

1. *Introduce standard tools and techniques for software development.*
2. *Understand the object oriented approach for automated software build process.*
3. *Introduce the concepts of AWT framework.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Implement simple abstract data types and design abstraction functions.*
2. *Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.*
3. *Apply object-oriented design patterns for problem solving.*
4. *Implement Exception handling with synchronization.*
5. *Execute programs on Multithreading and String handling concepts.*
6. *Design applications with an event-driven graphical user interface.*

UNIT- I
The Java Language: Importance of Java -Programming Paradigms -The History and Evolution of Java -Java Byte Code.
Introduction of OOP: Abstraction, Encapsulation, Inheritance, Polymorphism-Understanding static -Varargs -Data Types -Type Casting -Java Tokens - Java Statements -Arrays.

UNIT- II
Introducing Classes –Class Fundamentals -Declaring Objects -Introducing Methods Introduction to Constructors -Garbage Collection-Introducing final -Inheritance - Method Overriding -abstract classes -Packages and Interfaces.

UNIT- III
Exception Handling - Exception Fundamentals - Exception Types -Uncaught Exceptions - Using try and catch - Nested try Statements -throw -throws –finally -Creating Your Own Exception Subclasses - Chained Exceptions.

UNIT-IV

Multithreaded Programming - The Java Thread Model -Thread Priorities -The Thread Class and the Runnable Interface - Creating Multiple Threads -Using isAlive( ) and join( ) –Synchronization-String Handling.

UNIT- V

Generics-A simple Generic Example-General form of Generic class -Generic Interfaces Collection Framework-Collections overview, Collection class, Collection interfaces.

Introducing the AWT - Using AWT Controls-Layout Managers -Introducing Swing -Exploring Swing.

TEXT BOOKS
1. Herbert Schildt, *The Complete Reference Java,* Eighth Edition , McGraw Hill.
2. Y Daniel Liang, *Introduction to Java programming* — Que E &T.

REFERENCES
1. P.J. Deitel and H.M. Deitel, *Java for Programmers,* Pearson education.
2. Bruce Eckel, *Thinking in Java*, Pearson Education.

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(20HS0814) INTELLECTUAL PROPERTY RIGHTS
[Open Elective (OE)-II]

COURSE OBJECTIVES

The objectives of this course is to

1. *Provide an understanding of the concept and significance of intellectual property rights*
2. *Understand the concept of trademarks, copy rights, patents and the need for their protection*
3. *Comprehend the concept of competition, unfair competition and the latest developments in the laws pertaining to intellectual property rights*

COURSE OUTCOMES

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

1. *Become aware of intellectual property rights, concepts, treaties, agencies and international organizations involved in sanctioning IP rights*
2. *Identify different types of intellectual properties, ownership rights and the scope of the protection*
3. *Get an adequate knowledge on patents, trademarks, copy rights and to get property rights for their intellectual work*
4. *Able to identify, apply, and assess ownership rights, registration processes for IP rights*
5. *Discern the approaches for intellectual property management and intellectual property audits*
6. *Demonstrate knowledge and understanding on unfair competition and latest developments in IP rights at international level*

UNIT-I
INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual propertyrights.

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 secret elitigation.

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. Deborah, E. Bouchoux, *Intellectual property right*, cengage learning
2. Nityananda KV, Intellectual *property rights: Protection and Management.* Cengage Learning India Private Limited.

REFERENCES

1. Prabuddha ganguli, *Intellectual property right - Unleashing the knowledge economy*, Tata McGraw Hill Publishing CompanyLtd.
2. Ahuja VK *, Law relating to Intellectual Property rights.* IN: Lexis Nexis
3. Neeraj P &Khushdeep D, *Intellectual Property Rights,* India. PHI learning pvt limited.

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B.Tech III Year II Semester

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(20AG0715) DAIRY AND FOOD ENGINEERING LAB

Course Objectives:

1. *Knowledge on milk and food processing unit operations*
2. *To handle pasteurization, sterilization, packaging, etc. of dairy products*
3. *Control spoilage of food through process operations such as evaporation, freezing, membrane processing etc.*

Course Outcomes:

On successful completion of this course, student will be able to

1. *Enable the students to understand the methods of food preservation and the dairy development*
2. *Developed the understanding of physic – chemical properties of milk*
3. *Summarizing the methods of pasteurization and its importance*
4. *To acquaint the students with various dairy engineering operations such as homogenization, pasteurization, thermal processing, evaporation, freezing and drying of milk*
5. *Control spoilage of food through process operations such as evaporation, freezing, membrane processing etc.*

