VIVEKANANDHA

COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution, affiliated to Anna University –Chennai)

Approved by AICTE, New Delhi & Accredited by NAAC and NBA (Tier – I)

Elayamaplayam, Tiruchengode – 637 205, Namakkal District, Tamil Nadu.

CURRICULUM AND SYLLABUS

For

B.TECH. AGRICULTURAL ENGINEERING

REGULATION 2023

Curriculum and Syllabus (Semester I to IV)

Applicable to students admitted from the academic year 2024-25 onwards

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous)

Elayampalayam, Tiruchengode – 637205

B.TECH. AGRICULTURAL ENGINEERING

Regulation 2023

COLLEGE VISION

To impart value based education in Engineering and Technology to empower young women to meet the societal exigency with a global outlook.

COLLEGE MISSION

- To provide holistic education through innovative teaching-learning practices
- To instill self confidence among rural students by supplementing with co-curricular and extra-curricular activities
- To inculcate the spirit of innovation through training, research and development
- To provide industrial exposure to meet the global challenges
- To create an environment for continual progress through lifelong learning

DEPARTMENT VISION

To be the centre of excellence in producing highly skillful women engineers in the field of agriculture engineering who can promote sustainable agricultural development in and around globe.

DEPARTMENT MISSION

- To prop up women in gaining education and knowledge in the field of agricultural engineering that infuses the technology in tradition methodologies.
- To endorse students in research and training and leading them to meet out the current needs in the field of agricultural engineering.
- To develop new technologies with integrated knowledge that can turn the geo greener.

Programme Educational Objectives (PEOs)

Graduates of the Agricultural engineering will

- Acquire sound knowledge in agricultural engineering principles and practices.
- Design and develop innovative agriculture products and equipment.
- Become a skilled agripreneur, thereby providing ethical contribution to society continuously.

Programme Outomes (POs)

- **PO1 Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2 Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3 Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4 Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5 Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6 The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7 Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8 Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9 Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10 Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11 Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12 Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)

Graduates of the Agricultural Engineering can able to

- Develop expertise in design and developing solutions to agricultural problems existing in the society.
- Instill the concept of sustainable agricultural productivity with engineering applications.

Mapping Programme educational objectives (PEOs) with Programme Outcomes (POs)

PO / PEO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	√	√	√	√	√	-	-	-	-	-	-	-
PEO2	-	-	√	√	-	√	√	√	√	-	-	√
PEO3	-	-	√	-	-	-	-	√	-	√	√	-

Mapping Courses with Programme Outcomes (POs)

PO / Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U23AG301	3	2	2	1	1	1	1					1
U23AG302	3	2	2		2			1				1
U23AG303	3	2	3	2	3	3	2	2	2		2	2
U23AG304	3	2	1	1	2	2	1	1	2	2	1	3
U23AG305	3	3	2	3	3	2	2	3	2	2	1	2
U23AG306	3	2	2	1	1	1	1					1
U23AG307	3	3	3	2	3	3	3	3	3	3	3	1
U23AG408	3	2	2	1		1					1	1
U23AG409	3	3	2	1		1			1		1	2
U23AG410	2	3	3	2	3			2			2	2
U23AG411	2	3	1	2	1	1	1					1

U23AG412	3	2	2	1		1					2	1
U23AG413	3	2	2	1	3	1				1	2	1
U23AG514	2	2	1	2	1	2	2	1	2	2	1	2
U23AG515	2	3	3	2	3			2		1		2
U23AG516	1	1	2	2	2	2	1	1		1	1	2
U23AG517	1	1	2	1	2	2	2	2	2	2	2	2
U23AG618	2	2	3	1	1	1						1
U23AG619	2	2	2	2	2	2	2	2	1	2	2	2
U23AG620	2	1	3	1	3	1					1	1
U23AG621	2	1	3	1	1	1				1		1
U23AG622	1	1	2	2	2	2	1	1		1	1	2
U23AG723	3	3	2	1	1	1	2	1	1	1	2	3
U23AG724	3	3	2	1	1	1	2	1	1	1	2	3

CREDIT DISTRIBUTION – R2023

S. No.	Category	Credit Per Semester								Total Credits
		1	2	3	4	5	6	7	8	
1	BSC	8	8	4	4					24
2	ESC	7	8							15
3	HSMC	4	4					3		11
4	PCC			15	15	8	13	12		63
5	PEC					12	6			18
6	OEC						3	6		9
7	EEC	1		1		1	1	3	10	17
8	MC				1					1
9	CTC			1	1	1	1			4
Total		20	20	21	21	22	24	24	10	162

BSC – Basic Science Courses, ESC – Engineering Sciences Courses, MC – Mandatory Courses, HSMC – Humanities and Social Sciences including Management Courses, EEC – Employability Enhancement Courses, PCC – Professional Core Course, OEC – Open Elective Course, EEC – Employment Enhancement Course, CTC – Carrier Track Course.

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Programme	**B. Tech.**	Programme Code	108	Regulation	**2023**
Department	**AGRICULTURAL ENGINEERING**			Semester	**I**

CURRICULUM
((Academic year 2025 - 2026)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA101	Matrices and Calculus*	BSC	3	1	0	4	40	60	100
U23EN101	English For Communication*	HSMC	3	0	0	3	40	60	100
U23CH101	Engineering Chemistry$	BSC	3	0	0	3	40	60	100
U23CS101	Programming for Problem Solving*	ESC	3	0	0	3	40	60	100
U23TA101	தமிழர் மரபு / Heritage of Tamils*	HSMC	1	0	0	1	40	60	100
PRACTICAL INTEGRATED WITH THEORY									
U23GE102	Design Thinking$	EEC	1	0	2	1	50	50	100
PRACTICAL									
U23CH102	Chemistry Laboratory$	BSC	0	0	3	1	60	40	100
U23CS102	Programming for Problem Solving Laboratory*	ESC	0	0	3	1	60	40	100
U23GE204	Engineering Practices Laboratory$	ESC	0	0	3	1	60	40	100
MANDATORY COURSES									
-	Induction Programme*	3 Weeks				0	-	-	-
U23MCFY2	Indian Constitution and Universal Human values$	MC	2	0	0	0	100	-	100
					Total	**18**	**530**	**470**	**1000**

BSC - Basic Science Courses, ESC- Engineering Science Courses, MC-Mandatory courses, HSMC-Humanities and Social Sciences including management courses, EEC – Employability Enhancement courses, CA- Continuous Assessment, ESE - End Semester Examination.

*Common for all branches

$ Common for ECE, EEE, BT, BME, CIVIL & AGRI, AI & ML

Board Chairman **Principal**

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**B.TECH**	Programme Code	**108**	Regulation	**2023**		
Department	**AGRICULTURAL ENGINEERING**			Semester	**I**		

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23MA101	**Matrices and Calculus**	3	1	0	4	40	60	100

Course Objective	The Main Objective of the course is • To develop the use of matrix algebra techniques that is needed by engineers for practical applications. • To familiarize the students with differential calculus. • To familiarize the student with functions of several variables. This is needed in many branches of engineering. • To make the students understand various techniques of integration. • To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.	
Course Outcome	At the end of the course the students will be able to	Knowledge level
	CO1: Use the matrix algebra methods for solving practical problems.	K3
	CO2: Apply differential calculus tools in solving various application problems.	K4
	CO3: Able to use differential calculus ideas on several variable functions.	K5
	CO4: Apply different methods of integration in solving practical problems.	K5
	CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems.	K3
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	2	1									2		
CO 2	3	3	2	1									2		
CO 3	3	1	2	1									2		
CO 4	3	2	2	1									2		
CO 5	3	1	1	1									2		

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment. 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**MATRICES**	Periods	**9+3**

Characteristic equation – Eigen values and Eigenvectors of a real matrix– Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem(excluding proof) – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms. Simple application in encoding message using 2×2 matrix.

