PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018
(AUTONOMOUS)
B.E – AGRICULTURE ENGINEERING
REGULATIONS 2019
CURRICULUM
(For candidates admitted during the Academic Year 2019-2020)
(CHOICE BASED CREDIT SYSTEM)
SEMESTER III

S.No.	Category	Course Code	Course Title	L	T	P	C
	Theory						
1.	BS	MA19301	Transforms And Boundary Value Problems	3	1	0	4
2.	PC	AI19301	Principles and Practices of Crop Production	3	0	0	3
3.	PC	AI19302	Surveying, Levelling and Farm Structures	3	0	0	3
4.	ES	AI19303	Strength of Materials	3	1	0	4
5.	ES	AI19304	Mechanics of Machines	3	0	0	3
6.	MC	MC19301	Value Education	2	0	0	0
	Practical						
7.	PC	AI19305	Crop Production Practices Laboratory	0	0	2	1
8.	ES	AI19306	Surveying Laboratory	0	0	4	2
9.	PC	AI19307	Drawing of Farm Structures	0	0	2	1
			TOTAL	**18**	**2**	**10**	**22**

SEMESTER IV

S.No.	Category	Course Code	Course Title	L	T	P	C
	Theory						
1.	BS	MA19403	Probability and Statistics	3	1	0	4
2.	PC	AI19401	Principles and Practices of Horticultural Crop Production	3	0	0	3
3.	PC	AI19402	Fluid Mechanics and Hydraulics	3	1	0	4
4.	PC	AI19403	Hydrology and Groundwater Engineering	3	0	0	3
5.	ES	AI19404	Thermal Engineering	3	0	0	3
6.	MC	MC19401	Environmental Science and Engineering	3	0	0	0
	Practical						
7.	PC	AI19405	Agricultural Engineering Practices Laboratory	0	0	2	1
8.	PC	AI19406	Fluid mechanics and Strength of Material Laboratory	0	0	4	2
9.	EE	EN19401	English Proficiency Course Laboratory	0	0	2	1
			TOTAL	**18**	**2**	**6**	**20**

MA19301 TRANSFORMS AND BOUNDARY VALUE PROBLEMS 3 1 0 4

COURSE OBJECTIVES

To enable students to

- introduce Fourier series analysis which is central to many applications in engineering apart from solving boundary value problems.
- acquaint the student with Fourier transform techniques used in many engineering systems.
- formulate Partial Differential Equations and use Mathematical tools for the solution of PDE thatmodel several physical processes
- develop the modeling of one dimensional equation of heat conduction, wave equation and two dimensional Laplace equation
- develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform does for continuous systems, a valuable aid in analysis of continuous time systems

UNIT I FOURIER SERIES 12

Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine series - Half range cosine series - Complex form of Fourier Series - Parseval's identity - Harmonic Analysis.

UNIT II FOURIER TRANSFORMS 12

Fourier integral theorem (without proof) - Fourier transform pair - Sine and Cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations - Lagrange's linear equation - Solutions of standard four types of first order partial differential equations - Linear partial differential equations of second and higher order withconstant coefficients

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

One way and Two way classifications - Completely randomized design - Randomized block design - Latin square design - 2^2 factorial design.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties - Inverse Z-transform - Convolution theorem - Formation of difference equations - Solution of difference equations using Z-transform. .

TOTAL PERIODS 60

COURSE OUTCOMES

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

- derive Fourier series, their possible forms of representations of periodic functions
- identify and formulate a function in frequency domain whenever the function is defined in timedomain
- formulate and solve partial differential equations that occur in many engineering applications
- model wave and heat equations, solve certain boundary value problems and use the solutionmethods in engineering applications.
- demonstrate the use of Z-transform to convert discrete functions into complex frequency domainrepresentation

TEXT BOOKS

1. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Narayanan S., ManickavasagamPillai.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" ,Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998
3. Papoulis. A and Unnikrishnapillai. S., "Probability, Random Variables and Stochastic Processes" McGraw Hill Education India , 4th Edition, New Delhi , 2010.

REFERENCES

1. Larry C. Andrews, Bhimsen K. Shivamoggi, "Integral Transforms for Enginears", SPIE Optical Engineering press, Washington USA (1999).
2. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi (2010).
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education (2007).
4. Erwin Kreyszig., "Advanced Engineering Mathematics" 10thEdition,Wiley Publications
5. Ray Wylie C and Barrett.L.C, "Advanced Engineering Mathematics", Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.

CO/PO Mapping :

***CO-PO & PSO Matrix Correlation :: Put if, Strong :3, Moderate : 2, Weak : 1, Nil : -**

COs	Programmes Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	-	-	1	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	1	3	2
CO3	3	2	3	2	-	-	-	-	-	-	-	1	3	2
CO4	3	2	2	2	-	-	-	-	-	-	-	1	3	2
CO5	3	3	2	2	-	-	-	-	-	-	-	1	3	2

AI19301 PRINCIPLES AND PRACTICES OF CROP PRODUCTION 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- impart knowledge in the basics of Agriculture principles and practices.
- acquire knowledge in seasonal selection of crops and its establishments.
- introduce about the management of crops in all aspects.
- study the cultivation practices of major field crops.
- get an idea about the production practices of cash crops.

UNIT I INTRODUCTION TO AGRICULTURE 10

Introduction to agriculture - terms, definitions and branches; Scope and importance of agriculture; Field crops classification based on agronomic, special purpose, life span, root depth and Co_2 fixation; Factors affecting crop growth and production - internal (genetic) and external (Environmental, Edaphic& Biotic); Major crops in India and Tamil Nadu; Crop seasons in India and Tamil Nadu - factors influencing choice of crops- regional and seasonal selection.

UNIT II PRINCIPLES AND PRACTICES OF CROP PRODUCTION I 10

Field preparation - land configuration; Tillage - objectives and types - On season tillage - Off season tillage - Special purpose tillage - modern concepts; Seeds and Sowing - Seed selection - Seed treatment - Sowing and planting - Crop geometry; Cropping system - Inter cropping - Cover cropping - Mixed cropping - Relay cropping - Multitier cropping - Crop rotation - Cropping pattern - Cropping intensity.

UNIT III PRINCIPLES AND PRACTICES OF CROP PRODUCTION II 10

Intercultural operations - Gap filling - Thinning - Mulching - Earthing-up - Propping; Water Management - Methods of Irrigation - Crop water requirement - Water use efficiency; Nutrient management - Essential nutrients - Nutrient requirement - Fertilizer application (Types and Methods); Weed management - Cultural - Chemical - Integrated; Pest and Diseases management - Cultural - Chemical - Integrated.

