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 (AG)

S.No.	Course Code	Subject	L	T	P/Drg	C
1.	19HS0848	Engineering Physics	3	1	-	4
2.	19HS0830	Algebra and Calculus	3	-	-	3
3.	19HS0810	Communicative English	3	-	-	3
4.	19CE0101	Engineering Mechanics	2	1	-	3
5.	19HS0852	Engineering Physics Lab	-	-	3	1.5
6.	19HS0811	Communicative English Lab	-	-	3	1.5
7.	19ME0301	Workshop practice lab	-	-	4	2
Contact Periods / Week			11	2	10	18
			Total/Week 23			

I B. Tech. – II Semester (AG)

S.No.	Course Code	Subject	L	T	P/Drg	C
1.	19HS0802	Engineering Chemistry	3	1	-	4
2.	19HS0831	Differential Equations and Vector Calculus	3	1	-	4
3.	19EE0240	Basic Electrical and Electronics Engineering	3	-	-	3
4.	19CS0501	Python Programming	3	-	-	3
5.	19ME0302	Engineering Graphics	1	-	4	3
6.	19HS0806	Engineering Chemistry Lab	-	-	3	1.5
7.	19CS0502	Python Programming Lab	-	-	3	1.5
Non -Credit Course						
8.	19HS0816	Indian Constitution	3	-	-	-
Contact Periods / Week			16	2	10	20
			Total/Week 28			

II B. Tech. – I Semester (AG)

S.No	Course Code	Subject	L	T	P/Drg	C
1	19ME0305	Engineering Thermodynamics	2	1	-	3
2	19CE0150	Strength of Materials	3	1	-	4
3	19CE0104	Surveying & Geomatics	3	-	-	3
4	19AG0701	Greenhouse Technology	3	-	-	3
5	**Open Elective – I**		3	-	-	3
	19CE0136	Water Technology				
	19EE0238	Generation of Energy Through Waste				
	19ME0349	Fundamentals of Mechanical Engineering				
	19EC0448	Introduction to Communication Systems				
	19CS0550	Relational Database Management System				
	19HS0813	Management Science				
6	19CE0106	Strength of Materials Lab	-	-	3	1.5
7	19CE0107	Surveying Laboratory	-	-	3	1.5
8	19ME0310	Computer Aided Machine Drawing lab	-	-	2	1
Non -Credit Course						
9	19HS0805	Environmental Science	3	-	-	-
Contact Periods / Week			17	2	8	20
			Total/Week 27			

II B. Tech. – II Semester (AG)

S.No	Course Code	Subject	L	T	P/Drg	C
1	19HS0833	Numerical Methods, Probability & Statistics	4	-	-	4
2	19CE0151	Fluid Mechanics & Hydraulic Machinery	2	1	-	3
3	19AG0702	Farm Machinery & Equipment-I	3	-	-	3
4	19AG0703	Principles of Agronomy & Soil Science	3	-	-	3
5	**Open Elective - II**		3	-	-	3
	19CE0143	Fundamentals of Urban Planning				
	19EE0233	Industrial Instrumentation				
	19ME0350	Mechanical Measurements &Control Systems				
	19EC0449	Elements of Embedded Systems				
	19CS0551	Java Programming				
	19HS0814	Intellectual Property Rights				
6	19CE0112	Fluid Mechanics & Hydraulic Machinery Lab	-	-	3	1.5
7	19AG0704	Farm Machinery & Equipment-I Lab	-	-	3	1.5
	19AG0705	Principles of Agronomy & Soil Science Lab	-	-	2	1
Non -Credit Course						
9	19HS0817	Essence of Indian Traditional Knowledge	3	-	-	-
Contact Periods / Week			19	1	8	20
			Total/Week 28			

III B. Tech. – I Semester (AG)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19ME0319	Heat & Mass Transfer	3	-	-	3
2	19CE0152	Soil Mechanics	3	-	-	3
3	19AG0706	Farm machinery & Equipment-II	3	-	-	3
4	19AG0707	Agricultural Process Engineering	3	1	-	4
5	**Open Elective – III**		3	-	-	3
	19CE0129	Elements of Road Traffic Safety				
	19EE0226	Electrical Energy Conservation and Auditing				
	19ME0321	Non-Conventional Energy Resources				
	19EC0450	Introduction to IOT				
	19CS0545	Software Development & Testing				
	19HS0861	Business Ethics				
6	19CE0153	Soil Mechanics Lab	-	-	3	1.5
7	19AG0708	Farm machinery & Equipment-II Lab	-	-	3	1.5
8	19AG0709	Agricultural Process Engineering Lab	-	-	2	1
Non -Credit Course						
9	19HS0858	Human Values and Professional Ethics	3	-	-	-
Contact Periods / Week			18	1	8	20
			Total/Week 27			

III B. Tech. – II Semester (AG)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19HS0815	Entrepreneurship Development	3	-	-	3
2	19ME0307	Theory of Machines	3	-	-	3
3	19AG0710	Dairy &Food Engineering	3	1	-	4
4	19AG0711	Soil and Water Conservation Engineering	3	-	-	3
5	**Open Elective - IV**		3	-	-	3
	19CE0124	Construction Project Management				
	19EE0231	Neural Networks and Fuzzy Logic				
	19ME0353	Computer Aided Process Planning				
	19EC0451	MATLAB Programming				
	19CS0546	Introduction to Cyber Security				
	19HS0862	Strategic Management				
6	19AG0712	Dairy & Food Engineering Lab	-	-	3	1.5
7	19AG0713	Soil and Water Conservation Engineering Lab	-	-	3	1.5
8	19AG0714	Agricultural Engineering (Virtual Lab)	-	-	2	1
Non -Credit Course						
9	19HS0859	English for Corporate Communication Skills Lab	-	-	2	-
Contact Periods / Week			15	1	10	20
			Total/Week 26			

IV B. Tech. – I Semester (AG)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19HS0860	Supply Chain Management	3	-	-	3
2	19AG0720	Solid Waste & By-Product Utilization	3	-	-	3
3	19AG0721	Irrigation & Drainage Engineering	3	-	-	3
4	**Professional Elective Course(PEC) – I**		3	-	-	3
	19AG0722	Food Processing Plant Design and Layout				
	19AG0723	Food Packaging Technology				
	19AG0724	Food Quality and Control				
5	**Professional Elective Course(PEC) – II**		3	-	-	3
	19AG0725	Hydrology, Ground Water & Well Engineering				
	19AG0726	Watershed Development				
	19AG0727	Information Technology for Land and Water Management				
6	**Professional Elective Course(PEC) – III**		3	-	-	3
	19AG0728	Tractor Systems & Controls				
	19AG0729	Design of Agricultural Machinery				
	19AG0730	Precision Agriculture and System Management				
7	19AG0715	Internship(60 Hours)	-	-	-	3
8	19AG0716	Project Phase-I	-	-	4	2
Contact Periods / Week			18	-	4	23
			Total/Week 22			

IV B. Tech. – II Semester (AG)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	MOOC		3	-	-	3
3	19AG0717	Seminar	-	-	6	3
4	19AG0718	Comprehensive Viva Voce	-	-	-	2
5	19AG0719	Project Phase-II	-	-	22	11
Contact Periods / Week			3	-	28	19
			Total/Week 31			

Note: L – Lecture hours, T – Tutorial, P – Practical, Drg. – Drawing, C – Credit

Total Credits: 160

Year	I Year		II Year		III Year		IV Year		Total
Semester	I Sem	II Sem	I Sem	II Sem	I Sem	II Sem	I Sem	II Sem	
Credits	18	20	20	20	20	20	23	19	160

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L	T	P	C
3	1	0	4

(19HS0848) ENGINEERING PHYSICS

COURSE OBJECTIVES

1. *To impart knowledge in basic concepts of various forces & Frames of References.*
2. *Key points related to Physics of Solids.*
3. *To familiarize the basic concepts of acoustics and ultrasonics with their Engineering applications.*
4. *To recognize the various basic terms related to Oscillations.*
5. *To understand the fundamentals of Nano Science & Technology.*

COURSE OUTCOMES

After completing this course students will be able to

1. *Explains various terms related to Vectors & Scalars and Newton"s laws of motion.*
2. *Apply the principles of acoustics in designing of buildings.*
3. *Explains the applications of ultrasonics in various engineering fields.*
4. *Explains various terms related to waves and Oscillations.*
5. *Explains the importance of various mechanical properties of materials.*
6. *Apply the basic properties of nano materials in various engineering branches.*

UNIT – I:

MOTION OF PARTICLES

Basic laws of vectors and scalars-conservative forces- F = - grad V, torque and angular momentum - Newton‘s laws, Inertial and non-inertial frames of reference-rotating frame of reference with constant angular velocity- Centre of Mass – Gravitation and Kepler‘s Laws (Qualitative)

UNIT – II:

PHYSICS OF SOLIDS

Elasticity and isotropic materials, Stress, Types of stresses, Strain, Types of strains, longitudinal strain, volume strain and shearing strain and Hooke‘s Law- Behavior of wire

under the load, Elastic modulus's of solids, Poisson's ratio. Internal energy due to strain – Beams- classification-types of support.

UNIT – III:

ACOUSTICS AND ULTRASONICS

ACOUSTICS: Introduction – Reverberation – Reverberation time – Sabine's formula- Derivation of Sabine's formula, Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.

ULTRASONICS – Introduction- Properties and Production by piezoelectric method – Detection methods –Applications of ultrasonics.

UNIT – IV:

HARMONIC OSCILLATORS

Simple Harmonic oscillator and solution of differential equation- Damped harmonic motion and solution of differential equation – over damped, critically damped and lightly damped oscillators- Forced oscillations and resonance (qualitative treatment).

UNIT-V:

PHYSICS OF NANOMATERIALS

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

TEXTBOOKS

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*‖ , McGrawHill Education Private Ltd, New Delhi.

REFERENCE BOOKS

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 McGraw 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	0	0	3

(19HS0830) ALGEBRA AND CALCULUS

COURSE OBJECTIVES

1. *This course will 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 evaluate multiple integrals in Cartesian, cylindrical and spherical geometries*

COURSE OUTCOMES

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. *Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems*
5. *Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions.*

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 - Diagonalization of a matrix - Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT – II

Calculus and MeanValueTheorems: Rolle‘s Theorem - Lagrange‘s mean value theorem - Cauchy‘s mean value theorem - Taylor‘s and Maclaurin‘s theorems (without proofs).

UNIT – III

MultivariableCalculus: Partial derivatives - Total derivatives - Chain rule - Jacobians - Functional dependence - Maxima and minima of functions of two variables - Method of Lagrange multipliers.

UNIT – IV

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 – V

SpecialFunctions: Beta and Gamma functions and their properties - Relation between Beta and Gamma functions - Evaluation of definite integrals using Beta and Gamma functions.

TEXTBOOKS

1. B. S. Grewal,*Higher Engineering Mathematics*,Khanna Publishers,42nd Edition, 2017
2. B. V. Ramana, *Higher Engineering Mathematics*, Tata McGraw Hill Companies, Third Edition

REFERENCES

1. T.K.V. Iyengar, *Engineering Mathematics Volume-I*, S.Chand Publication, 5th Edition, 2010
2. T.K.V. Iyengar, *Engineering Mathematics Volume-II*, S.Chand Publication, 5th Revised Edition, 2011
3. T.K.V. Iyengar, *Engineering Mathematics Volume-III*, S.Chand Publication, 10th Revised Edition, 2015
4. E.Rukmangadachari, *Engineering mathematics, volume-I*, Pearson Publishers, 1st Edition, 2015
5. Dr.C. Sankaraiah, *Mathematical Methods*, Unitech series, First Edition, 2008

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L	T	P	C
3	0	0	3

(19HS0810) COMMUNICATIVEENGLISH

COURSE OBJECTIVES

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

COURSE OUTCOMES

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 employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.*
3. *To Participate in informal discussions and speak clearly on a specific topic or in general.*
4. *To Comprehend, discuss and respond to academic texts and use appropriate language for description and interpretation in writing.*
5. *To form sentences using proper grammatical structures and correct word forms.*

UNIT – I
Part-1

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **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; singular and plural; Basic sentence structures; simple question form - wh-questions; word order in sentences and Content words

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 after listening 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: M**echanics of writing - punctuations **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions and function words

Part-2

The Thakur"s Well by Prem chand 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:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes and word forms

Part-2

I am not that Woman by Kishwar Naheed from Engage with English.

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.

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).

Part-2

The Power of Prayer by A P J Abdul Kalam from Paths to Skills in English.

TEXTBOOKS

1. Board of Editors *Engage with English* Orient Blackswan First Edition, 2016
2. Prof. G.M. Sundaravalli&A.S.Kamalakar*Paths to Skills in English* Orient Blackswan, First Edition, 2015.

REFERENCES

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Hewings, Martin. *Cambridge Academic English (B2).* CUP, 2012.
4. Eric H.Glendinning &Beverly Holmström *Study Reading: A Course in Reading Skills for Academic Purposes*Cambridge University Press; 2 edition, 14 October 2004.

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I B.Tech – I Sem.

L	T	P	C
2	1	0	3

(19CE0101) ENGINEERING MECHANICS

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

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 Moment of Inertia for composite sections.*

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 S, A Textbook of Engineering Mechanics, B.S. New Age International, 3rd Edition, 2016.
2. Dr. R. K. Bansal, Engineering Mechanics, Laxmi Publications, 4th Edition, 2011.

REFERENCES

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

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L	T	P	C
0	0	3	1.5

(19HS0852) ENGINEERING PHYSICS LAB

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 energy gap, B-H curve and resonance phenomena in LCR circuits.*
4. *Develop an ability to apply the knowledge of physics experiments in the later studies.*

COURSE OUTCOMES

The students will be able to

1. *Operate various optical instruments.*
2. *Estimate wavelength of laser and particles size usinglaser.*
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 energyloss by B-H curve.*

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 onglass plates) using Laser source.
8. Determination of energy gap of a semi conductor using p – n junction diode. B- H curve.
9. Magnetic field along the axis of current carrying coil – Stewart & Gee's Method.
10. Determination of frequency of tuning fork - Melde's Apparatus.
11. Determination of Spring constant – Coupled Oscillator.
12. Determination of di electric constant of dielectric material using charging and discharging of capacitor.
13. Determination of Numerical Aperture of an Optical fiber.
14. Measurement of resistance with varying temperature –Thermistor.

REFERENCE BOOKS:

1. S. Balasubramanian, M.N. Srinivasan –*A Text book of Practical Physics*‖, SChand 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
0	0	3	1.5

(19HS0811) COMMUNICATIVE ENGLISH LAB

COURSE OBJECTIVES

1. *Students will be exposed to a variety of self instructional, learner friendly modes of language 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, public speaking.*
5. *Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.*

COURSE OUTCOMES

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.*

UNIT – I
Part-1
Introduction to Phonetics
Part-2
Word Stress- Intonation

UNIT – II
Part-1
JAM - Oral Presentation
Part-2
Describing objects/places/persons- Minutes of Meeting

UNIT – III
Part-1
Situational dialogues – Greeting and Introduction -Telephonic Conversations

Part-2
Book Review-Report Writing

UNIT – IV
Part-1
Non-verbal Communication – Dumb Charade
Part-2
Debate/Group Discussion- Movie Review- Reading Comprehension.