Unit - II	**DIFFERENTIAL CALCULUS**	Periods	**9+3**

Limit, Continuity, Differentiability, Rules of differentiation, Differentiation of various functions, Rolle's theorem(excluding proof), Mean value theorem(excluding proof), Taylor's theorem(excluding proof), Maxima and Minima. Applications: Newton's law of cooling – Heat flow problems.

Unit – III	**FUNCTIONS OF SEVERAL VARIABLES**	Periods	**9+3**

Partial differentiation – Homogeneous functions and Euler's theorem(excluding proof) – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables(excluding proof) – Maxima and minima of functions of two variables. Applications: Lagrange's method of undetermined multipliers.

Unit - IV	**INTEGRAL CALCULUS**	Periods	**9+3**

Definite and Indefinite Integrals- Methods of integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions -Reduction formula on $\int_0^{\frac{\pi}{2}} \cos^n x dx$, $\int_0^{\frac{\pi}{2}} \sin^n x dx$.

Unit - V	**MUTIPLE INTEGRALS**	Periods	**9+3**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

	Total Periods	**45+15=60**

Text Books

1.	Stewart, J. Calculus: Early Transcendentals (8th Edition), Cengage Learning, 2015.
2.	Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

References

1.	Kreyszig E, Advanced Engineering Mathematics (10th Edition), John Wiley (2015).
2.	Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3.	Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus ", 14th Edition, Pearson India, 2018.
4.	Anton H, Calculus: Early Transcendentals, 10th Edition, Wiley (2016).
5.	B V Ramana, Higher Engineering Mathematics, Tata McGraw Hill Education Pvt Ltd., New Delhi (2016)

E-Resources

1.	https://freevideolectures.com › All Courses › Calculus › UCLA
2.	www.learnerstv.com/Free-engineering-Video-lectures

3.	www.nptel.ac.in

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Programme	**B.Tech.**	Programme Code	**108**	Regulation	**2023**
Department	**AGRICULTURAL ENGINEERING**			Semester	**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23EN101	**English for Communication**	3	0	0	3	40	60	100

Course Objective

The main objective of this course is to:

- Improve the communicative ability of learners.
- Develop learners read widely in order to practice writing.
- Enrich vocabulary and strengthen grammatical understanding.
- Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning.
- Learn to apply the language features of academic and professional writing and speaking.

Course Outcome

At the end of the course, the student should be able to,	Knowledge Level
CO1: Use appropriate vocabulary in a professional context.	K1
CO2: Write appropriately based on the knowledge gained through reading of a variety of materials.	K1
CO3: Use grammatically correct language.	K2
CO4: Read and infer meanings of technical texts.	K2
CO5: Comprehend and retain understanding of context and syntax through reading.	K3

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

Cos	Programme Outcomes (POs)												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**	**PSO 3**
CO 1						2			3	3		3	1		
CO 2						2			3	3		3	1		
CO 3						2			3	3		3	1		
CO 4						2			3	3		3	1		
CO 5						2			3	3		3	1		

Pre-requisites Nil

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I		Periods	**9**
Listening-Introduction to Different Types of Listening, Listening to Casual Conversations, **Speaking**- Introduction to develop the Art of Speaking, Giving Self Introduction, **Reading**–Understanding the Basics of Reading Skills, Reading Instructions and Technical Manuals, **Writing**- Introduction to writing strategies, Writing Definitions, **Focus on Language** - -Technical terms (Jargon), Word Formation with Prefixes and Suffixes, Using Active Voice and Passive Voice, Basic sentence patterns, Tenses (past, present, perfect and continuous tenses).			
Unit – II		Periods	**9**
Listening- Listening to lectures, listening to description of equipment, **Speaking**- Strategies for Developing Conversational Skills, Short Conversations through Role Play Activities, **Reading**– Reading Comprehension, Reading e-mails, Reading Headlines, Predicting the Content, **Writing**- Paragraph writing, Essay writing, Note making, Writing Descriptions, **Focus on Language**–Collocations, One word substitution, Subject - verb agreement			
Unit – III		Periods	**9**
Listening- Listening to different kinds of interviews (Face - to - face, radio, TV and telephone interviews), **Speaking**-Describing an Object, Asking Questions, Participating in Discussions **Reading**– Intensive reading, Reading passages for gist. **Writing**- Writing short& lengthy e-mails with emphasis on Brevity, Clarity, Coherence and Cohesion), **Focus on Language**–Sequential Connectives, Impersonal Passive			
Unit – IV		Periods	**9**
Listening-Note Taking, **Speaking**- Improving Fluency through Narration. **Reading**–Reading passages for specific information- Phone messages, Reading and Transferring Information. **Writing**- Effective writing strategies, Informal writing, Writing a Memo, **Focus on Language**– Cause and Effect, Conditional Statements (if - clauses and types), Usage of Modal Verbs.			
Unit – V		Periods	**9**
Listening- Listening to understand Modulation, Listening to Welcome Speeches, **Speaking**- Delivering Welcome Address, Understanding Segmental and Supra-segmental Features-Practicing Stress, Pause and Intonation, **Reading**– Reading for a purpose, Reading Business Documents, Interpreting Charts and Graphs. **Writing**- Describing a Process. **Focus on Language** -Synonyms and Antonyms, Common Errors in English.			
		Total Periods	**45**

Text Books	
1.	Faculty from the Department of English, English for Communication, Cengage Learning India Pvt. Ltd., 2025.
References	
1.	Dr. Padma Ravindran, Poorvadevi, M. Y. Abdur Razack- English for life, English for work, students Book, Ebek language laboratory pvt ltd, 2021.
2.	Dutt Rajeevan, Prakash. A Course in Communication Skill (Anna University, Coimbatore edition): Cambridge University Press India Pvt.Ltd, 2020.
3.	S.P. Dhanavel, English and Communication Skills for Students of Science and Engineering, Orient Blackswan Pvt, Ltd, 2020.
4.	Technical English – I & II, Sona versity, Sona College of Technology, Salem, First Edition, 2022.
5.	Meenakshmi Raman and Sangeeta Sharma- 'Technical communication English Skills for Engineers; oxford University Press, 2024.
E-Resources	
1.	http://www.sparknotes.com/lit/the-alchemist/summary.html
2.	https://www.stephencovey.com/7habits/7habits.php
3.	http://en.wikipedia.org/wiki/The_Seven_Habits_of_Highly_Effective_People

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Programme	**B.Tech**	Programme Code	**108**	Regulation	**2023**
Department	**Agricultural Engineering**			Semester	**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CH101	**Engineering Chemistry**	3	0	0	3	40	60	100

Course Objective

The main objective of this course is to:

- Recognize the basic technology requirements in water treatment
- Gain knowledge in basics and preparations, properties and applications of Polymers.
- Enrich the Knowledge of the students with the basics of Nano materials, their properties and applications.
- Familiarize about the Non renewable, renewable energy and different types of storage devices in the engineering application.