UNIT IV PRODUCTION PRACTICES OF AGRICULTURAL CROPS I 9

Generalized management and cultivation practices for important groups of field crops in Tamil Nadu; cereal crops (Rice, Maize, Sorghum, Bajra and Ragi); Grain legumes (Red gram, Black gram, Green gram, Cowpea Horse gram and Soybean); Green manure crop (Daincha and Sunnhemp); fodder crops (Bajra Napier Hybrid grass and Fodder Sorghum).

UNIT V PRODUCTION PRACTICES OF AGRICULTURAL CROPS II 6

Generalized management and cultivation practices of Oil seed crops (Groundnut, Sunflower, Gingelly and Castor), Sugar crop (Sugarcane) and Fiber crop (Cotton and Jute).

TOTAL PERIODS 45

COURSE OUTCOMES

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

- acquire knowledge in factors affecting growth and production of crops.
- analyze the choice of crops to be selected for different regions and seasons.
- understand the crop management practices of agricultural field crops.
- identify the best cultivation practices to be followed for higher yield of field crops.
- gain an idea about the cultivation of cash crops.

TEXT BOOKS

1. Reddy T. Sankara G.H. YellamandaReddy, Principles of Agronomy, Kalyani Publishers, New Delhi, 1995.
2. Rajendra Prasad, Text Book of Field Crop Production. Directorate of Information and Publication, KrishiAnusandhanBhavan, Pusa, New Delhi, 2005.
3. Handbook of Agriculture. ICAR Publications, New Delhi.

REFERENCES

1. Balasubramaniyan, P and SP. Palaniappan. 2002. Principles and practices of Agronomy. Agrobios (India), Jodhpur.
2. Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore. 2005
3. Chatterjee, B.N. and K.K.Bhattacharyya.1986. Principles and Practices of Grain legume production. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Chatterjee, B.N. and P.K.Das.1989. Forage crop production - Principles and Practices. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

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COs	**Programmes Outcomes(POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	2	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	-	3	2	-	-	-	-	-	-	-	-	3	3	2
CO3	2	3	-	-	-	2	-	-	-	-	-	-	3	2
CO4	-	3	2	-	-	2	-	-	-	-	-	3	3	2
CO5	2	-	-	-	-	-	-	-	-	-	-	-	3	2

AI19302 SURVEYING, LEVELLING AND FARM STRUCTURES 3 0 0 3

COURSES OBJECTIVES

To enable the students to

- introduce the principles of chain surveying.
- provide exposure in traversing using compass and plane table.
- understand the different methods of levelling.
- gain knowledge about the applications of levelling and modern surveying.
- enrich knowledge on Farm structures.

UNIT I FUNDAMENTALS AND CHAIN SURVEYING 9

Definition - Classifications - Basic principles; Equipment and accessories for ranging and chaining - Methods of ranging; Well-conditioned triangles; Errors in linear measurement and their corrections; Obstacles; Traversing - Plotting - applications - Areas enclosed by Irregular figures.

UNIT II COMPASS AND PLANE TABLE SURVEYING 9

Compass - Basic principles - Types - Bearing - Systems and conversions - Sources of errors - Local attraction - Magnetic declination – Dip-Traversing - Plotting - Adjustment of closing error - applications; Plane table and its accessories - Merits and demerits - Radiation – Intersection - Traversing - sources of errors - applications.

UNIT III LEVELLING 9

Level line - Horizontal line - Datum - Bench marks - Levels and staves - temporary and permanent adjustments - Methods of levelling - Fly levelling - Check levelling - Longitudinal and Cross-section - Reciprocal levelling - Curvature and refraction - sources of errors in levelling - Precise levelling.

UNIT IV LEVELLING APPLICATIONS AND MODERN SURVEYING 9

Contouring - Methods - Characteristics and uses of contours -Plotting - Methods of interpolating contours; Computation of cross sectional area and volumes Earthwork calculations - Capacity of reservoirs - Mass haul diagrams; Total Station - Global Positioning System (GPS)

UNIT V FARM STRUCTURES 9

Farmstead - Farm Roads - Cattle sheds - Stanchion barn - Poultry shed - Hog housing - Machinery and implement shed; Storage structures - food grain – feed and forage; Structures for Plant environment - Green houses - Poly houses - Shade net.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- handle all surveying equipment.
- gain knowledge in the principles of compass surveying.
- understand the different types of levelling.
- prepare contour maps and carryout surveying works related to land projects.
- update their knowledge in modern farm structures.

TEXT BOOKS

1. Dr. B. C. Punmia, Surveying , Volume I &II,Laxmi Publications (P) Ltd., 2005.
2. N.N. Basak ,Surveying and Levelling, Tata McGraw-Hill Education Pvt. Ltd., 2004.

REFERENCES

1. R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. S.S.Bhavikatti, Surveying Theory and Practice, I.K.International Publishing House Pvt. Ltd, New Delhi,2010
3. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice‘ Hall of India 2004
4. K.R. Arora, Surveying Vol I & II, Standard Book house , Twelfth Edition. 2013

CO/PO Mapping :

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COs	**Programmes Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	3	-	1	-	-	-	-	3	-	-	-	-	3	2
CO2	-	3	2	3	3	-	-	2	3	-	-	2	-	1
CO3	-	-	-	-	3	1	-	-	-	-	-	-	1	3
CO4	3	-	3	-	1	2	-	-	-	-	-	-	-	2
CO5	2	1	2	-	3	-	-	1	-	-	-	1	2	2

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AI19303 STRENGTH OF MATERIALS 3 1 0 4

COURSE OBJECTIVES

To enable the students to

- impart knowledge in the fundamental concepts of stress and strain in mechanics of solids.
- estimate the thermal stresses developed in bars and relationship between elastic constants.
- analyse the behaviour of beams under the action of various forces..
- understand the concept of torsion of circular shafts and deflection of springs.
- study the methods used for determination of deflection in beams, shells.

UNIT I STRESSES AND STRAINS 12

Simple stresses and strains; Elasticity and plasticity - force deformation curve for various materials - Hooke's Law; Principle of superposition - stresses in bars of different sections - stresses in bars of uniformly tapering sections and in composite bars - stresses in inclined planes - principal stresses and planes.

UNIT II THERMAL STRESSES AND ELASTIC CONSTANTS 12

Thermal stresses and strains in simple bars and composite bars; Lateral and linear strain - Poisson's ratio; Volumetric strain of a rectangular body subjected to an axial force; Relation between elastic constants and their derivation.

UNIT III SHEAR FORCE AND BENDING MOMENT 12

Types of loads acting on the beams - different types of beams; Shear force - bending moment - sign conventions - relation between shear force and bending moment; Bending stresses in beams; Shearing stresses in beams.