UNIT – V
Part-1
Information Transfer
Part-2
Job Application and Resume Writing - Interview Skills

Suggested Software:
1. Walden InfoTech Software

REFERENCES

1. T. Balasubramanian *A Textbook of English Phonetics for Indian Students*Mcmillian second edition,2012.
2. DhamijaSethi *A Course in Phonetics and spoken English* Prentice-hall of India Pvt. Ltd, 2000.
3. Krishna Mohan & NP Singh *Speaking English Effectively*,Mcmillian, second Edition, 011.
4. E.Sureshkumar&P.Sreehari *A Hand Book of English Laboratories* Foundation books, 2011.
5. M Ashraf Rizvi *Effective Technical Communication*McGraw Hill Education, Second edition ,27 July 2017.

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L	T	P	C
0	0	4	2

(19ME0301) WORKSHOP PRACTICE LAB

COURSE OBJECTIVES

1. *To familiarize with the basic manufacturing processes and to study the various tools and equipment*
2. *The course provides hands-on training in the trades of Carpentry, Fitting, House-wiring, and Tin Smithy.*
3. *Overview of metal cutting processes, plumbing is provided through live demonstrations.*
4. *To know the labour involved, machinery or equipment necessary, time required to fabricate.*
5. *To acquire practical skills by performing the experiments in different shops of workshop*

COURSE OUTCOMES

1. *Apply wood working skills in real world applications.*
2. *Build different parts with metal sheets in real world applications*
3. *Apply fitting operation in various applications*
4. *Apply different types of basic electric circuit connections*
5. *Demonstrate soldering and brazing.*

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 job 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 - IT WORKSHOP

COURSE OBJECTIVES

To provide students with hands-on experience in

1. *Basic hardware*
2. *Productivity tools like MS Office*
3. *Basic operating system installations.*

COURSE OUTCOMES

After Completion of this Course the Student would be able to

1. *Identify the basic computer peripherals.*
2. *Gain sufficient knowledge on assembling and disassembling a PC.*
3. *Learn the installation procedure of Windows and Linux OS.*
4. *Acquire knowledge on basic networking infrastructure.*
5. *Learn productivity tools like Word, Excel and Power point.*
6. *Acquire knowledge on basics of internet and worldwide web.*

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.

REFERENCES:

1. *Introduction to Computers*, Peter Norton, McGraw Hill, 2001
2. *MOS study guide for word, Excel, Power point & amp; Outlook Exams*, Joan Lambert, Joyce Cox, PHI. 2008

3. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education.2009
4. *Networking your computers and devices*, Rusen, PHI, 2009
5. *Trouble shooting, Maintaining & Repairing PCs*, Bigelows, TMH, 2010

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(19HS0802)ENGINEERING CHEMISTRY

COURSE OBJECTIVES

1. *To familiarize engineering chemistry and its applications*
2. *To impart the concept of soft and hard waters, softening methods of hard water*
3. *To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement*

COURSE OUTCOMES

1. *List the differences between temporary and permanent hardness of water, explain the principles of reverse osmosis and electrodialysis. Compare quality of drinking water with BIS and WHO standards.*
2. *Apply Nernst equation for calculating electrode and cell potentials, apply Pilling-Bedworth rule for corrosion and corrosion prevention, demonstrate the corrosion prevention methods and factors affecting corrosion, compare different batteries and their applications*
3. *Explain different types of polymers and their applications, solve the numerical problems based on Calorific value, select suitable fuels for IC engines, explain calorific values, octane number, refining of petroleum and cracking of oils.*
4. *Explain the constituents of Composites and its classification identify the factors affecting the refractory material, illustrate the functions and properties of lubricants, and demonstrate the phases and reactivity of concrete formation.*
5. *summarize the applications of SEM, TEM and X-ray diffraction in surface characterization, explain the synthesis of colloids with examples, outline the preparation of nanomaterials and metal oxides identify the application of colloids and nanomaterials in medicine, sensors and catalysis*

UNIT – I

WATER TECHNOLOGY: Introduction, Soft water and Hardness of water, Estimation of hardness by EDTA Method. Boiler troubles, Municipal water treatment, Industrial water treatment, Specifications for drinking water - Bureau of Indian Standards (BIS) and World

Health Organization (WHO) standards, Zeolite and Ion-exchange processes. Desalination of brackish water - Reverse osmosis (RO) and Electro dialysis.

UNIT – II

ELECTROCHEMISTRY AND APPLICATIONS: Electrochemical cell, Nernst equation, Cell potential calculations. Primary cells Li Battery. Secondary cells-Lead acid Battery and Lithium ion cell (Rechargeable) - working of the batteries including cell reactions. Fuel cells-Basics principles and working principles of Hydrogen-Oxygen, Methanol-Oxygen fuel cells.

CORROSION: Introduction to Corrosion, Types of Corrosion (Chemical or Dry Corrosion, Electrochemical or Wet corrosion), Differential aeration cell corrosion, Galvanic corrosion, Pilling-Bed worth ratios and uses, Factors affecting the corrosion-Cathodic and Anodic protection, Electroplating (Nickel and Copper) and Electro less plating.

UNIT – III

POLYMERS AND FUEL CHEMISTRY: Introduction to Polymers, Functionality of monomers Nomenclature of Polymers, Mechanism of Chain growth, Step growth polymerization. Thermoplastics and Thermosetting plastics- preparation,properties and applications of PVC and Bakelite. Elastomers – Preparation, properties and applications of Buna-S,Buna-N,Thikol.

FUELS- Types of fuels, Calorific value, Numerical problems based on calorific value,Analysis of coal, Liquid fuels, Refining of Petroleum, Fuels for IC engines, Knocking and Anti-knock agents, Octane and Cetane values, Cracking of oils, Alternative fuels-Propane, Methanol Ethanol and Bio fuels.

UNIT – IV

BASIC ENGINEERING MATERIALS: Composites - Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, Properties and Engineering applications. Refractories- Classification, Properties. Lubricants- Classification, Mechanism, Properties of lubricating oils and Applications. Building materials- Manufacture of Portland Cement, constituents, phases and reactivity of clinker, Setting and Hardening of Cement.

UNIT – V

SURFACE CHEMISTRY AND APPLICATIONS: Introduction to Surface chemistry, Colloids, Micelle formation, Synthesis of colloids (any two methods with examples), Chemical and Electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, Stabilization of colloids and nanomaterials by stabilizing agents, Characterization of surface by physicochemical methods (SEM, TEM, X-ray diffraction), Solid-gas interface, Solid-liquid interface, adsorption isotherm, BET equation (no derivation), Applications of colloids and Nanomaterials – catalysis, medicine, sensors, etc.

TEXTBOOKS

1. KNJayaveera, GVSubba Reddy and C. Ramachandraiah, *Engineering Chemistry*, McGraw Hill Higher Education, Forth Edition, New Delhi, 2019.
2. Jain and Jain, *A Text Book of Engineering Chemistry*, DhanapathiRai Publications, New Delhi, 2010.

REFERENCES

1. S.S Dhara, *A Text book of Engineering Chemistry*,S. Chand Publications, New Delhi, 2010.
2. K.B.ChandraSekhar, UN.Das and Sujatha Mishra, *Engineering Chemistry*, SCITECH Pubblications India Pvt Limited, 2015.
3. H.D. Gesser, *Applied Chemistry*,Springer International Edition, 2010.

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(19HS0831) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

COURSE OBJECTIVES

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 worldapplications.*
3. *To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate and modeling the problems, to think creatively and to synthesize information*

COURSE OUTCOMES

1. *Solve the differential equations related to various engineering fields*
2. *Identify solution methods for partial differential equations that model physical processes*
3. *Interpret the physical meaning of different operators such as gradient, curl and divergence*
4. *Estimate the work done against a field, circulation using vector calculus*
5. *Students will become familiar with applications of surface and volume integrals*

UNIT – I

First and Higher Order Ordinary Differential Equation: Exact - Linear and Bernoulli‘s equations - Second order linear differential equations with constant coefficients with R.H.S term of the types e^{ax}, sinax, cosax, polynomials in x^n ,e^{ax} V(x).

UNIT – II

Equations Reducible to LinearDifferentialEquations: 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 eliminating arbitrary constants and functions.

Solutions of P.D.E: Equations solvable by direct integration - Linear and non-linear equations of first order - Method of separation of variables.

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.

UNIT – V

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) - applications of these theorems.

TEXTBOOKS

1. Dr. Shahnaz Bathul, *Engineering Mathematics*, Overseas Publishers PV.L.T,Fourth Edition,2008.

2. T.K.V. Iyengar, *Engineering Mathematics Volume-I,* S.Chand Publication, 5th Edition, 2010

REFERENCES

1. E.Rukmangadachari & E.Keshava Reddy, *Engineering mathematics volume-I,* Pearson Publishers, 1st edition, 2015.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 42nd Edition, 2017
3. Peter V.Oneil, *Advanced Engineering Mathematics*, Thomson Books, 5th Edition, 2003
4. Dr. A Anjauyulu, *Engineering Mathematics-I,* Deepthi Publications.
5. Erwin Kreyszig. *Advanced Engineering Mathematics*, John Wiley Publications,8th Edition, 2000

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(19EE0240) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OBJECTIVES

1. *To understand the nature of different circuit elements, fundamental laws and network Theorems.*
2. *Understand the operation of dc machines and single phase transformers.*
3. *Understand the characteristics of the p-n junction diode.*
4. *Understand the characteristics of the p-n junction diode.4. Understand the characteristics Of BJT, FET, MOSFET and characteristics of special purpose electronic devices*

COURSE OUTCOMES

Upon completion of the course, students will:

1. *Determine the equivalent impedance of given network by using network reduction techniques.*
2. *Determine the current through any element and voltage across any element*
3. *Apply the network theorems suitably.*
4. *Analyze the operating principles of motor and transformer.*
5. *Analyze the operating principles of major electronic devices, its characteristics and applications.*
6. *Design and analyze the DC bias circuitry of BJT and FET.*

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, Regulationof Transformer.

PART-B

UNIT – I

SEMICONDUCTOR DEVICES: Intrinsic Semiconductors-Electron-Hole Pair Generation, Conduction in Intrinsic Semiconductors, Extrinsic Semiconductors-N-Type and P-Type Semiconductors, Comparison of N-Type and P-Type Semiconductors. The p-n Junction – Drift and Diffusion Currents, The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics- Diode Specifications, Applications of Diode, Diode as a Switch. Diode as a Rectifier-Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Rectifiers with Filters, Zener Diode-Volt-Ampere Characteristics, Zener Diode as Voltage Regulator.

UNIT – II

BJT: BipolarJunctionTransistor(BJT)–TypesofTransistors,Operationofnpnandpnp Transistors,Input-OutputCharacteristicsofBJT-CB,CEandCCConfigurations,Relation betweenIC,IBandIE -TransistorBiasing-FixedBias - TransistorApplications- Transistor as an Amplifier, Transistor as a Switch.

UNIT – III

JFET & MOSFET: Junction Field Effect Transistor (JFET) -TheoryandOperation of JFET, OutputCharacteristics,TransferCharacteristics,ConfigurationsofJFET-CD,CSandCG

Configurations,JFETApplications-JFETasanAmplifier,JFETasaSwitch,Comparisonof BJTandJFET,MOSFET- StaticCharacteristicsofMOSFET, Applications of MOSFET.

TEXT BOOKS

1. M.S. Naidu and S. Kamakshiah, –Basic Electrical Engineering –,TMH,2011
2. T.K. Nagasarkar and M.S. Sukhija, –Basic Electrical Engineering‖, Oxford University Press,2005.

REFERENCES

1. D.P. Kothari & I.J. Nagrath, ―Theory and Problems ofBasic Electrical Engineering‖, PHI, 2009
2. V. K Mehta, –Principles of Electrical Engineering‖, S. Chand Publications,2011
3. T. Thyagarajan, –Fundamentals ofElectrical Electronics Engineering‖, SCITECH Publications 5th Edition , 2007.
4. Hughes, ―Electrical and Electronic Technology‖, Pearson Education, 2012.

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(19CS0501) PYTHON PROGRAMMING

COURSE OBJECTIVES

1. *Introduction of Scripting Language*
2. *Exposure to various problem solving approaches of computer science*
3. *To introduce function-oriented programming paradigm*
4. *Exposure to solve the problems using object oriented concepts, exceptional handling*
5. *Exposure to solve the problems using Files, Regular Expressions and, Standard Libraries*

COURSE OUTCOMES

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

1. *Making Software easily right out of the box*
2. *Solve the problems using control structures, input and output statements*
3. *Summarize the features of lists, tuples, dictionaries, strings and files*
4. *Experience the usage of standard libraries, objects, and modules*
5. *To build the software for real needs.*

UNIT- I

Introduction: Algorithms -Building blocks of flow-chart design -History of Python -Python features – Applications - Programming Using the REPL(Python Shell) - Running Python Scripts – Variables – Assignment – Keywords - Input-Output - Indentation.

Data Types: Data Type – Types of data: Single Valued and Multi valued data types.

Single Valued: Numbers - Strings and methods - Booleans.

UNIT- II

Data Structures: Lists – Tuples – Sets - Dictionaries and Sequences - Indexing and slicing - Comprehensions -**Type Casting:** Conversion methods.

Operators and Expressions: Operators-Types of operators - Expressions and order of evaluations.

Control Flow:Simple if - if else- nested if - if-elif-else –looping: while and for -Jumping: break – continue - pass

UNIT-III

Functions - Defining Functions - Calling Functions - Passing Arguments - Keyword Arguments –Default Arguments - Variable-length arguments - Anonymous Functions - Fruitful Functions(Function Returning Values) - Nested functions - Recursive functions - Scope of the Variables in a Function - Global and LocalVariables.

Object Oriented Programming in Python: Classes - Class diagram – Constructor - Object-'self variable' - Methods - Magic methods – Inheritance – Polymorphism - Method overloading -Overriding Methods.

UNIT-IV

Modules: Creating modules - Import statement - From Import statement - Name spacing

Python packages: Introduction to PIP - Installing Packages via PIP (Numpy, Pandas, MatPlotlib etc..) - Using Python Packages.

Exception Handling: Introduction - try except block - try else – finally - Raising Exceptions - User Defined Exceptions

Introduction to Regular Expressions – Searching and Matching

UNIT V

Functional Programming: Iterators and Generators - Maps and Filters

Files: Text files- Reading and Writing files - Command line arguments;

Brief Tour of the Standard Library - Dates and Times - Data Compression - Python Runtime Services – Mathematics - Data Management and Object Persistence

GUI Programming - Turtle Graphics

TEXT BOOKS

1. VamsiKurama, *Python Programming: A Modern Approach*, Pearson
2. ReemaThareja, *Python Programming - Using Problem Solving Approach*, First Edition (English, Paperback), Oxford University Press.

REFERENCES

1. Mark Lutz, *Learning Python,*Orielly
2. Allen Downey, *Think Python,* Green Tea Press
3. W.Chun, *Core Python Programming*, Pearson.
4. Kenneth A. Lambert, *Introduction to Python,*Cengage
5. Michael T. Goodrich , Roberto Tamassia, Michael H. Goldwasser, *Data Structures and Algorithms in Python,* 1st Edition , kindle Edition .