Gain knowledge in destruction and protection of metals for engineering applications.

Course Outcome

The students who complete this course successfully are expected to:	Knowledge Level
CO1: Implement innovative solutions in wastewater treatment process.	K4
CO2: Familiarize with the applications of polymers in the field of engineering.	K3
CO3: Identify the synthesis methods of Nanoparticles and their industrial applications	K2
CO4: Recognize the renewable, non renewable energy and storage devices for domestic and industrial applications.	K4
CO5: Categorize the metal corrosion in different environment and find out appropriate control techniques to avoid corrosion	K3

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

Cos	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**	**PSO 3**
CO 1	3	3	3	2	1	2	2	2					1	1	2
CO 2	3	2	2	2		2	2	1					2	2	2
CO 3	3	2	2	3	2	1	2	1					2	1	1
CO 4	3	3	2	2	1	1	3	2					3	2	2
CO 5	3	3	3	2	1	2	2	1					2	1	2

Pre-requisites **Nil**

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit - I	**WATER TECHNOLOGY**	Periods	9
Introduction-sources and impurities in water-soft and hard water- water quality parameters.Types of hardness. Determination of hardness by EDTA method. Domestic water treatment. Boiler feed water –requisites, scale and sludge formation in boilers-caustic embrittlement- boiler corrosion- treatment of boiler feed water. Internal conditioning (carbonate, phosphate, and calgon conditioning) ,external conditioning – ion exchange process, zeolite process, Electrodialysis. Brackish water –water purification by reverse osmosis.			
Unit - II	**POLYMER CHEMISTRY**	Periods	9
Introduction - occurrence, definitions – functionality - degree of polymerization- classification of polymers – structure (linear, branched & network polymer structure) block, random & graft copolymers, tacticity, Tg (Factors influencing Tg), molecular weight - number and weight average method. Types of polymerizations - addition, condensation and copolymerization. Mechanism of polymerization (Free radical). Preparation, properties and applications of PE, nylon6, nylon 66, Poly Urethane, poly isoprene and Vulcanization of rubber, TEFLON ,PET, and Bakelite			
Unit - III	**NANO CHEMISTRY**	Periods	9
Basics- distinction between molecules, nanoparticles and bulk materials; size dependent properties. Nanoparticles: nanocluster, nanorod, nanotube (CNT) and nanowires. Synthesis: Top down process- laser ablation,spray pyrolysis, chemical vapour deposition, electro deposition. Bottom up process- precipitation, sol-gel, thermolysis - hydrothermal, solvothermal -properties and applications of nano materials in medical and electronic devices.			
Unit - IV	**ENERGY RESOURCES AND STORAGE DEVICES**	Periods	9
Non renewable energy - nuclear energy, nuclear reaction and its types; Nuclear power plant and its working (light water nuclear power plant & breeder reactor).Renewable energy and its sources - solar Energy - photo voltaic cells-working of photovoltaic cell, recent advances in solar cell materials; wind energy - types of wind power plants (WPPs), components and working of WPPs. Batteries and fuel cells: types of batteries -alkaline battery, lead storage battery, Ni-Cd battery, lithium battery, fuel cell - H_2-O_2 fuel cell-applications.			
Unit - V	**CORROSION AND ITS CONTROL**	Periods	9
Introduction, types of corrosion - chemical and electrochemical corrosion, mechanism, pilling -bedworth rule, types of electrochemical corrosion – galvanic corrosion, pitting corrosion, crevice corrosion, corrosion on wire fence and pipeline corrosion, factors influencing rate of corrosion. Corrosion control methods – sacrificial anode and impressed cathodic current. Protective coatings – paints: constituents and functions, metallic coatings - steps involved in cleaning the surface for electroplating, electroplating (Au), and electro less plating (Ni).			
		Total Periods	**45**

Text Books

1. Dr.S.Mageswari, Dr.K.Balachandran, Dr.G.Vijayakumar, “Engineering Chemistry” Tata Mc Graw Hill Pvt. Ltd., First Edition-2024.
2. O.G.Palanna, “Engineering Chemistry” Tata Mc Graw Hill Pvt. Ltd., Second Edition -2017

References

1. P. C. Jain and Monica Jain, “Engineering Chemistry”, 17th Edition, DhanpatRai Publishing Company Pvt. Ltd., 2018.
2. Arun Bahl, B.S. Bahl, G.D. Tuli, “Essentials of Physical Chemistry**”** Published by S. Chand & Company Ltd., 2014
3. Sashi Chawla, Dhanpat Rai & Co. Pvt. Ltd., “Engineering Chemistry” Fifth Edition - 2017.
4. Dr.S.Vairam, Dr.Suba Ramesh, “Engineering Chemistry” First Edition, Wiley Publication, Reprint-2016

E-Resources

1. https://www.who.int/water_sanitation_health/dwq/arsenicun6.pdf
2. https://www.schandpublishing.com/books/tech-professional/applied-science/a-textbook-polymer-chemistry/9788121941129/#.XdZ214MzY2w
3. https://www.elsevier.com/books/nanochemistry/klabunde/978-0-444-59397-9

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Programme	**B.Tech**	Programme Code	**108**	Regulation	**2023**
Department	**Agricultural Engineering**			Semester	**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CH102	**CHEMISTRY LABORATORY**	0	0	2	1	60	40	100

Course Objective

The main objective of this course is to:

- Gather basic simple acid-base reactions and study the mechanism of acid mixture with base.
- Learn pH and potential of hydrogen in a sample solution.
- Study the redox reaction through potential difference.
- Infer iron forms complex with thiocyanate.
- Gather knowledge on hardness producing salts and removal of hardness through estimation.
- Collect data required for dissolved oxygen present in water sample.
- Understand alkalinity and available chlorine present in water sample.

Course Outcome

The students who complete this course successfully are expected to:	Knowledge Level
CO1: Infer knowledge on neutralization reaction between acid, acid mixture with base and identify the concentrations.	K3
CO2: Identify the concentration of sample using pH.	K3
CO3: Spot the concentration of sample solution through redox reaction by potentiometric method	K4
CO4: Estimate Iron by complexation reaction spectrometric ally.	K4
CO5: Determine hardness and dissolved oxygen present in domestic water supply and Identify alkalinity and available chlorine present in the given sample.	K4

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

Cos	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO 1	3	3		2	2	1	1						2	2	2
CO 2	3	3		2	2	2	2						2	1	2
CO 3	3	3		2	2	1							1	2	2
CO 4	3	3	1	2	2	1							2	2	
CO 5	2	3	1	2		2	3						2	2	