UNIT IV TORSION 12

Torsion formulation stresses and deformation in circular and hollows shafts - Deflection in shafts fixed at the both ends - Deflection of helical springs

UNIT V DEFLECTION OF BEAMS AND SHELLS 12

Deflection of beams - double order differential equation method - Macaulay's method; Deformation of thin cylindrical and spherical shell.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- understand the fundamental concepts of stress and strain in mechanics of solids.
- understand the effect of thermal stresses in bars.
- analyse and determine shear force, bending moment and stresses in beams.
- determine the twisting of shafts and deflection of springs.
- gain sufficient knowledge in deflection of beams and shells.

TEXT BOOKS

1. Bansal, R.K., “Strength of Materials”, Laxmi Publications (P) Ltd., 2007
2. Rajput, R.K., “Strength of Materials”, by S Chand & Co Ltd., 2007

REFERENCES

1. Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010.
2. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., NewDelhi, 2009
3. Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, 2007.
4. Hibbeler, R.C., "Mechanics of Materials", Pearson Education, Low Price Edition, 2007

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COs	**Programmes Outcomes(POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	3	2	3	1	-	-	-	-	-	-	-	1	1
CO2	2	3	2	3	1	-	-	-	-	-	-	-	1	1
CO3	2	3	2	3	1	-	-	-	-	-	-	-	3	3
CO4	2	3	2	3	1	-	-	-	-	-	-	-	2	2
CO5	2	3	2	3	1	-	-	-	-	-	-	-	3	3

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AI19304 MECHANICS OF MACHINES 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- study various terminologies used in machines.
- understand concept of sliding and rolling friction.
- know the application of different types of cam and follower.
- impart knowledge in gears.
- delineate the concepts of flywheel and balancing.

UNIT I MECHANISMS 9

Definitions - Kinematic links - Pairs - Chain - Machines and mechanism - Types and uses - Kinematic inversion of four bar chain and slider crank mechanism; Velocity and acceleration in simple mechanisms; Vector polygon and instantaneous centre methods; Coriolis component of acceleration.

UNIT II FRICTION AND APPLICATIONS 9

Sliding and rolling friction - friction in screw threads; Bearing and lubrication; Friction clutches; Belt drives; Friction aspects in brakes.

UNIT III MOTION OF CAM AND FOLLOWER 9

Cam and follower - types - application - displacement diagrams - profile layout for uniform velocity - Uniform acceleration and retardation - simple harmonic and cycloid motion.

UNIT IV GEARS AND GEAR TRAINS 9

Gears - classification - terminology - law of gearing - tooth profile - interference between rack and pinion; Gear trains - simple – compound - reverted epi-cyclic gear trains.

UNIT V FLYWHEEL AND BALANCING 9

Inertia - turning moment - flywheel - fluctuation of speed and energy; Balancing of rotating masses.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- gain inputs in the terminologies pertaining to agricultural machineries.
- acquire basic knowledge in the friction applications.
- know the various motion of cam and follower.
- gain sufficient knowledge on gear trains.
- implement ideas of rotating masses and flywheel.

TEXT BOOKS

1. Khurmi, R.S. and Gupta, J.K, Theory of machines, Eurasia Publication House, 1994
2. Rattan, S.S, Theory of Machines, 3rd Edition, Tata McGraw-Hill, 2009

REFERENCES

1. Thomas Beven,Theory of Machines, CBS Publishers and Distributors, New Delhi,1984.
2. Ballaney, P.L, Theory of machines, Khanna Publishers, New Delhi,1994.
3. A text book of theory of machines, Dr.R.K.Bansal, Laxmi publications (p) Ltd, New Delhi, 1st Edition 2000.
4. Theory of machines and mechanisms, J.E. Shigley, J.J. Uicker, Theory of Machines and Mechanisms, Mc-Graw Hill, 2nd Edition, 1995.
5. Design of machinery : An introduction to the synthesis and analysis of mechanisms and machines, Robert L Norton, New York : McGraw-Hill, 2012.

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COs	**Programmes Outcomes(POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	-	3	2	-	-	-	-	-	-	-	-	3	3	2
CO3	2	3	-	-	-	2	-	-	-	-	-	-	3	2
CO4	-	3	2	-	-2	-	-	-	-	-	-	3	3	2
CO5	2	-	-	-	-	-	-	-	-	-	-	-	3	2

MC19301 VALUE EDUCATION 2 0 0 0

COURSE OBJECTIVES

To enable students to

- develop the individual multi-dimensionally in physical, intellectual, emotional and spiritual dimensions.
- facilitate individuals think about and reflect on different values.
- understand their responsibility in making choices and the practical implications of expressing them.
- instigate to choose their personal, social, moral and spiritual values.
- design and chisel the overall personality of an individual.

UNIT I PERSONAL VALUES 6

Value Education – Definition, Types of values; Human values - Respect, Acceptance, Consideration, Appreciation, Listening, Openness, Affection, Patience, Honesty, Forgiveness, Sacrifice, Authenticity, Self Control, Altruism, Tolerance and Understanding, Wisdom, Decision making, Self –actualization, Character formation towards positive Personality, Contentment; Religious Values -Humility, Sympathy and Compassion, Gratitude. Peace, Justice, Freedom, Equality.

UNIT II COMMUNAL VALUES 6

Social Values - Pity and probity - Self control - Respect to - Age, Experience, Maturity, Family members, Neighbors- Universal Brotherhood - Flexibility -Peer pressure - Sensitization towards Gender Equality, Physically challenged, Intellectually challenged - Reliability - Unity - Modern Challenges of Adolescent Emotions and behavior - Comparison and Competition- Positive and Negative thoughts- Arrogance, Anger and Selfishness.

UNIT III ENGINEERING ETHICS 6

Professional Values -.Knowledge thirst - Sincerity in profession- Regularity, Responsibility, Punctuality and Faith - Perseverance - Courage - Competence - Co-operation- Curbing unethical practices - Integrity, Social Consciousness and Responsibility. Global Values - Computer Ethics – Moral Leadership - Code of Conduct - Corporate Social Responsibility.

UNIT IV SPIRITUAL VALUES 6

Developing Spirituality - Thinking process, Moralization of Desires - Health benefits- Physical exercises - Mental peace - Meditation - Objectives, Types, Effects on body, mind and soul- Yoga - Objectives, Types, Asanas. Family values -family's structure, function, roles, beliefs, attitudes and ideals, Family Work Ethic, Family Time, Family Traditions.

UNIT V HUMAN RIGHTS 6

Classification of Human Rights - Right to Life, Liberty and Dignity- Right to Equality - Right against

Exploitation - Cultural and Educational Rights- Physical assault and Sexual harassment - Domestic violence.