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(19ME0302) ENGINEERING GRAPHICS

COURSE OBJECTIVES

1. *Understand the importance graphics in engineering*
2. *To introduce the students to the "universal language of Engineers" for effective Communication through drafting*
3. *Develop the graphical skills for communication of concepts, ideas and design of engineering products through engineering drawings.*
4. *Increase ability to take data and transform it into graphic drawings*
5. *To familiarize the students in basic concept of conic sections, projections and development of objects*

COURSE OUTCOMES

1. *Graphically construct and understand the importance of mathematical curves in engineering applications*
2. *Able to draw the basic views related to projections of Points, Lines and Planes*
3. *Able to draw the projections of geometrical solidsand sectional view of solids*
4. *Understand the concept of projection and acquire visualization skills, development of surfaces and interpenetrations of solids*
5. *To draw multi view orthographic and other projections including isometric*

UNIT – I

Introduction To Engineering Drawing: Principles of Engineering Graphics and their significance - usage of Drawing instruments – lettering - Conic sections, Cycloids 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

Projections of Planes: Surface inclined to both reference planes

UNIT – III

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

Sections of Solids: Sectional Views of Right regular Solids - Prisms, Pyramids.

UNIT – IV

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

Interpenetration of Solids: Cylinder to Cylinder, Prism to Prism, Cone to Cone (simple Problems Only

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. BasantAgarwal& CM Agarwal, *Engineering Drawing & Graphics*, Mcgraw Hill Education, 2013.
2. N.D.Bhatt, *Engineering Drawing*, Charotar Publishers, 2011.
3. K.L.Narayana, Kannaiah, *A text Book of Engineering Drawing*, Scitech Publishers, 2010.

REFERENCES

1. K.Venugopal*A text Book of Engineering Drawing and Graphic*, New Age Publishing New Delhi, 2008.
2. P.J.Shah, *A Text Book of Engineering Graphics*, S.Chand& Company Ltd., New Delhi,2016

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(19HS0806) ENGINEERING CHEMISTRY LAB

COURSE OBJECTIVES

Verify the fundamental concepts with experiments

COURSE OUTCOMES

1. *Determine the cell constant and conductance of solutions*
2. *Prepare advanced polymer materials*
3. *Estimate the Iron and Calcium in cement*
4. *Calculate the hardness of water*
5. *Determination of conductivity of an acid*

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 oil by Redwood viscometer .
9. Determination of percentage of Iron in Cement sample by Colorimetry
10. Estimation of Calcium in Port land Cement
11. Adsorption of Acetic acid by Charcoal
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. Chandra Sekhar, G.V. Subba Reddy and Jayaveera, *Chemistry Practical – Lab Manual,* McGraw Hill Higher Education, 2015.

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(19CS0502)PYTHON PROGRAMMING LAB

COURSE OBJECTIVES:

1. *statistical tests. The course provides hands-on training in usage of basic concepts, control structures, data structures, object oriented programming, exceptional handling and plotting of graphical entities.*

COURSE OUTCOMES:

After completion of this course, a successful student will have

1. *Ability to program on basic concepts, control structures.*
2. *Ability to implement data structures and their operations*
3. *Ability to work on object oriented programming*
4. *Ability to handle exceptional handling and plotting of graphical entities.*
5. *Ability to develop any real world problem*

LIST OF EXPERIMENTS:

1. Implement the following tasks

   a) Write a python program to check whether the number is positive or negative.

   b) Write a python program to find whether a given number is even or odd.

   c) Write a python program to find biggest number among three numbers.

2. Implement the following tasks

   a)Write a python program to displaying reversal of a number.

   b) Write a python program to print factorial of a number

   c) Write a python program to generate prime numbers series up to N

3. Implement following problems using python script

   a) Swapping of two number with and without using temporary variable.

   b) If the age of Ram, Sam, and Khan are input through the keyboard, write a python

program to determine the eldest and youngest of the three.

c) Arithmetic operations (Addition, Subtraction, Multiplication, and Division) on integers. Input the two integer values and operator for performing arithmetic operation through keyboard.

4. Implement the following tasks

a) Implement the python program to generate the multiplication table.

b) Implement Python program to find sum of natural numbers

c) If the first name of a student is input through the keyboard, write a program to display the vowels and consonants present in his/her name.

5. Implement the following tasks

a) The marks obtained by a student in 5 different subjects are input through the keyboard. Find the average and print the student grade as per the SIETK examination policy.

b) Given a number x, determine whether it is Armstrong number or not.
Hint: For example, 371 is an Armstrong number since 3**3 + 7**3 + 1**3 = 371. Write a program to find all Armstrong number in the range of 0 and 999.

6. Implement the following tasks

a) Write a Python script to

- create a list
- access elements from a list
- slice lists
- change or add elements to a list
- delete or remove elements from a list

b) Write a Python script to read the values from a list and to display largest and smallest numbers from list.

c) Write a Python script to compute the similarity between two lists.

7. Implement the following tasks

a) Write a Python script to read set of values from a Tuple to performvarious operations.

b) Write a Python script to perform basic dictionary operations like insert, delete and Display.

c) Write a Python program to count the occurrence of each word in a givensentence.

8. Implement the following tasks

a) Write a Python script to create Telephone Directory using dictionary and list to perform basic functions such as Add entry, Search, Delete entry, Update entry, View and Exit.

b) Implement Python script to display power of given numbers using function.

c) Implement a Python program that takes a list of words and returns the length of the longest one using function.

9. Implement the following tasks

a) Implement Python program to perform various operations on string using string libraries.

b) Implement Python program to remove punctuations from a given string.

c) Write a Python program to change the case of the given string (convert the string fromlower case to upper case). If the entered string is ‑computer‖, your program should output‑COMPUTER‖ without using library functions.

10. Implement the following tasks

a)Implement Python program to capitalize each word in a string. For example, the entered sentence ‑god helps only people who work hard‖ to be converted as ―God Helps Only People Who Work Hard‖

e) Write a Python script to display file contents.

f) Write a Python script to copy file contents from one file to another.

11. Implement the following tasks

a) Write a Python script to combine two text files contents and print the number of lines, sentences, words, characters and file size.

b) Write a Python commands to perform the following directory operations.

- List Directories and Files
- Making a New Directory
- Renaming a Directory or a File
- Removing Directory or File

12. Implement the following tasks

a) Create a package named Cars and build three modules in it namely, BMW, Audi and Nissan. Illustrate the modules using class. Finally we create the init .py

file. This file will be placed inside Cars directory and can be left blank or we can put the initialization code into it.

b) Write a python script to display following shapes using turtle.

TEXT BOOKS

1. VamsiKurama, *Python Programming: A Modern Approach*, Pearson
2. ReemaThareja, *Python Programming - Using Problem Solving Approach*, First Edition (English, Paperback), Oxford University Press.

REFERENCES

1. Mark Lutz, *Learning Python*,Orielly
2. Allen Downey, *Think Python*, Green Tea Press
3. W.Chun, *Core Python Programming*, Pearson.
4. Kenneth A. Lambert, *Introduction to Python*,Cengage
5. Michael T. Goodrich , Roberto Tamassia, Michael H. Goldwasser, *Data Structures and Algorithms in Python*, 1st Edition , kindle Edition .

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(19HS0816) INDIAN CONSTITUTION

COURSE OBJECTIVES

1. *To know the premises informing the twin themes of liberty and freedom from a civil rights perspective.*
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 Indiannationalism.*
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 IndianConstitution*
5. *To acquire knowledge for various competitive examinations*

COURSE OUTCOMES

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*

UNIT-I

Introduction to the Constitution

UNIT-II

Historical Perspective of the Constitution ofIndia- Salient features and characteristics of the Constitution of India

UNIT-III

Scheme of the fundamentalrights-The scheme of the Fundamental Duties and its legalstatus-The Directive Principles of State Policy – Its importance andimplementation

UNIT-IV

Parliamentary Form of Government in India – Powers and Functions-The President of India - Status and Powers -The historical perspectives of the constitutional amendments inIndia-Judiciary system - Powers and Functions

UNIT-V

Local Self Government – Constitutional Scheme inIndia- Election Commission: Role and Functions

TEXT BOOKS

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

REFERENCES

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

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II B.Tech – I Sem.

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(19ME0305) ENGINEERING THERMODYNAMICS
(Common to MECH & AGE)

COURSE OBJECTIVES

The students undergoing this course are likely 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. *Learn various thermodynamic cycles with the help of P-V and T-S Diagrams and pure substances.*
5. *Know about the Vapour Power Cycle or Thermal Power Plant Cycle with Methods of Improving cycle performance*

COURSE OUTCOMES (COs)

Upon completion of the course the student can

1. *Describe the Basic concepts of thermodynamics such as temperature, pressure, system, Properties, process, state, cycles and equilibrium.*
2. *Explain the Basic laws of thermodynamics and their applications.*
3. *Interpret the Concepts of enthalpy, entropy and other thermodynamic properties of ideal gas Process*
4. *Analyze different Thermodynamic cycles and efficiencies related problems*
5. *understanding the behavior of pure substances, usage of steam tables and Mollier chart in solving steam related problems*
6. *Understanding the various Methods of Improving cycle performances with solving steam related problems.*

UNIT – I

Basic Concepts: Definitions of system, boundary, surrounding control volume. Types of thermodynamic systems, Properties of system, definitions for properties like pressure, volume, temperature, enthalpy, internal energy, density, with their units. State, Property, Process and Cycle, Quasi Static Process, Thermodynamic Equilibrium.

Work & Heat Transfer: Work transfer, Types of work transfers, Point and Path Functions, 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. Non flow energy equation (NFEE). 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.

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, Sterling Cycle, Ericson Cycle, Otto Cycle, Diesel Cycle, Dual 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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(19CE0150) STRENGTH OF MATERIALS

(Common to MECH & AE)

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 and volumetric 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.AshokKr.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

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(19CE0104) SURVEYING & GEOMATICS
(Common to CE & AGE)

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 ***calculate**, **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 - EDM instruments - 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
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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(19AGO701) 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 varitieis 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 CO_2 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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(19CE0136) WATER TECHNOLOGY
(Open Elective-I)

COURSE OBJECTIVES

The objectives of this course:

1. *To develop a student"s skill in evaluating the performance of water treatment plants*
2. *Communicate the importance of conserving water*
3. *Outline the strategies for reducing water consumption*
4. *To minimize the risks of floods, droughts and landslides.*
5. *To develop rural areas in the region with clear plans for improving the economy of the regions.*

COURSE OUTCOMES (COs)

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

1. *Underline the importance of water and describe the mechanism of hydrological cycle*
2. *Describe various elements associate with public water supply*
3. *Describe water quality criteria and standards, and their relation to public health*
4. *Recognize the cause of water pollution and influence of climatic changes on water resources*
5. *Summarize various water conservation techniques in practice*
6. *Explain need for watershed management and implement various Plans for watershed management*

UNIT-I

Water Demand and Sources of Water: Water demand -Types of water demands- Percapita Demand- Factors affecting the percapita demand – Water cycle-Sources of water-Surface and subsurface sources - Factors governing the selection of source of water - Water deficiency-Water crisis

Introduction to Water Supply: Importance and Necessity of protected water supply systems - Objectives of protected water supply system- Flow chart of public water supply system

UNIT-II

Water Quality: Requirement of water for domestic use-Impurities in water- Characteristics of water-Water quality standards – Flow chart of basic treatment process- Latest treatment process- Membrane filtration-Reverse process- Desalination process

UNIT-III

Water Pollution: Surface water pollution – Causes - Remedial measures – Ground water pollution – Causes - Remedial measures

Climatic Changes on Water Resources: Impact of climatic changes on water resources- Droughts- Extreme Precipitation- Melting Glaciers and Snow Drought- Greenhouse Gas emissions- Algal blooms

UNIT-IV

Water Conservation: Definition – Rain-water harvesting– Advantages of implementing the rain-water harvesting–Components of roof top rain-Water harvesting-Techniques in rain water harvesting–Catchment harvesting-Check dams-Farm ponds-Percolation tank-Ground water recharge- Ground water recharge structures

UNIT-V

Watershed Management: Definition – Concept of Watershed Management-Need for watershed management- Objectives of watershed management-Characteristics of watershed – Planning of watershed management

TEXT BOOKS

1. Modi, P.N., *Water Supply & Waste Water Engineering, Vol. I & II*, Standard Book House, New Delhi, 2010.
2. J.V.S.Murty.,*Watershed Management*, New Age International Publications, New Delhi,2017.

REFERENCES

1. Garg, S.K., *Environmental Engineering Vol.I & II*, Khanna Publishers, New Delhi, 2015.
2. Madan Mohan Das, Mimi Das Saikia, *Watershed Management*, PHI Learning Pvt. Ltd., Delhi, 2012.
3. Ghanshyam Das, *Hydrology and Soil Conservation Engineering: Including Watershed Management*, PHI Learning Pvt. Ltd., Delhi.
4. https://theberkey.com/pages/a-guide-to-water-conservation
   https://blog.mygov.in/water-conservation-rainwater-harvesting/
   https://theconstructor.org/water-resources/methods-rainwater-harvesting/5420/
5. Links for ‑Climatic Changes on Water Resources‖
   https://ascelibrary.org/doi/10.1061/%28ASCE%29EE.1943-7870.0001394
   https://www.watercalculator.org/footprint/climate-change-water-resources/
   https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-water-resources.html

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(19EE0238) GENERTION OF ENERGY THROUGH WASTE
(Open Elective-I)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand different types of waste as fuel*
2. *To introduce Pyrolysis methods and conversion processes*
3. *To understand gasification methods for biomass*
4. *To learn 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. *Understand various types of gasifiers operation*
5. *Understand inclined and fluidized bed combustors operation*
6. *Understand 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. Non-Conventional Energy- Desai Ashok V. Wiley Eastern Ltd 1990.
2. Biogas Technology – A Practical Hand Book – Khandelwal K.C. and Mahdi SS, Vol I & II. Tata Mc Graw Hill Publishing Co Ltd.,1983.

REFERENCES

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

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(19ME0349) FUNDAMENTALS OF MECHANICAL ENGINEERING
(Open Elective-I)

COURSE OBJECTIVES

Objective of this course is to

1. *Impart knowledge on Engineering materials, alloying and Heat treatment.*
2. *Familiarize student with IC Engines and Air compressors.*
3. *Make the student learn about a Refrigeration& Air conditioning systems and working of various Power plants*
4. *Enable the student to know about Modern Machining processes.*
5. *Make the student understand about Robotics and computer aided drafting, manufacturing, quality control.*

COURSE OUTCOMES (COs)

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

1. *List the types of Engineering materials and also describe alloying, Heat treatment Processes.*
2. *Recognize the importance of IC Engines in automobiles and the classification of air compressors*
3. *Distinguish various types of air conditioning systems for house and Industrial applications*
4. *Explicate the working of various Power plants like nuclear, Hydro & thermal power plants*
5. *Classify various types modern machining processes and determine the best suitable process to machine a component.*
6. *Apply the working principles of CAD, CAM and CIM in the operation of Robotic manufacturing and quality control systems*

UNIT-I

Engineering Materials: Classification of Materials - Engineering properties of Materials, Necessity of alloying – Applications.

Heat Treatment of Alloys: Annealing - Normalizing – Hardening- Tempering- Surface hardening methods

UNIT-II

I.C. Engines- Definition of Engine and Heat Engine, I.C Engine Classification –Parts of an IC Engine, Working of Two Stroke & Four Stroke Engines.

Air Compressors: Reciprocating Compressor- Types of reciprocating Compressor-Working, Rotary Compressor-Working-Types of Rotary Compressor.

UNIT-III

Refrigeration & Air conditioning: Types of air conditioning systems-window air conditioning system, split conditioning system, Central air conditioning system.