Pre-requisites **Nil**

Course Assessment Methods

Direct

1. Pre lab and Post lab Test
2. Execution of Experiment and Viva-voce
3. End semester examination

Indirect

Course - end survey

Content of the syllabus

S.No	Name of the Experiment	Course Outcome
1.	Estimation of HCl using NaOH by Conductometric titration	CO1
2.	Estimation of Mixture of acid [standard HCl unknown CH_3COOH] using NaOH by Conductometric titration.	CO1
3.	Estimation of Barium Chloride using Sodium Sulphate by Conductometric precipitation titration	CO1
4.	Determination of HCl using NaOH by pH metry	CO2
5.	Estimation of Ferrous iron by Potentiometric titration.	CO3
6.	Estimation of Ferric ion by Spectrophotometry	CO4
7.	Determination of Total, Temporary and Permanent hardness of water by EDTA method.	CO5
8.	Estimation of Dissolved Oxygen content in water by Winkler's method	CO5
9.	Estimation of Alkalinity in water sample.	CO5
10.	Estimation of available Chlorine in bleaching powder.	CO5
	Total Periods	**30**

Lab Manuals suggested:

1	Chemistry laboratory I & II by Dr. A. Ravikrishnan,Sri Krishna Pub, Revised Edition-2017
2	Chemistry laboratory Manual by Dr. V. Veeraiyan, VRB Publishers Pvt. Ltd., Revised Edition-2017

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Programme	**B.Tech.**	Programme Code		**108**	Regulation		**2023**	
Department	**AGRICULTURAL ENGINEERING**				Semester		**I**	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CS101	**Programming for Problem Solving**	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Learn the fundamentals of computers, languages, number systems and acquire problem solving skills in C Programming	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Examine number systems and to apply problem solving techniques	K3
	CO2: Learn the basics of C programming with branching and looping statements	K2
	CO3: Experiment the C programs using Arrays and Pointers for simple applications	K3
	CO4: Solve C programs with the Functions and Strings	K3
	CO5: Apply Structures, Union and File concepts to solve simple real world problems	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	1	1	2							2	3	3
CO 2	2	1	1		2							2	2	2
CO 3	3	2	1	1	2							2	3	3
CO 4	3	2	1	1	2							2	3	3
CO 5	3	2	1	1	2							2	3	3

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examination
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**INTRODUCTION TO PROBLEM SOLVING**	Periods	**9**

Basic organization of Computer - Programming languages - Compilers – Interpreter - Flowchart – Pseudocode – Algorithm.

Number Systems – Decimal, Binary, Octal and Hexadecimal conversions.

Unit - II	BASICS OF C PROGRAMMING	Periods	9
Introduction to C – Features - Data Types – Constants – Variables - I/O Statement - Operators –Expressions - Decision Making and Branching – Looping Statements - Break, Go to, Continue.			
Unit – III	**ARRAYS AND POINTERS**	Periods	**9**
Arrays: Concepts – Need – one dimensional array – array declaration – features – array initialization - Two-Dimensional Arrays- Multidimensional Arrays. **Pointers**: Introduction, pointer declaration-accessing variable through pointer- Pointers and Arrays, Pointers and strings – Pointer Arithmetic - Array of Pointers – dynamic memory allocation - malloc, realloc, free.			
Unit - IV	**FUNCTIONS AND STRINGS**	Periods	**9**
Functions: Introduction, function declaration, defining and accessing functions, User-defined Functions- storage classes-function prototypes-parameter passing methods-recursion. **Strings**: Concepts – Strings manipulation - String Input / Output Functions- Strings standard functions - Arrays of Strings.			
Unit – V	**STRUCTURES, UNIONS AND FILE SYSTEMS**	Periods	**9**
Structures: Introduction- nested structures- Arrays of Structures - Structures and Functions – Pointers and structures - Pointers to Structures – Unions. **File**: opening, defining, closing, File Modes, File Types, Writing contents into a file, Reading file contents, Appending an existing file, File permissions and rights, Changing permissions and rights.			
		Total Periods	**45**

Text Books	
1.	S.Kuppuswami, S.Malliga, C. S. Kanimozhi and K.Kousalya, "Problem Solving and Programming", McGraw Hill, 2019.
2.	E. Balagurusamy, "Programming in ANSI C", 8th Edition, Mc Graw Hill, 2019.
References	
1.	Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition, 2017
2.	Kernighan BW and Ritchie DM, "The C Programming Language", 2nd Edition, Prentice Hall of India, 2017.
3.	Dr.V.Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, "Computer Programming", VRB Publishers Pvt.Ltd, 2016.
Tools Required	
	Codetandra/HackerRank/ HackerEarth / Any online Problem Solving Platforms
E-Resources	
1.	https://www.geeksforgeeks.org/c-language-set-1-introduction/
2.	https://www.programiz.com/c-programming
3.	https://www.cprogramming.com/

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Programme	**B.Tech.,**	Programme Code	**108**	Regulation	**2023**			
Department	**AGRICULTURAL ENGINEERING**			Semester	**I**			
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CS102	**Programming for Problem Solving Laboratory**	0	0	2	1	60	40	100

Course Objective	The main objective of the course is to • Develop simple C programs to illustrate the applications of User Defined and Derived Data Types such as Arrays, Pointers, Structures, and Functions.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Develop C programs for computer based solution of simple real world problems using Conditional and Looping statements	K3
	CO2: Implement simple C Programs using Strings and Arrays	K3
	CO3: Implement C program for simple applications using Pointers	K3
	CO4: Write C programs that perform operations on File	K4
	CO5: Demonstrate C Programs using Structures	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												**CO/PSO Mapping**	
COs	Programme Outcomes (POs)											PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	1	1	2							2	3	3
CO 2	3	2	1	1	2							2	3	3
CO 3	3	2	1	1	2							2	3	3
CO 4	3	2	1	1	2							2	3	3
CO 5	3	2	1	1	2							2	3	3

Course Assessment Methods

Direct
1. Pre lab and post lab test 2. End-Semester examination
Indirect
1. Course - end survey

List of Experiments	**CO's**
1. Write a C program that accepts an employee's ID, total worked hours in a month and the amount he received per hour. Print the ID and salary (with two decimal places) of the employee for a particular month.	CO1
2. Write a program in C to calculate the sum of three numbers with input on one line separated by a comma.	CO1
3. Write a program in C to find the sum of the series [x - x^3 + x^5 + ...].	CO1
4. Write a program in C to find the number and sum of all integers between 100 and 200 which are divisible by 9.	CO1
5. Write a program in C to count the total number of duplicate elements in an array.	CO2
6. You are given an input string 'S'. Your task is to find and return all possible permutations of the input string. **Note:** 1. The input string may contain the same characters, so there will also be the same permutations. 2. The order of permutation does not matter.	CO2