TOTAL PERIODS 30

COURSE OUTCOMES

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

- cultivate the values needed for peaceful living in the existing society.
- comprehend humanistic values to develop peace in the world.
- foster ethics in profession and usage of Technology.
- orient with the importance of value education towards personal, group and spiritual attributes.
- nurture physical, mental, spiritual growth to face the competitive world.

TEXT BOOKS

1. Sharma, S.P. Moral and Value Education; Principles and Practices, Kanishka publishers, 2013.

REFERENCES

1 Little, William, An introduction of Ethics. Allied publisher, Indian Reprint 1955.

2. "Values (Collection of Essays)". Sri Ramakrishna Math. Chennai. 1996.

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COs		**Programmes Outcomes (POs)**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	2	2	-	-	2	-	2
CO2	-	-	-	2	-	2	-	1	3	2	1	3	-	2
CO3	-	-	3	2	2	3	2	3	3	1	3	3	2	3
CO4	-	-	3	1	-	2	-	-	1	-	-	3	2	-
CO5	-	-	-	-	-	1	-	-	-	-	-	3	-	-

AI19305 CROP PRODUCTION PRACTICES LABORATORY 0 0 2 1

COURSE OBJECTIVES

To enable the students to

- gain sufficient knowledge in crop cultivation practices of important crops.
- know the basic principles in field preparation practices of crop cultivation.
- introduce the basic concept of seed selection and its treatment.
- introduce the different crop production practices in wet land, dry land and irrigated upland through hands on experience and demonstrations
- get an idea about weed management, pest management and post harvesting

LIST OF EXPERIMENTS

1. Field preparation studies
2. Identification of grains and crops
3. Seed selection and seed treatment procedures
4. Seed bed and nursery preparation
5. Sowing, transplanting and estimation of germination rate
6. Biometric observation for crops
7. Nutrient management studies
8. Weed management studies
9. Integrated Pest Management studies
10. Harvesting and yield estimation

TOTAL PERIODS 30

COURSE OUTCOMES

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

- acquire hands on experience in various crop production practices
- identify the choice of seeds to be selected for cultivation
- to gain sufficient knowledge in crop cultivation practices like sowing, intercultural operations and harvest.
- to introduce the different crop production practices in wet land, dry land and irrigated upland through hands on experience and demonstrations.
- to get an idea about weed management, pest management and post harvesting.

CO/PO Mapping :

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COs	**Programmes Outcomes(POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO2	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO3	3	-	-	-	2	-	-	-	-	-	-	3	3	-
CO4	3	-	-	-	2	-	-	-	-	-	-	3	3	3
CO5	3	-	-	--	-	-	2	-	-	-	-	3	3	-

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AI19306 **SURVEYING LABORATORY** **0 0 4 2**

COURSE OBJECTIVE

To enable the students to

- acquire skills in operating various surveying instruments.
- provide exposure in various methods and applications of surveying to agricultural engineering projects
- develop skill to operate leveling instruments
- train the student, how to demonstrate the total station and GPS
- study the applications of leveling

LIST OF EXPERIMENTS

1. **Chain Surveying**
   a. Chain traversing
2. **Compass Surveying**
   a. Triangulation Problem
   b. Compass traversing
3. **Plane Table Surveying**
   a. Radiation
   b. Intersection
4. **Levelling**
   a. Fly levelling using Dumpy level and Tilting level
   b. Check levelling
   c.LS & CS levelling
   d.Contouring
5. **Total Station And GPS**
   a. Demonstration of total station and GPS

TOTAL PERIODS 60

COURSE OUTCOMES

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

- use all surveying equipments
- gain knowledge in the principles and classification of chain surveying and ranging
- demonstrate the theodolite ,total station and global position system
- understand the different types of bearing and traversing
- prepare LS AND CS ,contour map and carryout surveying works projects

CO/PO Mapping :

***CO-PO & PSO Matrix Correlation :: Put if, Strong :3, Moderate : 2, Weak : 1, Nil : -**														
COs	**Programmes Outcomes(POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	-	-	3	1	-	-	3	2	2	3	3	2
CO2	3	3	-	-	3	1	-	-	3	2	2	3	3	2
CO3	2	1	-	-	1	`1	1	-	1	2	-	1	2	1
CO4	2	2	-	-	-	-	-	-	1	-	-	-	-	3
CO5	2	3	2	-	3	2	2	-	3	-	-	3	2	1

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AI19307 DRAWING OF FARM STRUCTURES 0 0 2 1

COURSE OBJECTIVES

To enable the students to

- plan and draw layout for farm structures
- understand the layouts and design of sanitary and storage structures.
- conceive and design various farm structures related to agricultural engineering
- enhance the knowledge in design of various farm systems.

LIST OF EXERCISES

1. Planning and Layout of farmstead
2. Design of loose housing and stanchion barn(including ventilation system)
3. Design of poultry house – Deep litter and Cage system(including ventilation system)
4. Design of a sheep / goat house and hog house
5. Design of silos – over ground and underground and hay storages
6. Design of farm fencing system and farm trusses
7. Design of machinery and equipment shed and workshops
8. Design of septic tank and sanitary structures
9. Design of rural/farm roads and culverts.
10. Design of biogas plant

TOTAL PERIODS 30

COURSE OUTCOMES

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

- design various form structures related to agricultural engineering
- plan and layout of farmstead
- design machinery and equipment shed and workshops
- design biogas plant
- design silos – over ground and underground and hay storages

CO/PO Mapping :

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COs	**Programmes Outcomes(POs)**													
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CO1	1	-	2	-	-	-	1	-	-	-	2	-	2	-
CO2	2	2	3	1	-	-	-	-	-	-	2	1	1	2
CO3	2	1	2	1	1	-	2	-	-	-	1	1	1	1
CO4	2	1	2	3	1	-	2	-	-	-	-	-	-	2
CO5	2	1	3	1	1	-	2	-	-	-	1	-	-	-

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MA19403 PROBABILITY AND STATISTICS 3 1 0 4

COURSE OBJECTIVES

To enable the students to

- analyse the concept of Random variables and probability distribution in designing processes
- know and differentiate the discrete and continuous two dimensional random variables.
- determine the concepts of hypotheses testing, its need and applications
- equip with statistical techniques for designing experiments, analyzing, interpreting and presenting research data.
- emphasize the aspects of statistical tools in engineering problems.