Power Plant Engineering: Introduction-Working Principles of Nuclear, Hydro & Thermal Power plant.

UNIT-IV

Modern Machining: Traditional machining versus modern machining methods- Need of modern machining process – Classification of modern machining methods-– Considerations in process selection, Materials, and applications, Ultrasonic Machining, Water Jet Machining, Abrasive Water Jet Machining.

UNIT-V

CAD/CAM: Role of computers in manufacturing– CAD, CAM, CIM, Computer aided quality control- Inspection Methods-Advantages & Applications.

Robotics: Robot-Necessity of Robot in manufacturing environment-Classification-Principle components-Degrees of freedom-End effectors-Advantage.

TEXT BOOKS

1. *Engineering Materials and Metallurgy*, R. K. Rajput, S. Chand Publishers, 3rd Edition, 2008.
2. *Thermal Engineering*, R.K.Rajput , Laxmi Publications, 6th Edition, New Delhi, 2010.

3. *Advanced Machining Processes*, Hassan Abdel, McGraw-Hill, 2005.
4. *Refrigeration and Air conditioning*, C.P. Arora & Domkundwar, McGraw Hill, 3rd edition,2010.
5. *Power plant Engineering*, P.K. Nag, Tata McGraw Hill Publications, 4th Edition, 2014.
6. *CAD/CAM*, A Zimmers & P.Groover, PE Publishing , 5th edition ,2008.
7. *Industrial Robotics* - M.P. Groover, Tata McGraw Hill Publications, 2017.

REFERENCES

1. *A Text Book of Material Science and Metallurgy for Engineers*, Dr. Kodgire, V.D, Everest Publishing House, 12th Edition, 2007.
2. *Thermal Engineering*, Sadhu Singh & Sukumar Pati, Pearson Publications, 2018.
3. *Power plant Engineering*, Ramalingam, SciTech Publishers, 1st Edition, 2010.

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(19EC0448) INTRODUCTION TO COMMUNICATION SYSTEMS
(Open Elective-I)

COURSE OBJECTIVES

The objectives of this course:

1. *To study the fundamental concepts of the analog communication system.*
2. *To analyze various analog modulation and demodulation techniques.*
3. *The students to be able to understand, analyze, and design fundamental digital communication systems.*
4. *The course focuses on developing digital communication systems*
5. *To 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. J.G.Proakis, M Salehi, Gerhard Bauch, –Modern *Communication Systems Using* MATLAB,‖ CENGAGE, 3rd Edition, 2013

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(19CS0550) RELATIONAL DATABASE MANAGEMENT SYSTEM
(Open Elective-I)

COURSE OBJECTIVES

The objectives of this course:

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 (COs)

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. *Database System Concepts*, Sixth Edition, Abraham Silbers chatz, Henry F. Korth and S. Sudharshan , Tata McGraw Hill, 2011.

REFERENCES:

1. *Database Management Systems*, 3rd Edition, Raghurama Krishnan, Johannes Gehrke, McGraw Hill Education,2003.
2. *Principles of Database and Knowledge – Base Systems*, J. D. Ullman, Vol 1 Computer Science Press.
3. *Database Systems Concepts*, Peter Rob & Carlos Coronel , Cengage Learning, 2008.
4. *Introduction to Database Systems*, C.J. Date ,Pearson Education.
5. *Database Management Systems*, G.K. Gupta ,McGrawHillEducation.

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II B.Tech – I Sem.

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(19HS0813) MANAGEMENT SCIENCE
(Open Elective-I)

COURSE OBJECTIVES:

The objectives of this course:

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

COURSE OUTCOMES: (COs)

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-Eltan 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. **Organisational 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 Methods of Performance Appraisal-Placement-Employee Induction-Wage and Salary 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: The concept of MIS Materials Requirement Planning (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 Mangement ,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. KanishkaBedi, Production and Operations Management, Oxford University Press,2004.
5. Memoria&S.V.Gauker, Personnel Management, Himalaya, 25/e,2005

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(19CE0106) STRENGTH OF MATERIALS LAB
(Common to CE, MECH & AGE)

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

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(19CE0107) SURVEYING LABORATORY
(Common to CE & AGE)

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)
8. Measurement of horizontal angles by method of repetition and reiteration.
9. Trigonometric leveling – Measurement of heights and distances (Single plane method)
10. Heights and distance measurement using Principles of tacheometric surveying
11. Setting out a simple curve by Rankine's method
12. Setting out works for a single bedroom residential buildings (Foundation marking)
13. Determination of area using total station

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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(19ME0310) COMPUTER AIDED MACHINE DRAWING LAB
(Common to MECH & AGE)

COURSE OBJECTIVES:

Objective of this course is to

1. *Provide the fundamental concepts of machine drawing, elaborating the idea of new structure such as a machine element.*
2. *Enable the students to learn the conventions to be followed by engineers for making accurate drawings*
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 (COs)

At the end of this course, the Student will be able to

1. *Draw the conventional representation of various materials and machine components with the help of software.*
2. *Design various thread profiles.*
3. *Explain the step to draw Machine elements such as Bolt, Nut and Keys.*
4. *Preparation of the part or assembly drawings as per the conventions*
5. *Interpret the machine drawings that in turn in the preparation of the part drawings*
6. *Identify the importance of linking the functional and visualization aspects in the preparation of assembly drawings.*

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.
- Keys-Saddle key, Sunk key, Woodruff key.

4. **PART DRAWINGS:**

Drawing parts of the following assembled drawings

- Sleeve & Cotter Joint
- Knuckle Joint
- Universal Coupling
- Flange Coupling

5.A**SSEMBLY DRAWINGS:**

Drawing assembled views for the following drawings

- Tool Post
- Eccentric
- Connecting rod
- Screw jack
- Stuffing box

Software Used: AUTOCAD (or) CATIA (or) SOLID EDGE

TEXT BOOKS

1. K.L. Narayana, P. Kannaiah & K. Venkata Reddy, *Machine Drawing*, New Age International Publishers, 3rd edition, 2008.
2. R. K. Dhawan, S. Chand Publications, *Machine Drawing*, Revised 2006 edition, 2006.

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(19HS0805) ENVIRONMENTAL SCIENCE
(Non-Credit Course)

COURSE OBJECTIVES

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

COURSE OUTCOMES (COs)

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, Food chains, 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.

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(19HS0833) NUMERICAL METHODS, PROBABILITY &STATISTICS
(Common to CE, ME & AGE)

COURSE OBJECTIVES

The objectives of this course:

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 (COs)

On successful completion of this course, the student 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, Euler and Runge-Kutta method of fourth order for solving first and second order 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*, 44thedition, 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.

REFERENCE BOOKS

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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(19CE0151) FLUID MECHANICS & HYDRAULIC MACHINERY
(Common to MECH & AG)

COURSE OBJECTIVES

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

COURSE OUTCOMES

After 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 apply it for measuring pressure devices*
3. *Classify various fluid flows and derive continuity, Euler"s, Bernoulli"s, Impulse Momentum, Darcy Weisback 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 pumps and turbine*

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 andcapillarity

Fluid Statics: Pascal‘s law - Pressure variation in a static fluid – Atmospheric, gauge and absolute pressures, Measurement of pressure – Piezometer – U–tube and inverted U–tube manometers and Bourdon‘s pressure gauge

UNIT-II

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

Fluid Dynamics: Euler‘s equation of motion along a streamline – Bernoulli‘s energy equation – Energy correction factor – Impulse momentum equation – Momentum correction factor – Force on a bend – Energy gradient line – Hydraulic gradientline

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: Analysis of free liquid jets – Forced vortex and free vortex - 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 of power plants – Elements of hydroelectric power station.

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 – Working proportions and design of each – Drafttube

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 – Submersible pumps – Limiting suction head – Expression for specific speed

TEXT BOOKS

1. Dr.P.N.Modi&Dr.S.M.Seth,*HydraulicsandFluidMechanicsIncludingHydraulicsMachines* , 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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(19AG0702) 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 and cost 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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(19AG0703) 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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(19CE0143) FUNDAMENTALS OF URBAN PLANNING
(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the concept of balanced town by ensuring that new and existing facilities are complimentary to each other*
2. *To provide sustainable buildings by considering the environmental, social and economic conditions*
3. *To create awareness about the traffic management within the town*

COURSE OUTCOMES (COs)

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. Abir bandyopadhyay, *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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(19EE0233) INDUSTRIAL INSTRUMENTATION
(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course are:

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

COURSE OUTCOMES (COs)

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 Analysers- 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 course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, DhanpatRai&Co., 2012.
2.Transducers and Instrumentation, D.V.S. Murty,PrenticeHallofIndia,2nd Edition,2004.

REFERENCE BOOKS:

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

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(19ME0350) MECHANICAL MEASUREMENTS & CONTROL SYSTEMS
(Open Elective-II)

COURSE OBJECTIVES

Objective of this course is to

1. *Impart brief knowledge basic principles and performance characteristics of measurement.*
2. *Familiarize student with basic principles to measure the temperature, pressure with the help of Thermocouple and different pressure gauges.*
3. *Make the student learn measurement of Speed, Acceleration and Vibration with the help of various instruments.*
4. *Enable the student to understand the measurement of Fuel level, measurement of Flow and Humidity, parameters like Force, Torque, Power and also learn about the basic principles, and applications of various control systems.*
5. *Make the student to Select appropriate device for the measurement of parameters like temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance.*

COURSE OUTCOMES (COs)

Students undergoing this course can

1. *State the basic principles of measurement systems and explain its performance characteristics*
2. *Distinguish the types of various temperature and pressure measurement instruments and finds the best one for the industrial applications*
3. *Explicate the principle of measurement of Speed, Acceleration and Vibration instruments and describe its working*
4. *Illustrate the operation of Fuel level, measurement of Flow and Humidity Measurement instruments and also state the applications of various control systems*
5. *Identify the appropriate device for the measurement of temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance.*
6. *Classify the various types of control systems for the measurement of temperature, speed and position*

UNIT-I

Definition - Basic principles of measurement - Measurement systems, generalized configuration and functional descriptions of measuring instruments - examples. Dynamic performance characteristics sources of error, Classification and elimination of error.

Measurement of Displacement: Theory and construction of various transducers to measure displacement - Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

UNIT-II

Measurement of Temperature: Classification - Ranges - Various Principles of measurement - Expansion, Electrical Resistance - Thermistor - Thermocouple - Pyrometers - Temperature Indicators.

Measurement of Pressure: Units - classification - different principles used- Manometers, Piston, Bourdon pressure gauges, Bellows - Diaphragm gauges. Low pressure measurement - Thermal. Conductivity gauges - ionization pressure gauges, Mcleod pressure gauge.

UNIT - III

Measurement of Speed: Mechanical Tachometers - Electrical tachometers - Stroboscope, Noncontact type of tachometer.

Measurement of Acceleration and Vibration: Different simple instruments - Principles of Seismic instruments - Vibrometer and accelerometer.

Stress & Strain Measurements: Various types - electrical strain gauge - gauge factor - method of usage of resistance strain gauge for bending, compressive and tensile strains - usage for measuring torque, Strain gauge Rosettes.

UNIT -IV

Measurement of Level: Direct method - Indirect methods - capacitative, ultrasonic, magnetic, cryogenic fuel level indicators - Bubler level indicators.

Flow Measurement: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot - wire anemometer Laser Doppler Anemometer (LDA).

Measurement of Humidity - Moisture content in the gases, sling psychrometer, Absorption psychrometer, Dew point meter.

UNIT - V

Measurement of Force, Torque and Power- Elastic force meters, load cells, Torsion meters, Dynamometers.

Elements of Control Systems: Introduction, Importance - Classification - Open and closed systems Servomechanisms-Examples with block diagrams-Temperature, speed & position control systems

TEXT BOOKS

1. *Measurement systems: Application and design*, Ernest O.Doebelin & Dhanesh N.Manik, TMH Publishers,7th edition.
2. *Mechanical Measurements*, Thomas G.Beckwith, Roy D.Marangoni & John H.Lienhard V, Pearson Publishers,6th edition.

REFERENCES

1. *Instrumentation, measurement & analysis* , B.C.Nakra & KKChaudhry, TMH Publishers,3rd edition.
2. *Mechanical and Industrial Measurements* ,R.K. Jain, Khanna Publishers,11th edition.
3. *Instrumentation & mech. Measurements*, AK. Tayal , Galgotia Publication ,2nd edition.

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(19EC0449) ELEMENTS OF EMBEDDED SYSTEMS
(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course:

1. *Able to understand the fundamental concepts of embedded systems.*
2. *Able to learn the core of embedded systems.*
3. *Able to learn to program the open source electronics.*
4. *Able to understand the principles of Internet of Things (IoT).*
5. *Able to understand the concepts of Internet of Things (IoT).*

COURSE OUTCOMES (COs)

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. *Learnabout 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 invarious 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 – Architectureof 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 – IPaddresses, 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, 2ndEdition, 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. https://store.arduino.cc/arduino-uno-rev3
2. https://www.arduino.cc/reference/en/
3. https://wso2.com/whitepapers/a-reference-architecture-for-the-internet-of-things/
4. Adrian McEwen & Hakim Cassimally, *Designing of Internet of Things*, John Wiley and sons Ltd, 1st Edition, 2014,

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(19CS0551) JAVA PROGRAMMING
(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course

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. The Complete Reference Java Eighth Edition – Herbert Schildt –McGrawHill.
2. Introduction to Java programming – Y Daniel Liang – Que E &T.

REFERENCES:

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

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(19HS0814)) INTELLECTUAL PROPERTY RIGHTS
(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course

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

COURSE OUTCOMES (COs)

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. *To 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 secrete litigation.

Unfair Competition: Misappropriation right of publicity, False advertising.

UNIT-V

New Development of Intellectual Property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS:

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

REFERENCES:

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

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(19CE0112) FLUID MECHANICS & HYDRALIC 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

Cycle 1:

1. Verification of Bernoulli‘s equation.
2. Calibration of Coefficient of discharge for Venturimeter.
3. Calibration of Coefficient of discharge for Orifice meter.
4. Calibration of Friction factor. (Major losses experiment)
5. Determination of loss of head due to sudden contraction (Minor losses experiment)

Cycle 2:

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.
11. Performance test on Kaplan turbine.

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

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(19AG0704) 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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(19AG0705) 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 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)

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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(19HS0817) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
(Non-Credit Course)

COURSE OBJECTIVES

The course aims at imparting basic principles of thought process, reasoning and inference. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions. The course focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

COURSE OUTCOMES (COs)

Ability to understand, connect up and explain basics of Indian traditional Knowledge in modern scientific perspective.