LIST OF EXPERIMENTS:

1. To Study the Vat pasteurizer
2. To study the HTST pasteurizer
3. To study the Homogenizers
4. To study the Sterilization
5. To study the Butter churns
6. To study the Spray dryers
7. To study the Freezers
8. To study the Evaporators
9. To study the Cyclone seperator
10. To study the Heat exchangers

REFERENCES

1. Ahmed, T. 1997. Dairy Plant Engineering and Management. 4th Ed. Kitab Mahal
2. McCabe, W.L. and Smith, J. C. 1999. Unit Operations of Chemical Engineering. McGraw Hill.
3. Rao, D.G. Fundamentals of Food Engineering. PHI learning Pvt. Ltd. New Delhi. 171
4. Singh, R.P. & Heldman, D.R. 1993. Introduction to Food Engineering. Academic Press

TEXT BOOKS

1. Toledo, R. T. 1997. Fundamentals of Food Process Engineering. CBS Publishers
2. Kessler, H. G., 1981. Food Engineering and Dairy Technology. Verlag A. Kessler, Freising.
3. Sukumar, D. C., 2005. Outlines of Dairy Technology. Oxford University Press, New Delhi.

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(20AG0716) IRRIGATION & DRAINAGE ENGINEERING LAB

COURSE OBJECTIVES

1. To understand the concept ofmicro-irrigation

2. To design the sprinkler and drip irrigationsystem

3. To understand the concept of planning and design of various methods of land drainage and its impact on environment

COURSE OUTCOMES

Studies will be familiar with

1. Basic terms related to the development of irrigation in India and AP and classification of different irrigation works

2. Basic terms related to soil and water conservation

3. Various terms related to soil loss estimation models

4. Understand the different types of micro irrigation and its design

5. Understand the maintenance of micro irrigation system

6. Understand the different types of land drainage and its importance

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 evapo-transpiration.

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 holemethod.

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 Theory and Practice —Michael, A.M. (2008). Vikas Publishing House, New Delhi.
2. Drainage Engineering - Luthin, J. N (2015). John Wiley & Sons, New York.
3. Drainage Principles and Applications Ritzema H. P. (1994). (2 ed.). ILRI Publication

REFERENCES:

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.

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(20AG0717) AGRICULTURAL ENGINEERING (VIRTUAL LAB)

Course Objectives

The Objective of this course is to make students familiar with
1. *The design of heat exchanges, understand the Membrane separation process.*
2. *Determine the drying characteristic for rotary dryer*
3. *Heat transfer by conduction, natural convection and radiation*
4. *Determine the water content of the soil by the oven drying method, Calculate the friction in pipesand Measurement of flow using venturi meter*

Course Outcomes

On successful completion of this course, the Student will be able to
1. *Design of heat exchangers*
2. *Membrane separation process*
3. *Determine the drying characteristic for rotary dryer*
4. *Heat transfer by conduction, natural convection and radiation*
5. *Determine the water content of the soil by the oven drying method*
6. *Calculate the friction in pipes and Measurement of flow using venturi meter*

List of experiments
1. To study heat exchanger
2. To study heat transfer in a double pipe heat exchanger
3. To study membrane separation process
4. To determine the drying characteristic for rotary dryer
5. Heat transfer by conduction
6. Heat transfer by natural convection
7. Heat transfer by radiation
8. To determine the water content of the soil by the oven drying method.
9. To calculate the friction in pipes
10. To measure the flow using venturi meter

References
1. http://vlabs.iitkgp.ac.in/cpd/exp2/index.html
2. http://ce-iitb.vlabs.ac.in/exp8/Aim.html?domain=Chemical%20Engineering&lab=Chemical%20Engineering%20Lab
3. http://vlabs.iitkgp.ac.in/cpd/exp7/index.html
4. http://vmt-iitg.vlabs.ac.in/Rotary_dryer(theory).html
5. https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=801&cnt=1

6. https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=791&cnt=1
7. https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=802&cnt=1
8. https://smfe-iiith.vlabs.ac.in/exp/water-content/
9. http://fm-nitk.vlabs.ac.in/exp4/index.html#
10. http://fm-nitk.vlabs.ac.in/exp5/index.html

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(20HS0859) ENGLISH FOR CORPORATE COMMUNICATION SKILLS LAB

COURSE OBJECTIVES
 The objective of this course is to

1. Improve the students' fluency in English, through a well-developed vocabulary

2. Enable them listening spoken English at normal conversational speed by English speakers

3. Respond appropriately in different social-cultural and professional contexts

4. Develop drafting skills among the students.

5. Develop Inter-personal and Intra-personal Skills

COURSE OUTCOMES
On successful completion of this course the student will be able to

1. Use fluency in English for all kinds of professional communication

2. Enhancing job required skills for getting success in their professions

3.Improving Effective Speaking Abilities for their business or professional correspondence

4. prepare effective Interview techniques to get job in the present scenario

5.Using the appropriate skills in all kinds of professional activities

6. Use effective communicative approaches by preparing job application, report and other kinds

  of spoken and written correspondences.