UNIT I RANDOM VARIABLES 12

Discrete and continuous random variables - Moments - Moment generating functions - Binomial,Poisson, Geometric, Uniform and Normal distributions.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES 12

Joint distributions - Marginal and conditional distributions - Covariance - Correlation and Linear regression - Transformation of random variables - Central limit theorem (for independent and identically)

UNIT III TESTING OF HYPOTHESIS 12

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample test based on Normal distribution for single mean and difference of means -Tests based on t, Chi- square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

UNIT IV DESIGN OF EXPERIMENTS 12

One way and Two way classifications - Completely randomized design - Randomized block design - Latin square design - 2^2 factorial design.

UNIT V STATISTICAL QUALITY CONTROL 12

Control charts for measurements (X and R charts) - Control charts for attributes (p, c and np charts) - Tolerance limits - Acceptance sampling.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- demonstrate the fundamental concepts of probability and probability distributions of random variables in designing process
- identify the differences in two dimensional random variables
- implement the statistical techniques to hypotheses testing of engineering and management problems
- be aware of the principles to be adopted for designing the experiments.
- compare statistical date using control chart in quality control

TEXT BOOKS

1. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
2. Johnson. R.A. and Gupta. C.B., "Miller and Freund‟s Probability and Statistics for Engineers", Pearson Education, Asia, 7th Edition, 2007..
3. Papoulis. A and Unnikrishnapillai. S., "Probability, Random Variables and Stochastic Processes" McGraw Hill Education India , 4th Edition, New Delhi , 2010..

REFERENCES

1. Larry C. Andrews, Bhimsen K. Shivamoggi, "Integral Transforms for Enginears", SPIE Optical Engineering press, Washington USA (1999).
2. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi (2010).
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education (2007).
4. Erwin Kreyszig., "Advanced Engineering Mathematics" 10thEdition,Wiley Publications
5. Ray Wylie C and Barrett.L.C, "Advanced Engineering Mathematics", Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.

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CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO4	3	3	3	2	-	-	-	-	-	-	-	2	3	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	3

AI19401 PRINCIPLES AND PRACTICES OF HORTICULTURAL CROP PRODUCTION 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- impart basic knowledge of Horticulture crop production.
- study the production practices of Horticulture crops.
- understand the cultivation practices of fruits and plantation crops.
- acquire knowledge in production practices of vegetable crops.
- introduce the production practices of flowers and medicinal plants.

UNIT I INTRODUCTION AND PROPAGATION OF HORTICULTURE CROPS 9

Horticulture crops - Scope and importance - Area and production - Exports and imports - fruit zones of India - Factors limiting production; Propagation - Methods (seed, vegetative method and tissue culture) - advantages and disadvantages - Propagation techniques - specialized plant parts for propagation; structures and tools used in propagation.

UNIT II PRCATICES IN HORTICULTURE CROPS 12

System of planting in orchards (Square, Rectangular, Hexagonal, Quincunx, Contour and Triangular);Training and pruning methods - usefulness; Protected cultivation - Precision farming - controlled environment cultivation - usefulness; Pollination and fruit set - factors influencing - improvement techniques; Fruit drops - Causes and management; Growth regulators - Types - Role in horticulture crops; Landscaping - Scope and Importance - Components of Landscaping.

UNIT III PRODUCTION PRACTICES OF FRUITS, SPICES AND PLANTATION CROPS 10

Generalized management and cultivation practices for important crops in Tamil Nadu - Fruit crops: Mango, Banana, Grapes, Acid lime, Papaya, Sapota and Guava; Spice crops: Pepper, Cardamom, Turmeric, Ginger and Coriander; Plantation crops: Coffee, Tea, Coconut and Arecanut.

UNIT IV PRODUCTION PRACTICES OF VEGETABLES 8

Generalized management and cultivation practices for important vegetable Crops: Tomato, Chillies, Capsicum, Brinjal, Bhendi, Onion, Gourds, Cassava, Carrot, Radish, Beetroot, Cabbage, Cauliflower, Amaranthus and Moringa.

UNIT V PRODUCTION PRACTICES OF FLOWERS AND MEDICINAL PLANTS 6

Generalized management and cultivation practices for commercial flower crops: Jasmine, Rose, marigold, Chrysanthemum; Cut flower production in rose; Commercial medicinal plants production technology: Gloriosa, Senna and Coleus.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- acquire knowledge in factors affecting growth and production of horticultural crops.
- understand the horticultural crop management practices.
- analyze the choice of practices to be followed for better growth of fruits, spices and plantation crops
- identify the best practices to be followed for higher yield of vegetable crops.
- gain ideas about the production technology of flowers and medicinal plants.

TEXTBOOKS

1. Kumar, N., Introduction to Horticulture, Rajalakshmi Publications. Nagercoil, 1993.
2. Edmond, J.B.Musser, A.M. and Andrews, F.S.1957. Fundamentals of Horticulture - McGraw Hill Book Co., New York.
3. Shanmugavelu, K.G. 1989. Production Technology of Vegetable Crops, Oxford India Publication, N.D.
4. Chattopadyay, T.K. 1998. A Text Book on Pomology (Vol.1-4), Kalyani publishers, New Delhi.

REFERENCES

1. Horticultural Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore. 2005
2. Kumar, N., Abdul Khader, M. Rangaswami, P. and Irulappan, I. Introduction to spices, plantation crops, medicinal and aromatic plants. Rajalakshmi Publications, Nagercoil. 1993.
3. Shanmugavel, K.G. Production Technology of Vegetable Crops. Oxford India Publications, New Delhi. 1989.
4. Bose T. K. and L.P.Yadav. Commercial Flowers, Nayaprakash, Calcutta.1989.
5. Handbook of Agriculture. ICAR Publications, New Delhi.

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CO1	2	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	-	3	2	-	-	2	3	-	-	-	-	3	3	2
CO4	-	3	2	-	-	-	2	-	-	-	-	3	3	2
CO5	2	-	-	-	-	-	-	-	-	-	-	-	3	2

AI19402 FLUID MECHANICS AND HYDRAULICS 3 1 0 4

COURSE OBJECTIVES

To enable the students to

- introduce the basic properties and behaviour of fluids.
- impart an idea of fluid statics and kinematics.
- estimate the rate of flow through various elements.
- analyze the flow through open channels.
- study the working principle of different types of pumps.

UNIT I FLUID PROPERTIES 12

Properties of fluids - definition - units of measurement - Mass density - specific weight - specific volume - specific gravity - viscosity - compressibility and bulk modulus of elasticity - surface tension - capillarity - vapour pressure.

UNIT II FLUID STATICS AND KINEMATICS 12

Fluid statics - Fluid pressure - Pascal's law - kinds of pressure - pressure variation in fluid - measurement of pressure - manometer and mechanical gauges; Hydrostatic forces on surfaces - total pressure and centre of pressure - buoyancy - meta centre - meta centric height; Fluid kinematics - types of fluid flow - rate of flow - velocity and acceleration - velocity potential function - stream function - stream line – equipotential line - flow net.