Sample Input xyz sample Output xyz, xzy, yxz, yzx, zxy, zyx **Sample Output :** All the possible permutations for string "XYZ" will be "XYZ", "XZY", "YXZ", "YZX", "ZXY" and "ZYX".	
7. Find the Smallest and Largest Element in an Array **Method 1:** Traverse the array iteratively and keep track of the smallest and largest element until the end of the array. **Method 2:** Traverse the array recursively and keep track of the smallest and largest element until the end of the array. **Method 3:** Sort the array using STL and return the first element as the smallest element and the last element as the largest element. **For example, consider the array.** arr = {1, 2, 3, 4, 5} **Sample output:** Smallest element: 1 Largest element: 5	CO2
8. Write a C program to find the sum of all the multiples of 3 and 5 below 100 using pointers. We have to find the number of numbers which are multiples of both 3 and 5 in the first 100 natural numbers. Multiples of both 3 and 5 in the first 100 natural numbers are the multiples of LCM of 3 and 5. LCM of 3 and 5 =3×5=15 **Sample output:** Multiples of 15 below 100 are 15, 30, 45, 60, 75 and 90.	CO3
9. Write a C program to count number of characters, words and lines in a text file. Logic to count characters, words and lines in a file in C program. How to count total characters, words and lines in a text file in C programming. **Example Source file** I love programming. Working with files in C programming is fun. I am learning C programming at VCEW. **Sample output** Total characters = 100 Total words = 18 Total lines = 3	CO4
10. Write a C program to implement Student database using Structure **Sample output:** **Enter details of student:** Name :abi RollNo:101 Percentage :89.7 **Entered details:** Name: abi RollNo: 101 Percentage: 89.70	CO5
Total Periods	**45**
Tools Required	
Codetandra / HackerRank / HackerEarth / Any online Problem Solving Platforms	
E-Resources	
1. https://www.programiz.com/c-programming	
2. https://www.cprogramming.com/	
3. https://beginnersbook.com/2015/02/simple-c-programs/	

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Programme	B.E/B.Tech.	Programme code	108	Regulation	2023
Department	**AGRICULTURAL ENGINEERING**		Semester		I

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23TA101	Heritage of Tamils / *தமிழர் மரபு*	1	0	0	1	40	60	100

Content of the syllabus

அலகு 1	**மொழி மற்றும் இலக்கியம்**	**Periods**	**3**

இந்தியமொழிக் குடும்பங்கள் –திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச் சார்பற்றத்தன்மை –சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள் – தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம் ,ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசனின் பங்களிப்பு.

அலகு 2	**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை**	**Periods**	**3**

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புற தெய்வங்கள் – குமரி முனையில் திருவள்ளுவர் சிலை – இசைக்கருவிகள் – மிருதங்கம் , பறை, யாழ், வீணை, நாதஸ்வரம் – தமிழர்களின் பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு 3	**நாட்டுப்புறக் கலைகள் மற்று வீரவிளையாட்டுக்கள்**	**Periods**	**3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம் , தமிழர்களின் விளையாட்டுக்கள்.

அலகு 4	தமிழர்களின் திணைக் கோட்பாடுகள்	Periods	3
தமிழகத்தின் தாவரங்களும் விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடுகள் – சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவு, கல்வியறிவு – சங்க கால நகரங்களும் துறைமுகங்களும் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.			
அலகு 5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்கு	Periods	3
இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமறியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள் , கையெழுத்துப்படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.			
		Total Periods	**15**

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Programme	B.E/B.Tech.	Programme code	108	Regulation	2023
Department	**AGRICULTURAL ENGINEERING**		Semester		I

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23TA101	Heritage of Tamils / தமிழர் மரபு	1	0	0	1	40	60	100

	Content of the syllabus		
UNIT I	**LANGUAGE AND LITERATURE**	**Periods**	**3**
Language Families in India – Dravidian Languages–Tamilasa Classical Language- Classical Literature inTamil–Secular Nature of Sangam Literature — Distributive Justice in Sangam Literature-Management Principles in Thirukural –Tamil Epics and Impact of Buddhism &Jainismin Tamil Land- Bakthi Literature Azhwars and Nayanmars –Forms of minor Poetry – Development of Modem literature in Tamil-Contribution of Bharathiyar and Bharathidhasan.			
UNIT II	**HERITAGE-ROCK ART PAINTINGS TO MODERN ART–SCULPTURE**	**Periods**	**3**

Hero stone to modern sculpture -Bronzeicons-Tribesand their handicrafts-Artoftemplecar making—Massive Terracotta sculptures Village deities, Thiruvalluvar Statueat Kanyakumari,Making of musical instruments-Mridhangam,Parai Veenai, Yazhand Nadhaswaram –Role of Temple sin Social and Economic Life of Tamils.			
UNIT III	**FOLK AND MARTIAL ARTS**	**Periods**	**3**
Therukoothu ,Karagattam, VilluPattu ,Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sportsand Games of Tamils.			
UNIT IV	**THINAI CONCEPT OF TAMILS**	**Periods**	**3**
Flora and Fauna of Tamils & Ahamand Puram Concept from Tholkappiyam and Sangam Literature- Aram Concept of Tamils-Educationand Literacy during Sangam Age- Ancient Cities and Port so Sangam Age- Export and Import during Sangam Age-Overseas Conques to Cholas.			
UNIT V	**CONTRIBUTIONOFTAMILSTOINDIANNATIONALMOVEMENTANDINDIANCULTURE**	**Periods**	**3**
Contribution of amils to Indian Freedom Struggle-The Cultural Influence of Tamils over theother parts of India- Self- Respect Movement- Role of Siddha Medicine in Indigenous Systems of Medicine–Inscriptions &Manuscripts —Print History of Tamil Books.			
		Total Periods	**15**

TEXT-CUM-REFERENCE BOOKS

1	தமிழகவரலாறும் – மக்களும்பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித்தமிழ் – முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
3	கீழடி – வைகை நதிக்கரையில் சங்கநகர நாகரிகம் (தொல்லியல் துறைவெளியீடு)
4	பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் வெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text BookandEducational Services Corporation, Tamil Nadu)
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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Programme	**B.E**	Programme code	**108**	Regulation	**2023**
Department	**Agricultural Engineering**		Semester		**I**

Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23GE102	**Design Thinking**	1	0	2	1	50	50	100

Course Objective

The student should be made to,

- Familiarize with design thinking concepts and principles
- Practice the methods, processes and tools of design thinking.
- Apply the design thinking approach and have ability to model real world situations.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand and apply the concept of team building activity	K2
	CO2: Understand Design Thinking and apply the designthinking approach to empathize situations in real world	K3
	CO3: Identify various methods of empathy and define the problem	K3
	CO4: Develop creative ideas through design thinking	K4
	CO5: Understand benefits of learning through observation, experience and application	K4

Pre-requisites -

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												**CO/PSO Mapping**	
COs		Programme Outcomes (POs)											PSOs	
	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**
CO 1	2	3	3	3	3	2	2	3	3	3	2	2	3	3
CO 2	3	3	3	3	3	3	3	3	3	3	3	3	2	2
CO 3	3	3	1	2	2	2	2	1	2	1			2	2
CO 4	3	3	3	3	3	2	2	2	2	2	2	1	2	2
CO 5	3	3	3	3	1	2	2	2	1	2	2	1	2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test through activities, assignment & Quiz 2. Models (Chart/paper/3D) 3. Prototype & Presentation
Indirect
1. Course - end survey

Content of the Syllabus

SESSION-I	Periods	**6**

Introduction – Team Building - Types – 4 C's of Team Building – Levels of Team Building – Benefits of Team Work – Team Building Activity.		
SESSION - II	Periods	**9**
Introduction to Design Thinking – Purpose of Design Thinking – Design Thinking Framework, Empathy and related case studies		
SESSION - III	Periods	**6**
Define: Examine and Reflect on the problem.		
SESSION - IV	Periods	**12**
Generating Ideas – Identifying ideas – Bundling the ideas and create concepts – Rapid Prototyping – Idea Refinement.		
SESSION - V	Periods	**12**
Importance & testing the design with people - Retest and redefine results		
	Total Periods	**45**