UNIT-I

- Basic structure of Indian Knowledge System: 4 ved
- 4 Upaved (Ayurved, Dhanurved, Gandharva Ved & Sthapthya Adi.,)

UNIT-II

- 6 Vedanga (Shisha, Kalppa, Nirukha, VYkaran, Jyothish & Chand)
- 4 Upanga (Dharma Shastra, Meemamsa, Purana & Tharka Shastra)

UNIT-III

- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care

UNIT-IV

- Philosophical Tradition (Nyaya, ,Sankhya, Yog, Jain & Boudha
- Indian Linguistic Tradition –(Phonology, morphology, syntax and semantics)

UNIT-V

- Indian Artistic Tradition - Chitra kala,Vasthu kala, Sangeetha, Nruthya Sahithya
- Case studies

TEXT BOOKS:

1. V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
2. Swami Jitatmanand, *Modern Physics and Vedant*, Bharatiya Vidya Bhavan
3. Swami Jitatmanand, *Holistic Science and Vedant*, Bharatiya Vidya Bhavan
4. Fritzof Capra, *Tao of Physics*
5. Fritzof Capra, *The Wave of life*

REFERENCES:

1. VN Jha (Eng. Trans.), *Tarkasangraha of Annam Bhatta*, International Chinmay Foundation, Velliarnad, Arnakulam
2. *Yoga Sutra of Patanjali*, Ramakrishna Mission, Kolkata GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanam with Vyasa Bhashya*, Vidyanidhi Prakashan, Delhi 2016
3. RN Jha, *Science of Consciousness Psychotherapyand Yoga Practices*, Vidyanidh Prakashan, Delhi 2016
4. P B Sharma (English translation), *Shodashang Hridayan*
5. V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya Vidya Bhavan, 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)*, Deccan College Pune 1965
8. *Panini Shiksha*, MotilalBanarasidas
9. V.N. Jha, *Language, Thought and Reality*, Vasudevasharan AGRAWAL Kala yevam Samskruthi, Shithya Bhavan Elahabad, 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

Pedagogy: Problem based learning, group discussions, collaborative mini projects.

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III B.Tech - I Sem

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(19ME0319) 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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III B.Tech – I Sem.

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(19CE0152) 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 (COs)

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 size analysis – 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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(19AG0706) 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

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(19AG0707) 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 oil seeds*
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

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

Scope and importance of crop processing: Principles and methods of food processing- cleaning and grading of cereals, 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 equipments, 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., New Delhi.

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

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(19CE0129) ELEMENTS OF ROAD TRAFFIC SAFETY
(Open Elective-III)

COURSE OBJECTIVES

1. *To understand the accident statistics globally and in India specifically, its causes and measures to overcome the situation.*
2. *The traffic regulation, parking problems, understanding of road signs, signals and marking are also taught; so that the student is well informed about all safety measures that a traffic engineer need to understand*
3. *To understand the various aspects of street lighting*

COURSE OUTCOMES (COs)

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

1. *Identify the causes for road accidents and can implement measures to prevent road accidents*
2. *Describe traffic regulations and implement parking methods*
3. *Classify different traffic signal and can design traffic signal system*
4. *List and illustrate various traffic signs*
5. *List and discuss various road markings*
6. *Discuss importance of street lighting and classify various street lighting system*

UNIT – I

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

UNIT – II

Regulations of Traffic: Basic Principals of Regulation – Regulation of Speed – Regulation of Vehicles – Regulations Concerning the Driver – Regulations Concerning Traffic – Parking Regulations – Enforcement of Regulations.

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

UNIT – III

Traffic Signs: Importance of Traffic Signs – Need for International Standardization – The Situation

in India – General Principals of Traffic Signing – Types of Traffic Signs – Danger Signs (Warning Signs or Cautionary Signs) – Prohibitory Signs – Mandatory Signs – Informatory Sings – Indication Signs – Direction Signs, Advance Direction Signs & Place Identification Signs – Overhead Sings – Route Marker Sings – Location, Height & Maintenance of Traffic Sings

UNIT – IV

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

UNIT – V

Road Markings: Function – Types of Road Marking – General Principals of Longitudinal Pavement Markings – Material & Colour – Centre Lines – Traffic Lane Lines – No Overtaking Zone Markings – Pavement Edge Lines – Carriageway Width Reduction Transition Marking – Obstruction Approach Markings – Stop Lines – Pedestrian Crossings – Cyclist Crossings – Route Direction Arrows – Word Messages – Markings at Approaches to Intersections – Parking Space Limits – Object Markings

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

TEXT BOOKS

1. L.R.Kadiyali and Lal, *Traffic Engineering and Transportation Planning*, Khanna Publications, 9th edition, 1999
2. S.K.Khanna & C.E.G.Justo, *Highway Engineering,* Published by Nemchand & Bros, 10th edition, 2012

REFERENCES

1. L.R.Kadiyali and Lal, *Principles and Practice of Highway Engineering Design*, Khanna Publications, 7th edition, 2013
2. R.Srinivasa Kumar, *Text book of Highway Engineering*, Universities Press
3. James H Banks, *Introduction to Transportation Engineering*, Tata McGraw hill Publications, 2nd edition

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(19EE0238) SOLAR PHOTOVOLTAIC SYSTEMS
[Open Elective– III]

COURSE OBJECTIVES

The objectives of the course are

1. *To develop a comprehensive technological understanding in solar PV system components*
2. *To provide in-depth understanding of design parameters to help design and simulate the performance of a solar PV power plant*
3. *To pertain knowledge about planning, project implementation and operation of solar PV power generation*

COURSE OUTCOMES

After the end of the course, a student should be able to

1. *Understand of renewable and non-renewable sources of energy*
2. *Gain knowledge about working principle of various solar energy systems*
3. *Analyse the solar power PV power generation*
4. *Applying the knowledge on to installation and integration of PV modules for different applications*
5. *Understand the operation of different solar collectors in the market*
6. *Understand the solar thermal energy storage systems*

UNIT-1

Introduction

Sources of renewable energy; global potential for solar electrical energy systems. Solar radiation. Extra terrestrial and terrestrial solar spectrum; clear sky direct-beam radiation; total clear sky insulation on a collecting surface; radiation on the collector in tracking systems; calculation of average monthly insolation from measured data

UNIT-2

PV cells and modules

Solar Cell and its function, Solar Technologies, Solar Cell Parameters, Efficiency of Solar Cell, Solar PV Module, Rating of Solar PV Module, PV Module Parameters, Efficiency of PV Module, Measuring Module Parameters

UNIT-3

Solar Photovoltaic Module Array

Connection of PV Module in Series and Parallel, Estimation and Measurement of PV Module Power, Selection of PV Module.

UNIT-4

Solar PV System Design and Integration

Solar Radiation Energy Measurements, Estimating Energy requirement, Types of Solar PV System, Design methodology for SPV system, Design of Off Grid Solar Power Plant, Case studies of 3KWp Off grid Solar PV Power Plant, Design and Development of Solar Street Light and Solar Lantern, Off Grid Solar power Plant.

UNIT-5

Solar collectors and Solar energy storage

Different types of solar collectors, Flat plate and concentrated type collectors, Fundamental Terminologies of thermal storage, Sensible heat storage materials, Latent heat storage materials, Solar thermo-chemical energy storage systems, Advantages and disadvantages of solar thermal storage, application of thermal storage

TEXT BOOKS

1. Chetansingh solanki *Solar Photovoltaic* PHI, Learning private ltd., New dehli- 2018
2. G.D Rai *Non-conventional Sources of Energy* Khanna Publishers, Delhi, 2012

REFERENCE BOOKS

1. Chetan Singh Solanki *Renewable Energy Technologies; A Practical Guide for Beginners* PHI School Books (2008)
2. Kothari D.P. and Signal K.C *Renewable Energy Sources and Emerging Technologies*, New Arrivals –PHI; 2 Edition (2011)

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(19ME0321) NON- CONVENTIONAL ENERGY RESOURCES
[Open Elective– III]

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, geothermal energy, fuel cells etc.*

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, Fuel cell, etc. for effective construction of Hybrid systems.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies*

UNIT-I

Introduction: Energy- World Energy use – Classification of Energy‘s - Reserves of Energy Resources– Environmental Aspects of Energy Utilization

Renewable energy: Need Of Renewable Energy – Renewable Energy Scenario in Andhra Pradesh, India and Around the World.

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, Solar Radiation Measurements

UNIT-III

Wind Energy: Wind Formation - Site Selection For Wind Turbine - Working Principle of Wind Turbine

Wind Energy System: Types of Wind Energy Systems – Performance – Details of Wind Turbine – Wind Energy Measurement, Safety and Environmental Aspects.

UNIT-IV

Bio – Energy: Biomass direct combustion – Biomass gasifiers – Biogas plants

Bio Fuel: Ethanol production – Biodiesel – Cogeneration - Biomass Applications

UNIT-V

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

Hydrogen Fuel: Hydrogen production and Storage - Fuel Cell Systems – Hybrid Systems.

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, 6thEdition, 1990.

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(19EC0450) INTRODUCTION TO IOT
(Open Elective-III)

COURSE OBJECTIVES
The objectives of this course are:

1. *To provide an overview on the ICT ecosystem and enabling environment to foster Internet of Things (including technology, standards, system management and applications) deployments.*
2. *Define the infrastructure for supporting IoT deployments.*
3. *To provide an understanding of the technologies and the standards relating to the Internet of Things.*
4. *Understand various case studies related to IoT domain.*

COURSE OUTCOMES
On successful completion of this course, student will be able to
1. *Understand the technology and standards relating to IoTs.*
2. *Understand where the IoT concept fits within the broader ICT industry and possible future trends.*
3. *Understand the key components that make up an IoT system.*
4. *Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack.*
5. *Configure Raspberry Pi, Understand Sensors, Actuators & get started with python on Raspberry Pi.*
6. *Apply the knowledge and skills acquired during the course to design, build and test a complete, working IoT system involving prototyping, programming and data analysis.*

UNIT – I
IoT Introduction & Concepts: Introduction to Internet of Things - Physical Design of IoT - Logical Design of IoT - IoT Enabling Technologies - IoT Levels & Deployment Templates.

UNIT – II
Domain Specific IoTs: Home Automation – Cities – Environment – Energy – Retail – Logistics - Agriculture – Industry - Health & Lifestyle.

UNIT – III
IoT and M2M: Introduction – M2M – Difference between IoT an M2M - Software Defined Networking - Network Function Virtualization for IoT.
Developing Internet of Things: IoT Design Methodology – Motivation for using Python

UNIT – IV

IoT Physical Devices & Endpoints: IoT Device – Raspberry Pi Board - Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming raspberry Pi with Python – Other IoT devices.

UNIT – V

Case Studies Illustrating IoT Design: Home Automation – Cities – Environment – Agriculture – Productivity applications.

TEXT BOOKS

1. Vijay Madisetti – Arshdeep Bahga, *Internet of Things a Hands-on Approach*, Arshdeep Bahga & Vijay Madisetti ,1st Edition, 2014.
2. Pethuru Raj and Anupama C. Raman, *The Internet of Things: Enabling Technologies, Platforms, and Use Cases*, CRC Press,1st Edition, 2014.

REFERENCES

1. Raj Kamal, *Embedded Systems*, Tata Mc Graw-Hill Education, 2ndEdition, 2011.
2. Adrian McEwen & Hakim Cassimally, *Designing of Internet of Things*, John Wiley and sons Ltd, 1st Edition, 2014,
3. Daniel Kellmereit - Daniel Obodovski, *The Silent Intelligence: The Internet of Things*, DnD Ventures, 1st Edition, 2013.

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III B. Tech – I Sem.

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(19CS0545) SOFTWARE DEVELOPMENT & TESTING
(OPEN ELECTIVE-III)

COURSE OBJECTIVES

The objectives of this course is to

1. *Illustrate the Software Development Models*
2. *Explain Software Requirements Engineering Process and SRS document*
3. *Illustrate the importance of modeling and modeling languages*
4. *Explain various testing methodologies*
5. *Explain Quality assurance and test cases*

COURSE OUTCOMES (COs)

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

1. *Define and develop as software project from requirement gathering to implementation*
2. *Ability to code and test the software*
3. *Ability to plan, estimate and maintain software systems*
4. *Understand the basic testing procedures*
5. *Able to generate test cases and test suites.*
6. *Test the applications manually by applying different testing methods and automation tools.*

UNIT-I

Introduction: Introduction to Software Engineering , Software Process, Software Myths, A generic view of process, A layered Technology, A Process Framework, Software Process Models, Unified process

Introduction to Agility: Agility, Agile Process, Agile Process Models

UNIT-II

Requirements Analysis and Specification: Requirements Engineering, Eliciting Requirements, Requirements Analysis, Types of Requirements, Requirement Modeling and Data Modeling, Concepts.

Architectural Design Concepts: The Design Process, Design Concepts, Design Model, Software Architecture, Architecture Styles.

UNIT-III

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps.

Web App Design: Introduction, Web App Interface Design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Component-Level Design.

UNIT-IV

Software Testing: Introduction, Levels of Software Testing – Unit Testing, Module Testing,

Integration Testing, System Testing, Acceptance Testing, Alpha Testing, Beta Testing,

Approach to Software Testing: Types of Software Testing - Black Box Testing, White Box Testing, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Art of Debugging.

UNIT-V

Software Quality: Software Testing Life Cycle, Software Quality, Testing Principles, Test Process – Testing Activities, Quality Assurance.

Software Test Cases: Introduction to Test cases, Test Case Selection – Test Planning and Design – Test Execution – Case Study on Test tools and automation.

TEXT BOOKS

1. Roger S.Pressman, *Software Engineering*- A practitioner_s Approach, McGraw-Hill International Edition, seventh edition, 2001.
2. Software Testing techniques, Boris Beizer, Dreamtech, Second Edition

REFERENCES

1. Ian Sommerville, *Software Engineering*, 8th Edition, Pearson Education, 2008.
2. Richard Fairley, *Software Engineering Concepts*, McGraw Hill, 2004.
3. Dr.K.V.K.K.Prasad, *Software Testing Tools*, Dreamtech

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III B.Tech I Sem

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(19HS0861) BUSINESS ETHICS
(Open Elective –III)

COURSE OBJECTIVES

1. *To provide basic knowledge of business ethics, personal ethics and values in modern context*
2. *To learn and develop best ethical practices in management disciplines to become good managers*
3. *To make them learn role of corporate culture and corporate governance*

COURSE OUTCOMES

After the completion of course Students will be able to:

1. *Apply various ethical principles in business and corporate social responsibility practices*
2. *Recognize how personal ethics can influence behavior and apply in decision making*
3. *Explain the ethical challenges facing the various functional departments*
4. *Identify the organizational and cultural variables that impact ethical judgment*
5. *Analyze various ethical codes in corporate governance*
6. *Identify organizational policies and systems that employ ethical conduct*

UNIT - I

BUSINESS ETHICS: Introduction – Meaning - Scope – Types of Ethics – Characteristics – Factors influencing Business Ethics – Importance of Business Ethics - Arguments for and against business ethics- Basics of business ethics - Corporate Social Responsibility – Issues of Management – Crisis Management

UNIT - II

PERSONAL ETHICS: Introduction – Meaning – Emotional Honesty – Virtue of humility – Promote happiness – karma yoga – proactive – flexibility and purity of mind.

UNIT - III

ETHICS IN MANAGEMENT - I

Introduction – Ethics in HRM – Ethics in HRM: Selection, Training and Development – Ethics at work place – Ethics in performance appraisal - Marketing Ethics –Technology Ethics and Professional ethics.

UNIT - IV

ETHICS IN MANAGEMENT – II: Ethics in Finance: Insider trading - ethical investment - Ethical issues in Information Technology: Information Security and Threats – Intellectual Property Rights – Cyber crime

UNIT – V

ROLE OF CORPORATE CULTURE IN BUSINESS: Meaning – Functions – Impact of corporate culture – cross cultural issues in ethics - Modern Ethical Models for Decision Making, Ethics for manager, ethics in business competition

TEXT BOOKS:

1. Murthy CSV: Business Ethics and Corporate Governance, HPH, 2007
2. Dr. K. Nirmala, Karunakara Readdy : Business Ethics and Corporate Governance, HPH

REFERENCES

1. M.G. Velasquez, *Business Ethics*, Prentice Hall India Limited, New Delhi, 7TH Edition,2012
2. Dr. K. Nirmala, Karunakara Readdy : Business Ethics and Corporate Governance, HPH
3. K. Venkataramana, Corporate Governance, SHBP, 2018

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III B.Tech – I Sem.