UNIT III FLOW MEASUREMENT 12

Equation of motion - Bernoulli's equation - applications – venturimeter - orifice meter - pitot tube - Orifice - flow through orifice - time of emptying a tank with and without inflow; Flow through pipes - loss of energy in pipes - major and minor losses in pipes.

UNIT IV OPEN CHANNEL FLOW 12

Flow in open channels - classification - most economical section of channel - rectangular – trapezoidal; Specific energy and critical depth - critical flow; Flow measurement in small channels - notches and weirs - rectangular - triangular - trapezoidal; Flow measurement in rivers, streams and canals - current meter - float method.

UNIT V PUMPS 12

Pumps - types; Centrifugal pump - components - working principle - Priming – cavitation; Reciprocating pump - components - working principle - types; Other pumps - submersible pump - Jet pump - Air lift pump - Hydraulic ram.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- gain sufficient knowledge about properties and behaviour of fluids.
- analyse the static and kinematic behaviour of fluids.
- measure the discharge and loss of energy in flow through pipes.
- estimate the flow through open channels.
- understand the different types of pumps and its working principle.

TEXT BOOKS

1. Bansal, R.K., A text book of Fluid Mechanics and Hydraulic Machinery, Laxmi Publications (P) Ltd., New Delhi, 2002.
2. Subramanya K., "Flow in Open Channels", Tata McGraw-Hill Publishing Company 2010.

REFERENCES

1. Garde, R.J., Fluid Mechanics through problems. New Age International Publishers (P) Ltd., New Delhi, 2002.
2. Jain A. K. "Fluid Mechanics", Khanna Publishers, 2010
3. Modi, P.N. and Seth S.M., Hydraulics and Fluid Mechanics. Standard Publishers Distributors, New Delhi, 2010.
4. Jagdish., Hydraulic Machines. Metropolitan Book House, New Delhi, 2000.

CO/PO Mapping

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COs	**Programmes Outcomes(POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	3	2	3	1	-	-	-	-	-	-	-	1	1
CO2	2	3	2	3	1	-	-	-	-	-	-	-	1	1
CO3	2	3	2	3	1	1	-	-	-	-	1	1	3	3
CO4	2	3	2	3	1	1	-	-	-	-	1	1	2	2
CO5	2	3	2	3	1	1	-	-	-	-	1	1	3	3

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AI19403 HYDROLOGY AND GROUNDWATER ENGINEERING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- introduce the concept of hydrological aspects of water availability and requirements.
- give idea about runoff and it measurement.
- study the properties of aquifers.
- impart knowledge on hydraulics related to wells.
- know about modern well drilling methods.

UNIT I PRECIPITATION AND EVAPORATION 10

Hydrological cycle - Meteorological measurements - Requirements, types and forms of precipitation - intensity - duration - frequency; Rain gauges - Spatial analysis of rainfall data using Thiessen and Isohyetal methods; Interception – Evaporation - evaporation measurements - pan evaporimeter - evaporation suppression; Infiltration - double ring infiltrometer - infiltration indices - infiltration equation (Horton's).

UNIT II RUNOFF 8

Watershed - catchment and basin - Catchment characteristics; Runoff - factors affecting runoff - Run off estimation using rational and empirical methods - Strange's table - CN&SCS methods; Stage discharge relationships - flow measurements - Hydrograph - Unit Hydrograph - IUH

UNIT III HYDRO-GEOLOGIC PARAMETERS AND INVESTIGATION 9

Groundwater - scope & importance - development in India - occurrence of groundwater - distribution; Water bearing properties of Rocks - Types of aquifer - confined - unconfined - perched - artesian - aquifuge - aquitard - aquiclude - Movement of groundwater; Geophysical investigation of groundwater - surface methods - Subsurface methods - aquifer mapping - uses - Water Balance.

UNIT IV HYDRAULICS OF WELLS 10

Wells - classification - advantages of open well and bore wells - Hydraulics of wells - static water levels - piezometric level; Aquifer characteristics; Pumping tests - selection of well sites; Steady state radial flow - Dupit's equation - Theim's equation - Partially penetrating wells - interference of wells; Unsteady state flow - Theis method - Jacob's method; Recuperation test; Hydraulics of open wells - well losses; Introduction to groundwater models.

UNIT V WELL DRILLING METHODS 8

Construction - dug well - tube wells - sunk wells - well logging - Types of well screen - Design of well screen - Casing - Curb; Well development - yield testing - Sanitary protection; Well drilling Techniques for different formations - rock blasting units - hand boring - Percussion drilling & tools; Pneumatic drilling - down the hole hammer - drill bits - Wagon drills - Jack hammer; Rotary drilling; Yield increase - Augmentation & Recharging techniques.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand the various parameters in meteorological measurements.
- gain knowledge on runoff measurement methods..
- know the various geological parameters and groundwater investigation techniques
- conduct hydraulic analysis on wells.
- gain knowledge on modern well drilling methods.

TEXT BOOKS

1. Subramanya .K. "Engineering Hydrology"- Tata McGraw Hill, 2010.
2. Jayarami Reddy .P. "Hydrology", Tata McGraw Hill, 2008.
3. Raghunath .H.M., "Hydrology", Wiley Eastern Ltd., 1998.

REFERENCES

1. David Keith Todd. "Groundwater Hydrology", John Wiley & Sons, Inc. 2007
2. VenTe Chow, Maidment, D.R. and Mays, L.W. "Applied Hydrology", McGraw Hill International Book Company, 1998.
3. Linsley, R.K. and Franzini, J.B. "Water Resources Engineering", McGraw Hill International Book Company, 1995.

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COs	**Programmes Outcomes(POs)**													
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CO1	2	3	1	3	2	-	2	-	2	2	1	-	3	2
CO2	2	3	3	2	2	1	2	1	2	3	2	2	2	3
CO3	2	2	3	2	3	1	3	1	3	3	2	2	2	3
CO4	3	2	3	3	2	2	3	1	2	2	3	1	2	2
CO5	2	2	2	3	3	2	2	-	2	2	3	1	2	3

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AI19404 THERMAL ENGINEERING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the fundamental concepts and first law of thermodynamics.
- know the second law and its application.
- study the principle of operation of IC engines and boilers.
- impart knowledge in the properties of mixture of gases.
- introduce modes of heat transfer.