UNIT I
COMMUNICATIVE COMPETENCY
    1. Functional English
    2. Reading Comprehension
    3. Vocabulary for competitive purpose
    4. Spotting Errors
UNIT II
TECHNICAL WRITING
5**.** Cover Letter
  6. Curriculum vitae
  7. Report writing

UNIT III
PRESENTATIONAL SKILLS
8. Impromptu Speech
9. Oral presentation
10. Power point presentation

11. Poster presentation

UNIT IV
CORPORATE SKILLS
12. Problem Solving
13. Team Work
14. Leadership Skills

UNIT V
GETTING READY FOR JOB
   15. Group Discussion
   16. Interview skills

Minimum requirements for English for Corporate Communication Skills Lab
   1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.

   2. English for Corporate 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, LAN with minimum 60 multimedia systems with the following

Specifications
      i)   a) Intel(R) core (TM) i3
              b) Speed 3.10 GHZ
              c) RAM – 4 GB
              d) Hard Disk – 320 GB
      ii)   Headphones with High quality

   SOFTWARE
   Walden Info Tech Software

   REFERENCES
   1. Effective Tech Communication, Rizvi, Tata McGraw – Hill Education, 2007.
   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, AnjanaAgarwal, New Age International Publishers, 2011.
   5. Listening Extra, Miles Craven, Cambridge University Press, 2008.

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(20HS0801) ENVIRONMENTAL SCIENCE

Course Objectives

The objectives of this course is to

1. *Identify environmental problems arising due to engineering and technological activities and the science behind those problems.*
2. *Identify the importance of interlinking of food chains.*
3. *Learn about various attributes of pollution management and waste management practices.*

COURSE OUTCOMES

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

1. *Recognize the physical, chemical and biological components of the earth's systems and show how they function.*
2. *Characterize and analyze human impacts on the environment.*
3. *Integrate facts, concepts and methods from multiple disciplines and apply to environmental Problems.*
4. *Create informed opinions about how to interact with the environment on both a personal and a social level.*
5. *Perform independent research on human interactions with the environment.*
6. *Recognize the ecological basis for regional and global environmental issues*

UNIT – I

INTRODUCTION: Definition, Scope and Importance of environmental science, Need for Public Awareness

NATURAL 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 Energy resources: Renewable and Non- Renewable sources of energy. Solar energy, Hydro electrical energy, Wind energy, Nuclear energy.

UNIT-II

ECOSYSTEMS: Concept of an ecosystem, structure and function of an ecosystem. Producers, Consumers and Decomposers. Biogeochemical cycles, Ecological succession, energy flow in an ecosystem, Foodchains, food webs and ecological pyramids. Types of ecosystems (a) Forest ecosystem, (b) Grassland ecosystem, (c) Desert ecosystem, (d) Aquatic ecosystem.

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

ENVIRONMENTAL POLLUTION AND GLOBAL ENVIRONMENTAL ISSUES:

Natural Disasters: Droughts, Floods, Cyclone, Landslides, Earthquake.

Pollution episodes: Air pollution, Water pollution, Land pollution, Noise pollution, Automobile, Nuclear pollution. Global warming, Acid rain, 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.

UNIT-V

ENVIRONMENTAL LEGISLATIONS, LAWS, POLICIES FOR SUSTAINABLE DEVELOPMENT:

Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water Act. Wildlife protection Act, Forest conservation Act.Municipal Solid Waste management. International conventions/Protocols Earth summit, Kyoto protocol and Montreal Protocol. Unsustainable to sustainable development, Role of NGO's for Sustainable development. Role of IT in Environment, 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.

TEXT BOOKS:

1. A.Kaushik and C.P.Kaushik, Environmental Sciences, 5th edition, New age international publishers, 2015.

2. M.Anji Reddy, Text Book of Environmental Science and Technology, BS Publications, 2016.

REFERENCES:

1. Anil Kumar and Arnab Kumar De, Environmental Studies, New Age International Publishers, New Delhi, 3rd Edition 2015.

2. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances andStandards", Vol.I and II, Enviro Media, 2016.

3. Rajagopalan.R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.