Textbooks	
1.	Solving Problems with Design Thinking - Ten Stories of What Works by Jeanne Liedtka 2013.
2.	Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.
3.	Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, 2nd edition, 2011
4.	Design of Business: Why Design Thinking is the Next Competitive Advant age by Roger L. Martin 2009.
5.	Change by Design: How Design thinking transforms organizations and empires Innovation, 2009, Harper Business, Brown, Tim and Berry.
References	
1.	Design thinking toolbox by Michael Lewick, Wily 2020
2.	Design thinking playbook by Michael Lewrick , Wily 2019
3.	Creative Confidence: Unleashing the Creative Potential Within Us All by by Tom 2014
4.	The Design of Everyday Things: by Don Norman 2013
E-Resources	
1.	https://www.collectivecampus.io/blog/6-resources-to-help-you-learn-design-thinking
2.	https://thisisdesignthinking.net/on-design-thinking/design-thinking-resources/
3.	http://hs.griet.ac.in/pdf/studymaterialsgr20/Design%20Thinking%20Lab%202020-21.pdf
4.	https://www.mindtools.com/brainstm.html
5.	https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit
6.	https://www.youtube.com/watch?v=2mjSDIBaUlM
7.	thevirtualinstructor.com/foreshortening.html
Activity Based Learning/Practical Based Learning	
http://dschool.stanford.edu/dgift/	
Online Course	
1	https://onlinecourses.nptel.ac.in/noc19_mg60/preview
2	https://www.ibm.com/design/thinking/page/badges/core-skills

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Elayampalayam, Tiruchengode – 637 205

Programme	**B.Tech.**	Programme Code	**108**	Regulation		**2023**		
Department	**Agricultural Engineering**			Semester		**I**		
Course Code	Course Name	Periods Per Week			Credit		Maximum Marks	
		L	T	P	C	CA	ESE	Total
U23GE204	**Engineering Practices Laboratory**	0	0	3	1	60	40	100

Course Objective

The main objective of this course is to:

The students should made to

1. To impart practical knowledge in fundamental mechanical engineering operations including welding, basic machining and sheet metal work to enhance student's competencies in manufacturing and fabrication techniques.
2. To provide hands-on experience in basic civil engineering practices specifically plumbing and carpentry in order to develop foundational skills in fabrication and assembly.
3. To introduce modern manufacturing tools such as 3D printing, CO_2 laser cutting, and wood routing machines and understand their applications.
4. Learn the assembling and dismantling methodology of home appliances.
5. Learn the resistor value identification through colors coated on resistor.
6. Learn the basics of signal generation in CRO.
7. Learn the soldering techniques in PCB board for designing the projects.

Course Outcomes

At the end of the course, the student should be able to,	Knowledge Level
CO1: Execute fundamental welding, basic machining and sheet metal operations for simple fabrication tasks.	K3
CO2: Perform basic plumbing and carpentry operations using tools and fittings with safety and accuracy.	K3
CO3: Understand the basics of house wiring techniques and the measurements of basic electrical quantities.	K2
CO4: Understand the resistor value identification through colors coated on resistor.	K2
CO5: Understand the soldering techniques in PCB board for designing the projects.	K2

Pre -requisites Nil

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | **CO/PSO Mapping**

COs	Programme Outcomes (POs)												PSOs		
	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	PSO 3
CO 1	3	2	3	2	2	-	-	-	2	-	-	-	2	3	-
CO 2	3	2	3	2	2	-	-	-	2	-	-	-	2	-	-
CO 3	3	2	2	3	2	2	-	-	2	-	-	-	2	-	-
CO 4	3	2	2	3	2	2	-	-	2	-	-	-	2	3	-
CO 5	3	2	3	3	2	2	-	-	2	-	-	-	2	-	-

Course Assessment Methods

Direct

1.Pre lab and Post lab test

2.Record mark 3.End- Semester Examinations	
Indirect	
1.Course –End survey	
Content of the Syllabus	
GROUP A **(MECHANICAL & CIVIL ENGINEERING)**	
MECHANICAL ENGINEERING PRACTICE:	**COs**
1.Welding: a) To join the metal plates by a Butt Joint in arc welding machine. b) To join the metal plates by a Lap Joint in arc welding machine.	CO1
2.Basic Machining: a) To perform simple facing & turning operation. b) To perform of step turning operation.	CO1
3.Sheet Metal: a) To make a rectangular tray from the given sheet metal. b) To make a basket from the given sheet metal.	CO1
CIVIL ENGINEERING PRACTICE:	**COs**
4.Plumbing: a) Single Tap G.I / PVC pipe connection involving the fitting like valves, taps & bends. b) Two Tap G.I / PVC pipe connection involving the fitting like valves, taps & bends.	CO2
5.Carpentry: a) To make a Cross Lap Joint from the given work piece. b) Preparation of ' T' Lap Joint from the given work piece.	CO2
6. Study Experiments: a) Study of 3D Printing machine and its applications. b) Study of CO_2 Laser engraving & cutting machine and its applications. c) Study of Wood routing machine and its applications.	CO1
GROUP B **(ELECTRICAL & ELECTRONICS ENGINEERING)**	
ELECTRICAL ENGINEERING PRACTICE :	
1. a) Residential house wiring b) Stair case wiring	CO3
2. LED lamp assembly and Dismantling	CO3
3. Measurement of Power, Energy & Power Factor by connecting single phase energy meter.	CO3
ELECTRONICS ENGINEERING PRACTICE :	
1. Measurement of Resistor value using color – coding and Multimeter.	CO4
2. Study of various waveforms by using CRO and Function Generator.	CO4
3. Verification of Logic gates AND, OR, NOR, NAND and NOT.	CO4
4. Soldering Practice – Components Devices and Circuits – Using general purpose PCB.	CO5
Total Periods	**45**
Reference Book :	
1.	Dr.P.Kannan, Mr.T.Satheeskumar & Mr.U.M.Saravanan, "Engineering Practices Laboratory" Manual. Pearson Education, 2025.
2.	Mr.T.Jeyapoovan, Mr.M.Saravana Pandian, "Engineering Practices Lab" Manual, Vikas Publishing House Pvt Ltd, 2017.