(Use of standard and approved steam table, Mollier chart and Heat and Mass Transfer data book permitted)

UNIT I BASIC CONCEPTS AND FIRST LAW 9

Thermodynamics and Energy - Comparison of microscopic and macroscopic approach - Intensive and extensive properties - systems and their types; Thermodynamic process and cycles - Simple problems on processes; Concept of Temperature and heat - Zeroth law of thermodynamics - First law of Thermodynamics - steady flow processes; solving problems on the applications of Thermodynamics.

UNIT II SECOND LAW OF THERMODYNAMICS 9

Heat reservoir - Source, sink - Heat engine, Refrigerator, heat pump - statements of second law and its corollaries; Carnot Cycle, Reversed Carnot cycle, efficiency, COP; Introduction to Pure substances - Formation of steam and its thermodynamic properties.

UNIT III INTERNAL COMBUSTION ENGINES 9

Introduction to IC engines - C.I and S.I Engines - Four stroke and two stroke engines; Simple carburetor and MPFI; Diesel pump and injector system; Lubrication and cooling system; Battery and Magneto ignition system.

UNIT IV IDEAL AND REAL GASES AND GAS MIXTURES 9

Properties of Ideal gas - Ideal and Real gas comparison; Vander Waals equation - Dalton law - Gibbs law - compressibility chart; Properties of mixture of gases; Simple problems on Gas mixtures.

UNIT V HEAT TRANSFER 9

Conduction - Plane wall, hollow cylinder, Composite walls - Fins; Convection - Forced convection and Free convection - Flow over flat plate and flow through pipes; Introduction to Radiation.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- gain knowledge on Thermodynamic principles and first law.
- acquire knowledge on thermodynamic second law and its applications.
- understand the working principle of IC engines and boilers.
- know the properties of gases and vapour mixtures.
- differentiate three modes of heat transfer.

TEXT BOOKS

1. Nag.P.K., "Engineering Thermodynamics", Third Edition, Tata McGraw hill, 2005.
2. R.K.Rajput, "Thermal Engineering", Laxmi publication (p) Ltd., New Delhi, 2010.

REFERENCES

1. Yunus. A.Cengel, M.Boles, "Thermodynamics - An Engineering Approach", Tata McGraw Hill, 2010.
2. Ganesan.V, "Internal Combustion Engines", Tata McGraw Hill, 2007
3. Domkundwar. S, C.P.Kothandaraman, "A course in Thermal Engineering", DhanpatRai& Co (P) Ltd, 2000.
4. Natarajan. E, "Engineering Thermodynamics: Fundamental and Application", Anuragam publications, 2012.
5. Rudramoorthy. R, "Thermal Engineering" Tata McGraw Hill New Delhi,2003

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CO2	2	3	2	3	1	-	-	-	-	-	-	-	1	1
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CO4	2	3	2	3	1	1	-	-	-	-	1	1	2	2
CO5	2	3	2	3	1	1	-	-	-	-	1	1	3	3

MC19401 **ENVIRONMENTAL SCIENCE AND ENGINEERING** **3 0 0 0**

COURSE OBJECTIVES

To enable the students to

- recognize the interdisciplinary and holistic nature of the environment.
- create awareness on ecosystem and biodiversity preserve.
- study about the integrated themes of pollution control and waste management.
- understand the significance of natural resources and environment to stimulate sustainable development.
- assess the socio-economic, political and ethical issues on population with environment.

UNIT I **INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES** **9**

Environment–Definition, scope, importance, need for public awareness; Forest resources–Use, over exploitation, deforestation, effects on forests and tribal people; Water resources – Use, over utilization of surface and ground water.; Mineral resources – Use, exploitation, environmental effects of extracting and using mineral resources; Food resources: Effects of modern agriculture – fertilizer, pesticide problems; Role of an individual in conservation of natural resources; **Activity**– Slogan making event on conserving natural resources or plantation of trees.

UNIT II **ECOSYSTEMS AND BIODIVERSITY** **9**

Concept of an ecosystem–Structure and function of an ecosystem, producers, Consumers, decomposers, energy flow in the ecosystem; Ecological succession; Food chains - food webs and ecological pyramids; Ecosystems–Types of ecosystem, Introduction, forest ecosystem. aquatic ecosystems(lakes, rivers); Biodiversity– Introduction, definition (genetic - species –ecosystem); Diversity–Value of biodiversity, Consumptive use, productive use, social values, ethical values, aesthetic values; Hotspots of biodiversity; Conservation of biodiversity– In-situ and ex-situ; conservation of biodiversity

UNIT III **POLLUTION** **9**

Pollution–Définition, air pollution, water pollution, marine pollution, noise pollution, thermal pollution ; Solid waste management– Causes, effects, control measures of urban and industrial wastes; Role of an individual in prevention of pollution; Disaster management– Floods, earthquake, cyclone, landslides; Electronic waste –Sources, causes and its effects

UNIT IV **SOCIAL ISSUES AND ENVIRONMENT** **9**

Water conservation – rain water harvesting, watershed management; Environmental ethics– climate change, global warming and its effects on flora and fauna, acid rain, ozone layer depletion, nuclear accidents, nuclear holocaust; Environment protection act– Air (Prevention and Control of Pollution)Act, water (Prevention and control of Pollution) act.

UNIT V **HUMAN POPULATION AND ENVIRONMENT** **9**

Human population– Population growth, variation among nations, population explosion; Family welfare programme; Environment and human health; Human rights; Value education; HIV/AIDS; Women and child welfare; Role of information technology in environment and human health.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- explain the importance of interdisciplinary nature of environment studies, uses and exploitation of natural resources.
- analyze the different types of ecosystem and biodiversity, its values and protecting the environment from degradation.
- investigate the existing environmental challenges related to pollution and its management.
- select suitable strategies for sustainable management of components of environment.
- correlate the impacts of population and human activities on environment.

TEXT BOOKS

1. Raman Sivakumar, Introduction to Environmental Science and Engineering, 2nd Edn, Tata McGraw Hill Education Private Limited, New Delhi,(2010).
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, (2010).

REFERENCES

1. S. Divan, Environmental Law and Policy in India, Oxford University Press, New Delhi, 2001.
2. A.K.De, Environmental Chemistry, VI edition,2015 NewAge International (P) ltd Publication, New Delhi.
3. C.S.Rao, Environmental Pollution and Control engineering, Vedition, New Age International (P) ltd Publication, NewDelhi 110002
4. Clair Nathan Sawyer, Perry L. McCarty, Gene F. Parkin, "Chemistry for Environmental Engineering

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CO2	-	-	-	-	-	1	2	3	-	2	-	3	1	-
CO3	1	-	2	-	1	1	2	3	-	2	-	3	1	2
CO4	-	-	2	-	2	1	3	3	-	2	-	2	1	1
CO5	-	1	-	-	-	1	3	3	-	2	-	2	1	-

AI19405 AGRICULTURAL ENGINEERING PRACTICES LABORATORY 0 0 2 1

COURSE OBJECTIVES

To enable the students to

- learn agro-meteorological measurements influencing crop production.
- estimate germination rate of food crops.
- study the soil and water parameter measurements.
- demonstrate farm machinery and implements.
- practice on agro-energy equipments.