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(19CE0153) SOIL MECHANICS LAB

COURSE OBJECTIVES

The objectives of this course

1. *Find index properties such as specific gravity, field density, Atterberg"s limits and sieve analysis on soils to classify soils*
2. *Find the engineering properties such as permeability, maximum dry density and corresponding optimum moisture content, shear strength and CBR values of soils*

COURSE OUTCOMES (COs)

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

1. *Conduct tests on fine grained soils to determine Atterberg"s limits*
2. *Conduct fields test to find out field density of cohesive and cohesion less soils*
3. *Perform sieve analysis and sedimentation analysis to classify the soil*
4. *Conduct field tests on soil to estimate soil permeability*
5. *Conduct compaction test and draw compaction curve to find out optimum moisture content and maximum dry density*
6. *Conduct shear tests to predict shear strength of the soil*

LIST OF EXPERIMENTS

1. Specific gravity of soil solids
2. Atterberg‘s limits (liquid limit, plastic limit and shrinkage limit)
3. Field density test-Core cutter and Sand replacement method
4. Grain size distribution-Sieve analysis
5. Permeability of soil (constant and variable head method)
6. Compaction test
7. California bearing ratio test
8. Consolidation test
9. Unconfined compression test
10. Direct shear test

Any eight experiments may be conducted

TEXT BOOKS

1. K.V.S. Appa Rao & V.C.S. Rao, *Soil Testing Lab Manual*, University Science Press, Laxmi Publications, 2016
2. S.Mittal and J.P. Shukla, *Soil Testing for Engineers*, Khanna Publishers, Sixth Edition

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III B. Tech - I Sem. (AG)	**L**	**T**	**P**	**C**
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(19AG0708) 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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(19AG0709) 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 separation*
6. *Understand the cleaning equipments*

Practical:

1. Preparation of flow charts and layout of a food processingplant
2. Mixing index and study of mixers
3. Determination of fineness modulus and uniformity index
4. Determination of mixing index of a feed mixer
5. Determination of the efficiency of cyclone separator
6. Tutorial on use of psychometric chart
7. Tutorial on power requirement in size reduction of grain using Rittinger_s law, Kick_s law and Bond_s law
8. Performance evaluation of hammer mill and attribution mill.
9. Separation behavior in pneumatic separation
10. Evaluation of performance of indented cylinder and screen pre cleaner

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., New Delhi.

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III B.Tech I SEM

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(19HS0858) 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*

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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

PSR Murthy, *Indian Culture, Values and Professional Ethics,* BS Publication, 2nd Edition, 2013

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III B.Tech II Sem

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(19HS0815) ENTREPRENEURSHIP DEVELOPMENT

Course objectives:

1. *To acquire necessary skills and knowledge required for organizing and carrying out entrepreneurial activities,*
2. *To develop the ability of analyzing and understanding business situations in which entrepreneurs act*
3. *To develop the ability of analyzing various aspects ofentrepreneurship – especially of taking over the risk, and the specificities as well as thepattern of entrepreneurship development*

Course outcomes:

1. *The ability to discern distinct entrepreneurial traits and identify the successful elements of successful entrepreneurial ventures*
2. *Consider the legal and financial conditions for starting a venture and to assess the opportunities and constraints for new ventures*
3. *Design strategies for the successful implementation of ideas*
4. *To comprehend the evaluation of business opportunity from the prospective of an investor*
5. *Identify the most suitable sources of finance for start-ups*
6. *To write and execute their own business plan*

UNIT-I

Introduction to Entrepreneurship - Concept of Entrepreneur_s, Enterprise and Entrepreneurship; Characteristics, Qualities, Functions of entrepreneur and Advantages of Entrepreneurship; Role of entrepreneurship in Economic development, Challenges faced by entrepreneurs, Entrepreneurial scenario in India and Abroad; Elements of Social Entrepreneurship, Types of Entrepreneurs, Entrepreneurship vs. Intrapreneurship.

UNIT-II

Small Business and its Importance - Introduction, Need, Classification of Micro, Small andMediumEnterprises(MSMEs),RoleofMSMEs,ProblemsofMSMEs,StepsforStarting MSMEs, The role of government in supporting MSMEs inIndia.

Forms of Business Organization: Evaluation of Form of Business organization: Sole Proprietorship, Partnership, Joint Hindu Family, Joint Stock Company and Co-operative Society. Special forms of business ownership: Licensing, Franchising and Leasing.

UNIT-III

Innovation and Idea Generation in Entrepreneurship - Concept of Invention and Innovation, types of innovation, Sources of Innovation, Importance of Innovation in Entrepreneurship. Sources of new ideas, Methods of generating ideas and Opportunity recognition and idea generation in entrepreneurship. Intellectual Property Rights (IPRs): Patents, trademarks, copyrights, and trade secrets. E-commerce and Business Start-ups, Sources of information for Start-up Entrepreneurs in India. Problems of Start-ups without IPRs.

UNIT-IV

Entrepreneurial Motivation - Concept of Motivation and Factors influencing the entrepreneurs;

Motivational Theories-Maslow_s Need Hierarchy Theory, McClelland_s Acquired Need Theory. Entrepreneurship Development Programs (EDPs) - Need and Role of EDPs. Opportunities for entrepreneurship in present scenario. Successful entrepreneurs

Financing of Enterprises - Source of financing - Debt capital, seed capital, venture capital, Loans available for starting ventures in India, Role of government agencies in small business financing. Role of consultancy organizations.

UNIT-V

Project Planning and Feasibility Study - Meaning of Project, Project Life Cycle, and Stages of Planning Process. Project Planning and Feasibility, Project proposal and report preparation.

TEXT BOOKS:

1. *Entrepreneurship*, 8/e, Robert D Hisrich, Mathew J.Manimala, Michael PPeters, Dean A.Shepherd, McGraw HillEducation.
2. *The Dynamics of Entrepreneurial Development and Management*, VasanthDesai, Himalaya Publishing House,Mumbai.

REFERENCES:

1. *Entrepreneurial Development*, S.S. Khanka, S. Chand and CompanyLimited.,
2. *Fundamentals of Entrepreneurship*, H. Nandan,PHI.
3. *Entrepreneurship Management* – text and cases, Bholanath Dutta, ExcelBooks.
4. *Entrepreneurship* – New venture Creation, Holt, andPHI.
5. *Entrepreneurial Development*, Ramachandran, Tata McGraw Hill, NewDelhi.

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III B.Tech - II Sem

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(19ME0307) 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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III B. TECH - II SEM (AG)

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(19AG0710) 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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B.Tech III Year II Semester

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(19AG0711) SOIL AND WATER CONSERVATION ENGINEERING

Course objectives:

1. *To enable the students to acquire knowledge on different soil loss estimation models, run off estimation by rational, curve number, cook"s etc.*
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 waste weir – Construction of contour bunds in fields. Contour

trenching – Staggered and continuous trench – Adaptability and types.

GRADED BUNDS– Design of graded bunds. Introduction to Conservation Ditching. **TERRACES** –Classification of Terraces-Design of narrow based and broad based terraces. Bench Terraces – Types of Bench Terraces Derivation for an equation for finding of vertical interval –Design of bench terraces.

UNIT – IV:

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

UNIT – V:

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

TEXT BOOKS:

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

REFERENCES:

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

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III B.Tech – II Sem.

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(19CE0147) PROJECT PLANNING AND CONTROL

COURSE OBJECTIVES

1. *To describe various elements of an engineering project and to draw the network*
2. *To perform PERT & CPM calculations and to identify the critical path*
3. *To perform various operations on the network*

COURSE OUTCOMES (COs)

After the successful completion of the course the student able to

1. *Differentiate various tools for planning and controlling the project*
2. *Construct the network for a project*
3. *Perform PERT computations and evaluate the critical path*
4. *Perform CPM computations and identify the critical path*
5. *Optimize time and cost for a project*
6. *Work with network during the progress of a project by updating the network and allocating the resource*

UNIT – I

Project Management: Project planning – Project scheduling – Project controlling – Project monitoring and control – Project monitoring and information cell – Decision making in project management – Project life cycle

Basic Techniques of Project Management: Bar charts – Steps for the construction of a bar chart – Limitations of bar charts – Milestone charts – Velocity diagrams – Development of Network – CPM/PERT Networks – Advantages of network over milestone chart

UNIT – II

Elements of Network: Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles

Development of Network: Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure – Hierarchies

UNIT – III

PERT: Time Estimates: Uncertainties: Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time

PERT: Time Computations & Network Analysis: Earliest expected time – Formulation for T_E – Latest allowable occurrence time – Formulation for T_L – Combined tabular computations for T_E and T_L – Slack – Critical path – Probability of meeting scheduled date

UNIT – IV

CPM: Network Analysis: CPM Process – CPM Network – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L – Start and finish times of activity – Float – Critical activities and critical path

UNIT – V

CPM: Cost Model: Project cost – Indirect project cost – Direct project cost – Slope of direct cost curve – Total project cost and optimum duration – Contracting the network for cost optimization – Steps in time cost optimization

CPM: Updating: Updating process – Data required for updating – Steps in the process updating – When to update

Resources Allocation: Resources usage profiles: histograms – Resources smoothing – Resources levelling

TEXT BOOKS

1. Dr.B.C. Punmia, K.K. Khandelwal, *Project Planning and Control with PERT AND CPM,* Laxmi Publications (P) Ltd., 4th Edition, Reprint 2006
2. Dr.P.N. Modi, Sanjeev Modi and Rajeev Modi, *Program Evolution and Review Technique and Critical Path Method,* Standard Book House, 5th Edition, 2012

REFERENCES

1. L.S. Srinath, *PERT and CPM Principles and Applications,* Affiliated East-West Press (Pvt.) Ltd.
2. S.K. Bhattacharjee, *Fundamentals of PERT/CPM and Project Management*, Khanna Publishers

Kumar Neeraj Jha, *Construction Project Management: Theory and Practice*, Pearson, 2 edition, 2015

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(19EE0231) NEURAL NETWORKS AND FUZZY LOGIC
(Open Elective-IV)

COURSE OBJECTIVES:

Students undergoing this course are expected to:

1. *To introduce the basics of Neural Networks and essentials of Artificial Neural*
2. *Networks with Single Layer and Multilayer Feed Forward Networks.*
3. *To have knowledge on Associate Memories, Fuzzy sets and Fuzzy Logic system components.*
4. *To know Neural Network and Fuzzy Network system application to Electrical Engineering*
5. *The main objective of this course is to provide the student with the basic understanding of neural networks and fuzzy logic fundamentals.*

COURSE OUTCOMES:

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

1. *Understand the basic concept of artificial neural networks*
2. *Understand different learning mechanism in artificial neural networks*
3. *Create Neural Network models for electrical engineering.*
4. *Understand the basic concepts of fuzzy sets.*
5. *Understand the basic concepts of fuzzy logic.*
6. *Create Fuzzy models for electrical engineering*

UNIT - I:

FUNDAMENTALS OF ARTIFICIAL NEURAL NETWORKS

Neural networks-introduction, Organization of human brain, Biological neuron, artificial neuron, McCulloch-Pitts neuron model, Characteristics and Applications of artificial neural networks Architectures of artificialneural networks – activation functions, important terminologies of ANN, learning strategies- supervised,unsupervised, reinforced learning.

UNIT - II:

SUPERVISED NETWORKS

Perceptron networks-Perceptron learning, Limitations of Perceptron, back propagation networks-architecture, Computations in each layer, Error calculation in Back propagation networks, Gradient descent method in learning, back propagation algorithm, learning factors - initial weights, leaning constant, momentum coefficient, Applications of Neural Networks to Electrical Engineering.

UNIT - III:

ASSOCIATIVE MEMORIES

Introduction, Associative Memories- Auto associative Memory, Bidirectional Associative Memory

(BAM), Architectures, Storage and Recall Phases, Recognition of noisy patterns, Hamming distance and Energy functions. Discrete Hopfield network architecture and storage and recall algorithm.

UNIT - IV:
CLASSICAL AND FUZZY SETS

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

UNIT -V:
FUZZY LOGIC SYSTEMS

Fuzzification–Fuzzy quantifiers, fuzzy inference, fuzzy rule based system-development of rule base and decision making system - Defuzzification to crisp sets-Fuzzification and Defuzzification methods. Applications of Fuzzy logic systems in Electrical Engineering.

TEXT BOOKS:

1. *Neural Networks, Fuzzy Logic, and Genetic Algorithms Synthesis and Applications by* S. Rajasekaran, G.A. Vijayalakshmi Pai, PHI, 2012
2. *Principles of Soft computing by* S.N. Sivanandam, S.N. Deepa, WileyIndia private Ltd., 2nd edition, 2013.

REFERENCES:

1. *Fuzzy Logic with Engineering Application by* Timothy J Ross, McGraw HillInc.1997.
2. *Introduction to Artificial Neural Networks by* Jacek M. Zurada, Jaico Publishing House.
3. *Neural Networks - A Comprehensive Foundation by* Simon Haykin, Prentice- Hall Inc, 1999.

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(19ME0353) COMPUTER AIDED PROCESS PLANNING
[Open Elective– IV]

COURSE OBJECTIVES
The objectives of this course is to

1. *Provide the student with an understanding of the importance of process planning role in manufacturing.*
2. *Classify the various methods of CAPP*
3. *Understand the importance of product development through CIMS, shop floor control, Computer Integrated Manufacturing and Automation*
4. *Understands about NC, CNC and DNC systems.*
5. *Know about capacity Planning, Adaptive control machining systems, FMS and MRP''s*

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

1. *Know the importance of process planning role in manufacturing*
2. *Describe the various methods of CAPP*
3. *Recognize the importance of product development through CIMS, shop floor control, Computer Integrated Manufacturing and Automation*
4. *Gain the knowledge about NC, CNC and DNC systems.*
5. *Identify about capacity Planning, Adaptive control machining systems*
6. *Familiar in FMS and MRP I and MRP II*

UNIT- I
Introduction to Process Planning: Role of process planning in the manufacturing cycle- Information requirement for process planning system - Merits of conventional process planning over CAPP - Structure of automated process planning system, features recognition, methods.

UNIT- II
Generative CAPP System: Importance - Generative CAPP system - Automation of logical decisions - Knowledge based systems - Inference Engine, implementation, benefits.
Retrieval CAPP System: Significance - Retrieval CAPP system, structure, relative advantages and disadvantages- implementation and applications.

UNIT- III
Implementation Techniques for CAPP: MIPLAN system - The Bottom-up approach - The Top-Down approach - Computer programming languages for CAPP- Criteria for selecting a CAPP system - Benefits of CAPP - MRP - I, MRP - II and benefits.

UNIT- IV
Computer Integrated Production Planning: Capacity planning- shop floor control- MRP-I, MRP-II- CIMS benefits.
Computer Integrated Manufacturing System (CIMS): Introduction to CIMS, Automation strategies, Automation and CAD/CAM, Scope of CIM- Computer controls in NC- NC, CNC and

DNC systems, components, block diagram, applications- Part programming- Group technology, benefits.