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Programme	**B.Tech.**	Programme Code	**108**	Regulation	**2023**
Department	**Agricultural Engineering**			Semester	**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23MCFY2	**Indian Constitution and Universal Human values**	2	0	0	0	100	NA	100

Course Objective

The main objective of this course is:

i) To know about the basic structure of Indian constitution.
ii) To know about our Central government Executive system of India
iii) To know about our State government Executive system of India
iv) To learn the Election system, Amendments and Emergency Provisions given by the constitution.
v) To know about the Special Constitutional Provisions in India

Course Outcome

At the end of the course, the student should be able to,	Knowledge level
● Understand the functions of the Indian government	K1
● Know about our Central Government, political structure & codes, procedures	K1
● Understand our State Executive & Elections system of India.	K1
● Remember the Election system, Amendments and Emergency Provisions given by the constitution.	K2
● Understand our Special Constitutional Provisions in India	K2

Pre-requisites ---

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1						3		3	2						
CO 2						3		3	3						
CO 3						3		3	2						
CO 4						3		3	3						
CO 5						3		3	3						

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment

Indirect

Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION**	Periods	**6**
Historical Background – Constituent Assembly of India – Fundamental Rights – Citizenship – Constitutional Remedies for citizens			
Unit - II	**STRUCTURE AND FUNCTION OF CENTRAL**	Periods	**6**
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India			
Unit – III	**STRUCTURE AND FUCTION OF STATE**	Periods	**6**
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts			
Unit - IV	**UNIVERSAL HUMAN VALUES**	Periods	**6**
Course Introduction - Need, Basic Guidelines, Content and Process for Value Education. Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations			
Unit – V	**UNIVERSAL HUMAN VALUES - PROFESSIONAL ETHICS**	Periods	**6**
Understanding Harmony in the Human Being - Harmony in Myself and society. Understanding Harmony in the Family - Human Relationship. Understanding Harmony in the Nature and Existence - Whole existence as Co-existence. Implications of the above Holistic Understanding of Harmony on Professional Ethics			
		Total Periods	**30**

Text Books	
1.	Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.
2.	The Constitution of India (Coat Pocket Edition) by Gopal Sankaranarayanan - 17th Edition. (2024)
References	
1.	R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi.
2.	M.Laksmikanth, Indian polity, Tata mchraw hill publications.
E-Resources	
1.	https://mhrd.gov.in/
2.	https://niti.gov.in/content/niti-aayog-library
3.	www.drishtiias.com/

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Programme	**B.Tech.**	Programme Code	108	Regulation	**2023**
Department	**AGRICULTURAL ENGINEERING**			Semester	**II**

CURRICULUM
(Academic year 2025 - 2026)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA202	Complex Analysis and Ordinary Differential Equations*	BSC	3	1	0	4	40	60	100
U23PH201	Engineering Physics $^{\$}$	BSC	3	0	0	3	40	60	100
U23EE201	Basic Electrical and Electronics Engineering$^{\#}$	ESC	3	0	0	3	40	60	100
U23TA202	**தமிழரும் தொழில்நுட்பமும் /** Tamils and Technology*	HSMC	1	0	0	1	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23CS203	Python Programming$^{@}$	ESC	3	0	2	4	50	50	100
U23EN202	Professional Communication*	HSMC	2	0	3	3	50	50	100
U23GE101	Engineering Graphics$^{\$}$	ESC	2	0	3	3	50	50	100
PRACTICAL									
U23PH202	Physics Laboratory$^{\$}$	BSC	0	0	3	1	60	40	100
MANDATORY COURSES									
U23MCFY1	Environmental Science and Engineering $^{\$}$	MC	2	0	0	0	100	-	100
					Total	**22**	**470**	**430**	**900**

BSC - Basic Science Courses, ESC- Engineering Science Courses, MC - Mandatory courses, HSMC- Humanities and Social Sciences including Management courses, CA- Continuous Assessment, ESE - End Semester Examination.

*Common for all branches

$^{\#}$Common for AI & DS, AI & ML, CSE, IT, BT, CIVIL & AGRI

$^{@}$Common for ECE, EEE, BME, BT, CIVIL & AGRI

$^{\$}$ Common for ECE, EEE, BME, BT, CIVIL, AGRI, AI & ML

Board Chairman **Principal**

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Programme	**B.TECH**	Programme Code	**108**	Regulation	**2023**
Department	**AGRICULTURAL ENGINEERING**			Semester	**II**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23MA202	**Complex Analysis and Ordinary Differential Equations**	3	1	0	4	40	60	100

Course Objective

The Main Objective of the course is to

- Understand the Analytic functions and Bilinear transformations.
- Proficiently understand the Complex Integration.
- Demonstrate Vector Differentiation and Integration.
- Know about the Ordinary Differential Equations.
- Identify the Laplace Transform of Derivatives and Integrals.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Analyze the construction of analytic functions.	K4
	CO2: Understand the concepts of cauchy's integral theorem and residue theorem in evaluation of complex integrals.	K3
	CO3: Explore the concepts of Green's , Stoke's and Gauss Divergence theorems in real life problems.	K5
	CO4: Understand the concepts of solving second order differential equations.	K5
	CO5: Apply the concepts of Laplace transform in solving ODE.	K3

Pre-requisites -

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs		
	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**	**PSO 3**
CO 1	3	2	1	1									2		
CO 2	3	2	1	1									2		
CO 3	3	2	1	1									2		
CO 4	3	2	1	1									2		
CO 5	3	2	1	1									2		

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit – I	**ANALYTIC FUNCTIONS**	Periods	**9+3**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions c+z, cz,1/z and Bilinear transformation.

Unit - II	COMPLEX INTEGRATION	Periods	9+3
Problem solving using Cauchy's integral theorem and integral formula- Taylor's and Laurent's expansions- Residues- Cauchy's residue theorem- Application: Contour integration over unit circle.			
Unit – III	**VECTOR DIFFERETIATION & INTEGRATION**	Periods	**9+3**
Vector Differentiation: Vector and Scalar Functions- Derivatives- Curves, Gradient of a Scalar Field- Directional Derivative -Divergence of a Vector Field - Curl of a Vector Field – Line, Surface and Volume integrals (concepts only), Green's theorem in a plane(excluding proof), Gauss Divergence theorem(excluding proof), Stoke's theorem (Excluding proof).			
Unit - IV	**ORDINARY DIFFERENTIAL EQUATIONS**	Periods	**9+3**
Second order Linear ordinary differential equations with constant coefficients, Cauchy's - Euler equations (excluding proof)- Legendre's Linear differential equations(excluding proof) - Method of variation of parameters.			
Unit – V	**LAPLACE TRANSFORMS**	Periods	**9+3**
Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems(excluding proof) -Transforms of derivatives and integrals – Initial and final value theorems(excluding proof) – Inverse transforms – Convolution theorem(excluding proof) – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.			
		Total Periods	**45+15=60**

Text Books	
1.	Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2020.
2.	Ravish R Sing , Mukul Bhatt, "Engineering Mathematics", Mc Graw Hill Education Pvt. Ltd-2018
3.	Sivaramakrishna Das. P, Vijayakumari.C, " Engineering Mathematics – II", Pearson India Education Pvt. Ltd-2022.
References	
1.	Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics" , Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.
2.	Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John Wiley (2015).
3.	Alan Jefferis , Advanced Engineering Mathematics, Academic Press- New Delhi-2003
4.	Yunus A.Cengel, William J.Palm III," Differential equations for Engineers & Scientists", Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.
5.	John Bird, Higher Engineering Mathematics, Anuradha Agencies(2004)
E-Resources	
1.	https://en.wikipedia.org › wiki › Ordinary_differential_equation
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

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Programme	**B.Tech.**	Programme Code	**108**	Regulation	**2023**
Department	**Agricultural Engineering**			Semester	**II**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23PH201	**ENGINEERING PHYSICS**	3	0	0	3	40	60	100