LIST OF EXPERIMENTS

1. AGROMETEOROLOGY

1. Meteorology - Precipitation - Rain gauges - recording and non-recording rain gauges.
2. Measurement of humidity, wind direction and speed.
3. Measurement of sunshine and solar radiation.
4. Measurement of evaporation (open pan evaporimeter) and study of Automatic Weather Station (AWS).

2. SOIL AND WATER PARAMETERS

1. pH and EC measurement using electrode device.
2. Soil moisture estimation by different methods.
3. Water management and irrigation scheduling

3. AGRICULTURAL MACHINERY

1. Demonstration of farm implements and machineries.
2. Demonstration of processing equipments
3. Demonstration of Agro-energy equipments.

TOTAL PERIODS 30

COURSE OUTCOMES

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

- learn agro-meteorological measurements influencing crop production.
- identify different food crops and estimate germination rates
- measure the soil and water parameters.
- gain knowledge in operation of farm machinery and implements.
- understand the use and working principle of agro-energy equipments.

CO/PO Mapping :

*CO-PO & PSO Matrix Correlation :: Put if, Strong :3, Moderate : 2, Weak : 1, Nil : -														
COs	**Programmes Outcomes(POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	-	-	-	-	-	-	-	-	-	-	2	3	-
CO2	3	2	-	-	-	-	-	-	-	-	-	2	3	-
CO3	3	2	-	-	2	2	-	-	-	-	-	3	3	3
CO4	3	-	-	-	2	-	-	-	-	-	-	3	3	-
CO5	3	-	-	-	2	-	-	-	-	-	-	2	3	-

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Agriculture Engineering
11/9/2020
AUTONOMOUS

EN19401 ENGLISH PROFICIENCY COURSE LABORATORY 0 0 2 1

COURSE OBJECTIVES

To enable students to

- familiarize with the reading skills such as skimming and scanning.
- practise writing tasks to the level expected.
- develop listening strategies such as listening for key words, making inferences and identifying main ideas.
- speak well without inhibition and to assist the students in improving their vocabulary, pronunciation and comprehension of grammar.

EXERCISES FOR PRACTICE

1. Listening Exercises from TOEFL
    a. Conversations, Lectures
2. Listening Exercises from IELTS
    b. Places and directions
    c. Actions and processes
3. Reading Exercises from PTE
    d. Re-order paragraphs
4. Reading Exercises from IELTS
    e. Opinions and attitudes
    f. Locating and matching information
5. Reading Exercises from BEC Vantage
    g. Single informational text with lexical gaps
    h. Error identification
6. Writing Exercises from PTE
    i. Summarize written text
7. Writing Exercises from IELTS
    j. Describing maps
    k. Describing diagrams
8. Speaking IELTS format
    l. Talking about familiar topics
    m. Giving a talk
    n. Discussion on a Topic

TOTAL PERIODS 30

COURSE OUTCOMES

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

- skim, scan and infer the given texts and attend the tasks successfully.
- write coherently using appropriate vocabulary and grammar.
- listen to speeches and conversations and answer the questions.
- communicate fluently and effectively on any given topics and appear with confidence for on-line tests.

TEXT BOOKS

1. Cambridge IELTS 12 Academic Student's Book with Answers: Authentic Examination Papers (IELTS… by Cambridge University Press . New Delhi.2016
2. TOEFL iBT Prep Plus 2018-2019 4 Practice Tests) Kaplan Publishing. Newyork.2017.

REFERENCES

1. Cambridge University Press India Pvt. Ltd, New Delhi.2016.
2. PTE Academic Test builder. Macmillan Education. London. 2012.

CO/PO Mapping :

***CO-PO & PSO Matrix Correlation :: Put if, Strong :3, Moderate : 2,Weak : 1, Nil : -**														
COs	**Programmes Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	2	3	-	-	-	3	2	-	-	-	-
CO2	-	-	2	2	-	-	1	1	3	2	-	2	-	-
CO3	-	-	-	-	-	3	1	2	3	2	2	3	-	-
CO4	-	-	2	-	-	2	2	3	3	2	2	1	-	-

AI19406 FLUID MECHANICS AND STRENGTH OF MATERIAL LABORATORY **0 0 4 2**

COURSE OBJECTIVES

To enable the students to

- verify the various principles of fluid flow by performing the experiments in lab.
- determine the major and minor losses of fluid flow through pipes.
- understand the working principles of various pumps by doing performance test.
- expose the testing of different materials under the action of various forces
- determine the properties of various materials experimentally.

FLUID MECHANICS

LIST OF EXPERIMENTS -

A. Flow Measurement

1. Flow through Venturimeter
2. Flow through Orifice meter
3. Flow through circular Orifice
4. Flow through Rectangular Notch
5. Verification of Bernoulli's Theorem

B. Losses in Pipes

1. Determination of friction coefficient in pipes
2. Determination of losses due to bends, fittings and elbows

C. Pumps

1. Performance test on Centrifugal pump
2. Performance test on Reciprocating pump
3. Performance test on Gear pump

STRENGTH OF MATERIALS LABORATORY

LIST OF EXPERIMENTS

1. Tension test on mild steel rod
2. Compression test on wood
3. Torsion test on mild steel rod
4. Impact test on metal specimen (Izod and Charpy)
5. Rockwell Hardness test on metals.
6. Brinell Hardness Test on metals
7. Deflection test on metal beam
8. Compression test on helical spring
9. Tension test on helical spring

TOTAL PERIODS 60

COURSE OUTCOMES

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

- determine the coefficient of discharge through various flow measuring devices.
- measure flow in pipes and determine frictional losses.
- develop characteristic curves of pumps.
- acquire knowledge in the area of material testing
- understand the behaviour of various materials by doing experiments

CO/PO Mapping :

*CO-PO & PSO Matrix Correlation :: Put if, Strong :3, Moderate : 2, Weak : 1, Nil : -														
COs	**Programmes Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	1	1	1	3	-	-	-	-	-	1	1	3	3
CO2	1	2	1	2	3	-	-	-	-	-	2	1	2	2
CO3	2	2	3	2	2	1	-	-	-	-	1	1	3	3
CO4	2	1	1	1	3	-	-	-	-	-	1	1	3	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-