UNIT- V

Flexible Manufacturing systems (FMS): Components of FMS, workstation, Material handling system and computer control system, FMS Layout configurations and benefits of FMS.

Adaptive control machining systems: Introduction to adaptive control machining systems, application- approaches, adaptive control optimization system, adaptive control constraint system, applications to machining processes, computer process monitoring and computer process control.

TEXT BOOKS

1. Mikel P.Groover *Automation, Production systems and Computer Integrated Manufacturing Systems,* Pearson Higher Education, Inc., 4th Edition, 2015.
2. Dr. Sadhu Singh, *Computer Aided Design and Manufacturing*, Khanna Publishers, 2009.

REFERENCES

1. Gideon Halevi and Roland D. Weill, –Principles of Process Planning", A logical approach, Chapman & Hall, 1995.
2. Chang T C and Richard A Wysk, –An Introduction to automated process planning systems‖, Prentice Hall, 1985.
3. H.P. Wang and J.K. Li, –Computer Aided Process Planning‖, Elsevier Science and Technology Publishers, 1st edition, 1991.

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(19EC0451) MATLAB PROGRAMMING
(Open Elective-IV)

COURSE OBJECTIVES
The objectives of this course:

1. *Understand the MATLAB Desktop, Command window and the Graph Window*
2. *Be able to do simple and complex calculation using MATLAB*
3. *Understand the mathematical concepts upon which numerical methods*
4. *Understand the tools that are essential in solving engineering problems*

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

1. *Analyze and visualize data effectively by using MATLAB.*
2. *Apply numeric techniques and computer simulations to solve engineering-related problems.*
3. *Apply a top-down, modular, and systematic approach to design, write, test, and debug sequential MATLAB programs to achieve computational objectives.*
4. *Design and document computer programs and analyses in a careful and complete manner so as to effectively communicate results, to facilitate evaluation and debugging by another programmer, and to anticipate and resolve user errors.*
5. *Demonstrate understanding and use of fundamental data structures (classes).*
6. *Create and control simple plot and user-interface graphics objects in MATLAB.*

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

UNIT-II
Arrays: Arrays, Multidimensional Arrays, Element by Element Operations, Polynomial Operations Using Arrays, Cell Arrays, Structure Arrays.

UNIT-III
Functions & Files: Elementary Mathematical Functions, User Defined Functions, Advanced Function Programming, Working with Data Files.

UNIT-IV
Programming Techniques: Program Design and Development, Relational Operators and Logical

Variables, Logical Operators and Functions, Conditional Statements, Loops, the Switch Structure, Debugging MATLAB Programs.

Plotting: XY- plotting functions, Subplots and Overlay plots, Special Plot types, Interactive plotting, Function Discovery, Regression, 3-D plots.

UNIT-V

Linear Algebraic Equations: Elementary Solution Methods, Matrix Methods for Linear Equations, Cramer Method, Undetermined Systems, Order Systems.

TEXT BOOKS

1. G. H. Golub and C. F. Van Loan, *Matrix Computations*, 3rd Ed., Johns Hopkins University Press, 1996.
2. B. N. Datta, *Numerical Linear Algebra and Applications*, Brooks/Cole, 1994 (out ofprint)

REFERENCES

1. William J Palm, *Introduction to MATLAB for Engineers*, 3rd edition, Mc GRAW HIL.
2. L. Elden, *Matrix Methods in Data Mining and Pattern Recognition*, SIAM Press,2007.
3. Amos Gilat, *MATLAB: An Introduction with Applications*,4th edition, WILEY.

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(19CS0546) INTRODUCTION TO CYBER SECURITY
(OPEN ELECTIVE-IV)

Course Objectives:

The objectives of this course

1. *To understand the fundamentals of cybercrime and the cyber offenses.*
2. *To learn the concepts of cyber threats and cyber security.*
3. *To analyze various cyber threats, attacks, vulnerabilities and mechanisms involved.*
4. *To understand the Tools and Methods Used in Cybercrime.*
5. *To explore the different security policies and practices.*
6. *To design suitable security policies for the given requirements.*

Course Outcome:

Students will be able to

1. *Know fundamentals of cybercrimes.*
2. *Analyze the cyber offenses.*
3. *Realize the cyber threats, attacks, vulnerabilities and its defensive mechanism.*
4. *Understand the Tools and Methods Used in Cybercrime.*
5. *Design suitable security policies for the given requirements.*
6. *Explore the industry practices and tools to be on par with the recent trends.*

UNIT- I

Introduction to Cybercrime: Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT - II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones.

UNIT IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V

Cyber Security: Organizational Implications Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOK:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

REFERENCE BOOK:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

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III B.tech – II Sem

(19HS0862) STRATEGIC MANAGEMENT
(Open Elective –IV)

COURSE OBJECTIVES

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1. *To introduce the basic knowledge of concepts underlying in strategic management, its process*
2. *To provide an insight to the tools and techniques used in analyzing and choosing strategies*
3. *To make them learn the principles of strategy formulation, implementation, evaluation and control of strategy*

COURSE OUTCOMES

After the completion of course Students will be able to:

1. *Describe major theoretical concepts, background work and research output in the field of strategic management.*
2. *Develop an understanding of the strategic management process and the functional strategies*
3. *Conduct analysis using various tools and frameworks to make strategic decisions*
4. *Explain the basic concepts, principles and practices associated with strategy formulation and implementation*
5. *Analyze various strategies and explore appropriate strategic implementation at business and corporate levels*
6. *Analyze and evaluate critically real life company situations and develop creative solutions, using a strategic management perspective*

UNIT I

Introduction to Strategic Management – Definition, significance and components- Strategic Management as a process –Developing a strategic vision, Mission, Objectives, Policies, Environmental Scanning

UNIT II

Strategic Analysis and Choice: Tools and techniques- Porter's Five Forces Model -BCG Matrix, GE Model, TOWS Matrix, Mc Kinsey 7‘S framework - Organisation Analysis – VRIO frame work, Value Chain Analysis.

UNIT III

Strategy Formulation: - Formulation of strategy at corporate and business level - Strategy Alternatives-Stability Strategy, Growth Strategy, Retrenchment Strategy, and Combination Strategy.

UNIT IV

Strategy Implementation: Types of Strategies: Offensive strategy, Defensive strategy, vertical integration, horizontal strategy- Strategy and Leadership - Organization Structure - Resource Allocation as a vital part of strategy - Management of Change

UNIT V

Strategy Evaluation and control – Establishing strategic controls - Role of the strategist - benchmarking to evaluate performance - strategic information systems – Guidelines for proper control- -strategic audit - Strategy and Corporate Evaluation and feedback in the Indian context.

TEXT BOOKS:

1. P. SubbaRao, *Strategic Management*, Himalaya,2010
2. Azar Kazmi, *Strategic Management and Business Policy*, Tata McGraw Hill Education, 2009

REFERENCES:

1. V.S.P. Rao, *Strategic Management – Text and Cases*, Excel books,2009
2. Fred R. David, *Strategic Management A competitive approach Concepts and Cases* , Pearson, 16th edition,2019
3. R. Srinivasan, *Strategic Management: the Indian context*, 5th edition, PHI,2014
4. N.Chandrasekharan. PS Ananthanarayanan, *Strategic Management*, Oxford publications, 2011
5. Charles L Hill, *Strategic Management an Integrated approach*, Cengage learning, 10th edition,2007

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B.Tech III Year II Semester

L	T	P	C
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(19AG0712) 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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B.Tech III Year II Semester

L	T	P	C
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(19AG0713) SOIL AND WATER CONSERVATION ENGINEERING LAB

Course objectives:

1. *To enable the students to acquire knowledge on different soil loss estimation models, run off estimation by rational, curve number, cook"s etc.*
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.*

LIST OF EXPERIMENTS

1. Study of different types and forms of water erosion
2. Soil loss estimation using erosivity index and erodibility index.
3. Determination of length of slope (LS) and cropping practice (CP) factors for soil loss estimation by USLE and MUSLE.
4. Measurement of evapo-transpiration.
5. Determination of sediment concentration through Oven Dry method.
6. Design of contour bunding system
7. Design of graded bunding system
8. Design and layout of broad based terraces
9. Design and layout of bench terracing systems
10. Determination of rate of sedimentation and storage loss in reservoir/tanks
11. Computation of soil loss by wind erosion. Use of current meter and water meter.

TEXT BOOKS:

1. Soil and Water Conservation Engineering. Scwab G.O. Frevert R.K. Edminster T.W. and Barnes K.K. 1981 John Wiley and Sons New York.

2. Manual of Soil and Water Conservation Practicals. Gurmel Singh.

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B.Tech III Year II Semester

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(19AG0714) 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 pipes and 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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(19HS0859) ENGLISH FOR CORPORATE COMMUNICATION SKILLS LAB

Course Objectives:

1. *To improve the students" fluency in English, through a well-developed vocabulary*
2. *To enable them listening spoken English at normal conversational speed by English speakers*
3. *To respond appropriately in different social-cultural and professional contexts*
4. *To develop drafting skills among the students.*
5. *To develop Inter-personal and Intra-personal Skills*

Course Outcomes:

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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IV B.Tech. I Sem (EEE & AGE)

L	T	P	C
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(19HS0860) SUPPLY CHAIN MANAGEMENT

Course objectives:

1. *To understand the role of distribution logistics and supply chain management in an economy*
2. *Understand the concepts of SCM such as outsourcing, distribution strategies, planning for uncertainty, decision making*
3. *To provide an insight in to the role of IT in supply chain management*

Course Outcomes:

After completion of the course, students would be able to

1. *Appreciate the evolution and identify the role of supply chain management in the economy*
2. *Identify and evaluate the drivers of supply chain management*
3. *Analyze the importance of make or buy decisions and identify appropriate suppliers*
4. *Appraise the importance of supply chain networks*
5. *Assess the risk associated with supply chain practices and take better decisions*
6. *Familiarize with and apply various computer based supply chain optimization tools*

UNIT I

Role of Distribution in Value discovery: Designing a distribution logistics system – Outsourcing of distribution logistics – Distinction between distribution logistics and supply chain management. Introduction - Supply Chain – Fundamentals –Evolution-Role in Economy -Importance - Decision Phases - Supplier- Manufacturer-Customer chain. - Enablers/Drivers of Supply Chain Performance. Supply chain strategy - Supply Chain Performance Measures.

UNIT II

Strategic Sourcing - Outsourcing – Make Vs buy - Identifying core processes - Market Vs Hierarchy - Make Vs buy continuum -Sourcing strategy - Supplier Selection and Contract Negotiation. Supplier Development - World Wide Sourcing

UNIT III

Supply Chain Network - Distribution Network Design – Role – Factors Influencing Options, Value Addition – Distribution Strategies - Models for Facility Location and Capacity allocation - Distribution Center Location Models - Supply Chain Network optimization models. Network Design decisions using Decision trees.

UNIT IV

Planning Demand, Inventory And Supply - Managing supply chain cycle inventory. Uncertainty in the supply chain –- Analyzing impact of supply chain redesign on the inventory - Risk Pooling - Managing inventory for short life – cycle products - multiple item -multiple location inventory management. Pricing and Revenue Management

UNIT V

Current Trends - Supply Chain Integration - Building partnership and trust in SC Value of Information: Bullwhip Effect - Effective forecasting - Coordinating the supply chain. . SC Restructuring - SC Mapping -SC process restructuring,–IT in Supply Chain- Agile Supply Chains-Reverse Supply chain.-Agro Supply Chains.

TEXT BOOKS:

1. Textbook of Logistics and supply chain management, DK Agarwal, Macmillan 2003
2. Supply Chain Management, Janat Shah, Pearson

REFERENCES:

1. *Supply chain Logistics Management*, Bowersox, Closs, Cooper,2/e,TMH.
2. *Supply chain management concepts and cases*, Rahul V. Altekar, PHI.
3. *Exploring Supply Chain – theory and practice*, Upendra Kachru, excel.

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

(19AG0720) SOLID WASTE & BY-PRODUCT UTILIZATION

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, New Delhi

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, New Delhi

2. Energy Technology Non-conventional, Renewable and conventional. Rao S and Parulekar, B.B. Khanna publishers, New Delhi.

3. Sustainable Development through Renewable Energy Sources, Pratap Singh et. al. 2004, Yash Publications, Bikaner.

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

(19AG0721) IRRIGATION & DRAINAGE ENGINEERING

Course objectives:

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

Course outcomes: Studies will be familiar with

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

UNIT – I

INTRODUCTION–Irrigation Engineering, advantages of irrigation, necessity and development of irrigation in India and AP and classification if irrigation projects, Irrigation terminology - GCA, CCA, Base period, crop period, Delta, Duty, Relationship between Duty and Delta (Delta= (864B) / Duty cm). 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 drain spacing equations.

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

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

UNIT – V

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

TEXT BOOKS:

1. Irrigation Engineering and Hydraulic Structures - Garg,S. K. (2017). Khanna Publishers, New Delhi.

2. Irrigation Principles and Practices - Israelson and Hassan. (2016). John Wiley and sons, New York.

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

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

5. Irrigation Water Resources and Water Power Engineering. Modi, P. (2014). Standard Book House, New Delhi.

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

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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B. Tech IV Year I Semester

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(19AG0722) FOOD PROCESSING PLANT DESIGN AND LAYOUT (PEC – I)

Course objectives:

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

Course outcomes:

Studies will be familiar with

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

UNIT – I:

Plant layout – Definition, meaning, objectives, principles. Plant layout – Factors in planning layouts. Methods of layout planning – Principles of plant layout – Storage layout, equipment layout, safety, plant expansion, floor space, utilities servicing, building, materials handling equipment, rail roads and roads. Types of plant layout – fruit processing plant. Salient features of rice processing plant. Salient features of maize processing plant. Salient features of pulses – processing plants. Salient features of oilseeds processing plants. Salient features of horticulture processing plants. Salient features of processing plants of vegetable crops.

UNIT – II:

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

UNIT –III:

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

UNIT – IV:

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

UNIT –V:

Food plant sanitation-Environmental protection, regulations, pollution control, air pollution abatement, particulate removal, noxious gas removal, thermal pollution control, recycling, CIP. Cost analysis - Cash flow for industrial operations, factors affecting investment and production costs, capital investment, and estimation of capital investment. Cost analysis - Cost indexes, cost factors in capital investment, estimation of total product cost. Preparation of feasibility report - Types of repots, organization of reports, organization of a design report, preparing the report, rhetoric, checklist for the final report.

TEXT BOOKS:

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

REFERENCES:

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

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B. Tech IV Year I Semester	**3**	**-**	**-**	**3**

(19AG0723) FOOD PACKAGING TECHNOLOGY
(PEC – I)

Course Objectives:

1. *To enable the student to understand the principles and acquire the knowledge on various aspects of food packaging materials and environmental control for different foods for handling, transportation and also to extend the shelf life.*
2. *Provides knowledge on spoilage of food materials, various packaging systems,*
3. *Provide knowledge on different packaging materials and their properties, testing of packaging materials and packaging equipments*

Course Outcome:

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

1. *Acquaint with various food packaging materials,*
2. *Various aspects of packaging methods and technology.*
3. *Spoilage of food materials, various packaging systems*
4. *Packaging materials and their properties*
5. *Testing of packaging materials*
6. *Packaging equipments*

Unit-I

Shelf life of Foods- Factors affecting shelf of food material during storage, spoilage mechanism during storage.

Packaging of foods- Definition, requirement, importance and scope of packaging of foods, types and classification of packaging system, advantage of modern packaging system.

Unit-II

Packaging materials- Types of packaging materials, their key properties and applications, metal cans, plastic packaging, different types of polymers used in food packaging and their barrier properties. Manufacture of plastic packaging materials; glass containers, types of glass used in food packaging, manufacture of glass and glass containers, closures for glass containers. Paper and paper board packaging, modification of barrier properties and characteristics of paper/ boards.

Unit-III

Nutritional labeling on packages, CAP and MAP, shrink and cling packaging, vacuum and gas packaging; active packaging, factors affecting the choice of packaging materials, disposal and recycle of packaging waste, printing and labeling; lamination.

Unit-IV

Package testing, testing methods for flexible materials, rigid materials and semi rigid

materials; Tests for paper, glass containers, metal containers.

Unit-V

Advanced Packaging Techniques- Active packaging - smart packaging - intelligent packaging, Packaging requirement for raw and processed foods and their selection of packaging materials. Factors affecting the choice of packaging materials - disposal and recycle of packaging waste.

TEXT BOOK

1. John, P.J. 2008. A Handbook on Food Packaging, Narendra Publishing House,
2. Mahadevia, M., Gowramma, R.V. 2007. Food Packaging Materials, Tata McGraw Hill
3. Robertson, G. L. 2005. Food Packaging: Principles and Practice, Second Edition, Taylor and 7. Francis Pub.

REFERENCES

1. Robertson, G. L. 2001. Food Packaging and Shelf life: A Practical Guide,Narendra Publishing House.
2. Gosby, N.T. 2001. Food Packaging Materials, Applied Science Publication
3. Coles R., McDowell D. and Kirwan, M.J. 2003. Food Packaging Technology, Blackwell Publishing Co.

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B. Tech IV Year I Semester	**3**	**-**	**-**	**3**

(19AG0724) FOOD QUALITY AND CONTROL
(PEC – I)

Course Objectives:

1. *To provide a basic understanding of quality concepts and practice in food companies.*
2. *To provide approaches to the planning and organization of a quality control system.*
3. *To provide a basic acquaintance with standards and specifications*

Course outcomes:

1. *To understand the application of food quality assessment of Food materials*
2. *To Identify the Statistical Quality Control of Foods, Sensory Evaluation of Food Quality*
3. *To understand the Different methods of quantitative descriptive analysis and consumer studies*
4. *To understand the fundamentals of food regulations*
5. *To understand the Food grade and standards and concept of HACCP*

UNIT I

Food Quality – its need and its role in Food Industry, Food Quality and Quality Attributes-Classification of Quality Attributes and their role in food Quality, Objectives, Importance and Functions of Quality Control, Methods of quality concepts of Dough Rheology, Quality Assessment of Food materials – Fruits and Vegetables, Quality Assessment of Food materials –Cereals and legumes, Quality Assessment of Food materials –dairy Products, Quality Assessment of Food materials –Meat, Poultry, Egg and Processed food Products

UNIT II

Statistical Quality Control of Foods, Sensory Evaluation of Food Quality – Introduction - Panel Screening Selection of Panel members, Requirements for conducting Sensory Evaluation and serving procedures, Methods of Sensory Evaluation and Evaluation cards – Difference/discrimination procedures, Methods of Sensory Evaluation and Evaluation cards-Ranking and Rating procedures.

UNIT III

Different methods of Quantitative descriptive analysis, Determination of Sensory thresholds

and taste Interactions, Objective/Instrumental analysis of Quality Control, Food laws and Standards (BIS), Consumer Studies – Types of Consumer studies- Preference Studies and Acceptance Studies, Consumer Studies – Types of Consumer studies- Preference Studies Objectives of Consumer Preference Studies-factors affecting consumer acceptance.

UNIT IV

Information obtained from Consumer Study -Factors Influencing results from Consumer surveys, Methods of Approach-Development of the questionnaire- Types of Questionnaire and other methods of data collection, Comparison of Laboratory Panels with Consumer panels. Limitations of Consumer Survey, Fundamentals of Food regulations-pertaining to Additives and Contaminants, Food regulations pertaining to aspects of Hygiene - Novel Foods & aspects of Labelling.

UNIT V

Different existing Food legislations-norms in implementation, Food grade and standards, International food regulations and certifications, Indian food regulations and Certifications, Concept of Codex Alimentarius, The concept and process of implementation of HACCP in an industry, USFDA - the cause of its existence - its role in safe guarding food quality – Significance, Food Adulteration and Food Safety.

TEXT BOOKS

1. Chandrashekar, U. 2002. Food Science and Applications in Indian Cookery. Phoenix Publishing House Pvt. Ltd.
2. Food Safety and Standards Authority of India. Ministry of Health and Family Welfare, Government of India.
3. Satarkar, A. 2008. Food Science and Nutrition. ABD Publishers. Jaipur
4. Sethi, M. 2008. Institutional Food Management. New Age Publishers. New Delhi.

REFERENCES :

1. Philip,A.C. Reconceptualizing quality. New Age International Publishers, Banglore. 2001.
2. Bhatia,R. and Ichhpujan,R.L. Quality assurance in Microbiology. CBS Publishers and Distributors, New Delhi. 2004.
3. Kher, C.P. Quality control for the food industry. ITC Publishers, Geneva. 2000.

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B.Tech IV Year I Semester

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3	-	-	3

(19AG0725) Hydrology, Ground Water & Well Engineering
(PEC – II)

Course Objectives:

1. *To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers,*
2. *To understand the techniques of development and management of groundwater.*
3. *To know the basic principles and movement of ground water and properties of ground water flow.*

Course Outcomes:

At the end of the course, students must be in a position to

1. *To understand the interaction among various processes in the hydrologic cycle*
2. *To understand the basic aquifer parameters and estimate groundwater resources for different hydro-geological boundary conditions*
3. *To understand of the physical and mathematical concepts of groundwater hydrology. Some real-world example problems are also being incorporated to give an idea about the complexities and challenges encountered during the modeling and management of groundwater processes.*

UNIT-I

INTRODUCTION: Hydrology-definition, hydrology cycle and its components. Forms of precipitation of Rainfall, Measurement of Rainfall – Recording and Non-Recording Rain gauges. Presentation of Rainfall data – Mass Curve and hyetograph, Mean Precipitation over an area – Arithmetic Mean, Thiessen Polygon, Isohyetal methods, Probability Analysis of Rainfall – Return Period, Plotting position by Weibull's method – Rainfall events at different probability levels.

UNIT-II

Hydrographs: Hydrographs-definitions and components, factors affecting flood hydrographs, .Derivation of Unit hydrographs, The conversio|

drograph duration, methods for unit hydrographs of different durations, (1) method of

superposition and (2) S-curve. S-curve method, explanation of concept and application. conversion of unit graph duration by S-curve method. Synthetic unit hydrograph, Concept, Snyder' synthetic unit hydrograph, formulas relating hydrograph features (basin lag, Peak flow and time base of the unit hydrograph). Instantaneous unit hydrograph, Concept and application, SCS Triangular Hydrograph.

Unit-III

GROUNDWATER: Water Resources status of India-Occurrence and Movement of ground water and Aquifers –Classification of Aquifers, Equilibrium Equations for Confined and Unconfined Aquifers, Aquiclude, Aquifuge, Specific Yield, Specific Retention, Divisions of Subsurface Water, Water Table, Storage Coefficient-Coefficient of Permeability and Transmissibility

UNIT IV

Classification of wells – Design of open wells – Ground water replenishment – Ground water exploration –Methods of drilling of wells – Common well drilling difficulties – Gravel packing – well screens – Development of well.

Unit – V

Surface and subsurface exploitation and estimation of ground water potential – Artificial ground water recharge – Ground water project formulation – Classification of indigenous pumps – Wind powered water lifts – Solar powered and biogas operated water lifts – Reciprocating pumps. centrifugal pumps – Terminology on Horse Power – Selection of pump-installation and troubleshooting of pumps – performance characteristic curves – Effect of change of impeller dimensions on performance characteristics. Hydraulic Ram – Propeller pumps - Mixed flow pumps - Air lift pumps – Priming – Vertical Turbine pumps – Submersible pumps – Cost economics

Text Books:

1. *A Textbook of Hydrology*, Dr. P. Jaya Rami Reddy, University Science Press.
2. *Hydraulics of Groundwater*, Bear J., McGraw-Hill International, 1979.
3. *Ground Water Hydrology*, Todd D.K., John Wiley and Sons, 2000.
4. *Groundwater and Wells*, Driscoll, F., St. Paul, Minnesota, II Ed., 1986.
5. *Ground Water Hydrology*, Raghunath H.M., Wiley Eastern Ltd., Second reprint, 2000.

References Books:

1. *Engineering Hydrology*, Subramanya, K., Tata McGraw Hill. Second Edition, 1987
2. *Groundwater Systems Planning and Management*, Willis, R. and W.W.G. Yeh, Prentice-Hall, 1987.
3. *Groundwater Resources Evaluation*, C. Walton, McGraw Hill, 1970.

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B. Tech IV Year I Semester	**L**	**T**	**P**	**C**
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(19AG0726) 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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B. Tech IV Year I Semester	**3**	**-**	**-**	**3**

(19AG0727) Information Technology for Land and Water Management
(PEC – II)

Course Objectives:

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

Course Outcomes:

1. At the end of the course, student have thorough knowledge about information technology, database, multimedia technologies, networking system and communication technology etc.

UNIT I:

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

UNIT II:

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

UNIT III:

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

UNIT IV:

Application of remote sensing, geographic information system (GIS) and GPS in ground water potential zones, run off estimation, water resources action plan, land resources action plan, site selection for implementation, land resource and evaluation. Use of satellite data for monitoring the changes in land and water. Relational data base management system (RDBMS) - definition- special application in land and water management (FAO). Object oriented approach – principle - OO approaches in water resource planning, flood planning, water quality monitoring etc. Information system – overview - types of information systems - development – integrated land and water information systems. Decision support systems – elements - support elements, water availability elements, water demand elements, integrated water management elements. Expert systems in relation to water management. Agricultural information management systems – models – types of models.

UNIT V:

Mathematical models in irrigation, optimization and water resource management. Mathematical models in soil and water conservation. Application of decision support systems - multi sensor data loggers. Overview of software packages in natural resource management. Information technology (IT) – introduction - users‟ needs in terms of land and water information systems and decision-support systems. Information technology concepts and its application potential.

Text Books

1. Climate-Smart Agriculture – Source Book. 2013. Food and Agriculture Organization

2. Daniel P. Loucks and Eelco van Beek. 2005. Water Resources Systems Planning and Management - An Introduction to Methods

References

1. Dipak De and Basavaprabhu Jirli (Eds.). 2010. Communication Support for Sustainable Development. Ganga Kaveri Publishing House

2. FAO. 1998. Land and Water Resources Information Systems. FAO Land and Water Bulletin 7

3. Fuling Bian and Yichun Xie (Eds.). 2015. Geo-Informatics in Resource Management and Sustainable Ecosystem. Springer

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B. Tech IV Year I Semester

L	T	P	C
3	1	-	3

(19AG0728) TRACTOR SYSTEM AND CONTROLS
(PEC – III)

Course objectives:

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

Course outcomes:

1. *To impart knowledge about different transmission system in tractor.*
2. *Identify different parts of transmission systems.*
3. *Be proficient about identify the different types of clutch and gears of existing tractor.*
4. *To get knowledge on brake, steering and hydraulic system*
5. *Students will learn about the tractor power outlets like P.T.O., and tractor stability testing.*
6. *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. Jagdishwar sahay. 2015. Elements of agricultural engineering. Standard publication, New Delhi.
2. Nakra C.P., 2009, Farm Machines and Equipment's. Dhanpat Rai 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.

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B. Tech IV Year I Semester	**3**	**1**	**-**	**3**

(18AG0729) DESIGN OF AGRICULTURAL MACHINERY
(PEC – III)

Course objectives:

1. *To enable the students to understand the general procedure for designing any machine parts.*
2. *To know the design of cotter and knuckle joints, leavers, springs various types of shafts, couplings bearings and various IC engine parts.*
3. *To develop an ability to identify, formulate and solve engineering problems.*

Course outcomes:

Studies will be familiar with

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

UNIT – I:

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

UNIT – II:

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

UNIT – III:

LEVERS – Introduction, application of levers in engineering practice, design of lever hand levers, foot lever, and cranked lever. Springs – Introduction, types of springs, material for

helical springs, spring wire, terminology, springs in series and parallel, flat spiral springs, leaf springs, construction of leaf springs.

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

UNIT – IV:

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

UNIT – V:

Fly wheel – Introduction, Coefficient of fluctuation of speed, fluctuation of energy, maximum fluctuation of energy, energy stored in a flywheel. Bearing – Introduction, classification of bearing, types of sliding contact bearings, rolling contact bearings – Introduction, advantages and disadvantages of rolling contact bearing over sliding contact bearings. Types of rolling contact bearings, types of radial ball bearings, Standard dimensions and designations of ball bearings, types of roller bearings, basic static load rating of rolling contact bearings, life of a bearing. Basic dynamic load rating of rolling contact bearings, dynamic load rating for rolling contact bearings under variable loads, reliability of bearing, lubrication of ball and roller bearings.

TEXT BOOKS:

1. Machine Design – Khurmi R.S. and Gupta J.K. 2005, Eurasia Publishing House Pvt.Ltd.,New Delhi.

2. Machine Design-Robert.l.Norton.2018, Person Education.

REFERENCES:

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

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B. Tech IV Year I Semester	**3**	**1**	**-**	**3**

(19AG0730) PRECISION AGRICULTURE AND SYSTEM MANAGEMENT
(PEC – III)

Course Objective:

1. *To enable the students to know the development of high precession agricultural machinery viz. sowing, planting spraying equipment.*

Course Outcomes:

1. *Upon completion of this course, the students can get knowledge on different functional requirements of precession agricultural machinery*
2. *Be proficient about identify the types and structures of existing greenhouse.*
3. *Students will learn the different systems for climate control in greenhouse and their management.*
4. *Familiar with the techniques of light management and CO_2 enrichment used for increasing and control crop production.*

UNIT I:

Introduction to precision agriculture – need and functional requirements, Familiarization with issues relating to natural resources. Familiarization with equipment for precision agriculture including sowing and planting machines. Familiarization with precision agriculture problems and issues.

UNIT II:

Familiarization with equipment for precision agriculture including power sprayers, land clearing machines, laser guided land levelers.

UNIT III:

Familiarization with equipment for precision agriculture including straw chopper, straw-balers, grain combines etc. Introduction to GIS based precision agriculture and its applications. Introduction to sensors and application of sensors for data generation.

UNIT IV:

Database management - system concept - system approach in farm machinery management, problems on machinery selection, maintenance and scheduling of operations.

UNIT V:

Application of PERT and CPM for machinery system management

Text books

1.Sharma DN and S Mukesh. Farm Power and Machinery Management Vol I.
2.Hunt Donnell. Farm Power and Machinery Management.

References

1. Kuhar J E. The Precision Farming Guide for Agriculturist.
2. Dutta SK. Soil Conservation and land management.
3. Sigma and Jagmohan. Earth Moving Machinery.

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(19AG0715) INTERNSHIP (60 HOURS)

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(19AG0716) PROJECT PHASE-I

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MOOCS

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(19AG0717) SEMINAR

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(19AG0718) COMPREHENSIVE VIVA VOCE

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(19AG0719) PROJECT PHASE-II