Course Objective

The student should be made to,
- understand the basic concepts of properties of matter
- gain knowledge about the conduction properties of metals
- identify the different types of crystal structures and crystal growth techniques. Study the production and applications of ultrasonics.
- correlate better understanding the carrier concentration and its variations with temperature in a semiconductor. Study the properties of modern engineering materials and its uses
- categorize the types of laser and fiber optics

Course Outcome

At the end of the course, the student will be able to	Knowledge Level
• understand the elastic properties of the materials	K2
• gain knowledge about the conduction properties of metals	K3
• determine packing factor for various unit cells and understand different types of crystal imperfections and learn the engineering, medical applications.	K2
• discuss the basic idea of semiconducting materials and realize the function of modern engineering materials	K4
• learn the optical properties of materials and its uses	K3

Pre-requisites ---

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	3	1	2									2
CO 2	3	2	3	3	1									
CO 3	3	3		3	1									2
CO 4	3		2	1	1								3	2
CO 5	3			1	2	2								2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments and Mind map 3. End-Semester examinations
Indirect
Course - end survey

Content of the syllabus

Unit – I	**PROPERTIES OF MATTER**	Periods	**9**

Elasticity: Types of moduli of elasticity - Poisson's ratio - Stress - Strain Diagram – uses - Hooke's law**.** Young's modulus: Uniform bending (qualitative) Experimental determination by non-uniform bending - Twisting couple on a wire – Application: I shape girders, Torsional pendulum.
Viscosity: Co-efficient of viscosity - Poiseuilles' formula - Experimental determination – uses.

Unit - II	**ELECTRICAL PROPERTIES OF METALS**	Periods	**9**

Classical theory: Classical free electron theory of metals- Expressions for electrical conductivity and Thermal Conductivity of metals – Wiedemann-Franz law (Qualitative) - Success and failures.
Quantum theory: de Broglie's hypothesis - Schrodinger's time independent and time dependent wave equations - Fermi – Dirac Statistics - Density of energy states (Qualitative).

Unit – III	**CRYSTAL PHYSICS AND ULTRASONICS**	Periods	**9**

Crystallography: Unit cell - Crystal systems - Bravais lattices- Lattice planes - Miller indices - Inter-planar spacing in cubic lattice- Calculation of number of atoms per unit cell- Atomic radius – Coordination number- Packing Factor for HCP structures - Crystal defects – point and line defects (qualitative).
Ultrasonics: Introduction - Properties and Generation of Ultrasonics – Magnetostriction and Piezoelectric Oscillator methods – Applications: Sound Navigation and Ranging (SONAR), Non – Destructive Testing (NDT) and Sonogram.

Unit - IV	**SEMICONDUCTING & MODERN ENGINEERING MATERIALS**	Periods	**9**

Semiconductors: Elemental and Compound semiconductors - Intrinsic carrier concentration – Density of electrons and holes - Band gap determination. Extrinsic semiconductor types, donor and acceptor level. Application: Construction and working of LED.

Metallic glasses: preparation, properties and applications - Shape memory alloys (SMA): Characteristics and applications of NiTi alloy.

Unit – V	**LASER AND FIBER OPTICS**	Periods	**9**

Laser: Interactions of Radiations with matters - Characteristics of laser – Derivation of Einstein's A and B coefficients. Types: CO_2 laser - Semiconductor laser: Homo junction - Applications.
Optical fiber: Principle of propagation of light through optical fiber - Numerical aperture and acceptance angle (Qualitative) -Types of optical fibers -Fiber optical communication system (block diagram) - Application: Temperature sensor, Displacement sensor.

Total Periods	**45**

Text Books

1.	R.K. Gaur and Gupta. S.L, Engineering Physics, Dhanpat Rai Publishers, 2017.
2.	S.O Pillai., Solid state physics, New Age International Private Limited.
3.	Dr.A.Panneerselvam and Dr.P.Mani, "Engineering Physics", Dhanam publisher, Chennai – 600 042. (2025)

References

1.	B.K. Pandey, S. Chaturvedi. "Engineering Physics", 1st Edition, Cengage Learning India Pvt Ltd, (2012).
2.	David Halliday, Robert Resnick Jearl Walker, Fundamentals Of Physics Extended 8/Ed 8th Edition, , Wiley India Pvt Ltd, 2008.
3.	Lawrence H.Vanvlack, "Elements of materials Science Engineering, 6th Edition, Pearson Publication.
4.	S.O.Pillai, "Solid State Physics", New Age International Publishers
5.	Dr.V.Rajendran, "Engineering Physics", Tata McGraw Hill Education Private Limited, New Delhi
E-Resources	
1.	www.e-booksdirectory.com
2.	Home.iitk.ac.in
3.	physics.cu.ac.bd

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Programme	**B.E./B.Tech**	Programme Code	**108**	Regulation	**2023**			
Department	**Agricultural Engineering**			Semester	**II**			

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23EE201	**Basic Electrical and Electronics Engineering**	3	0	0	3	40	60	100

Course Objective

The students should have made to

- Introduce the fundamental concepts of electric circuits and power systems.
- Provide knowledge on the working principles and applications of electrical machines.
- Familiarize students with domestic wiring systems, safety measures, and lighting equipment.
- Explain the operation and applications of basic semiconductor devices.
- Impart basic knowledge of digital electronics and logic circuits.

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understand basic concepts of DC and AC circuits, waveforms, and power systems.	K2
	CO2: Explain construction and operation of DC machines, transformers, and induction motors.	K2
	CO3: Demonstrate wiring systems, safety measures, and illumination techniques.	K2
	CO4: Describe characteristics and applications of semiconductor devices.	K3
	CO5: Apply digital logic fundamentals to design combinational and sequential circuits.	K3

Pre-requisites Basic concepts and understanding of magnetic fields

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**			
COs	Programme Outcomes (POs)												PSOs			
	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**	**PSO 3**	**PSO 4**
CO 1	3	2	2	1	1	-	-	1	-	-	-	3	3	-	2	-
CO 2	3	2	2	1	-	-	-	1	-	-	-	3	3	-	2	-
CO 3	2	2	1	1	-	-	-	1	2	2	2	3	3	-	3	2
CO 4	3	2	2	1	-	-	-	1	-	-	-	3	3	-	2	2
CO 5	3	2	2	1	2	-	-	1	-	-	-	3	3	-	2	-

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course –end Survey

Content of the syllabus			
Unit – I	**INTRODUCTION OF ELECTRICAL CIRCUITS**	Periods	**9**
Definition of Voltage, Current, Power, Energy, Power factor, Circuit parameters, Ohm‘s law, Kirchhoff‘s law, Concept of DC circuits. Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Real power, Reactive power and Apparent power, Power factor. Introduction to Single and three phase systems - types of three phase connections.			
Unit - II	**ELECTRICAL MACHINES AND ITS APPLICATIONS**	Periods	**9**
Review of Laws (Faraday‘s laws of electromagnetic induction - Lens law - Fleming's left hand rule and Right hand rule). Construction and Working principle- DC Generators, EMF equation, Applications. Working Principle of DC motors, Types and Applications. Construction, Working principle and Applications of Single phase Transformer and Single phase Induction Motor.			
Unit – III	**WIRING AND ILLUMINATION**	Periods	**9**
Types of wiring-staircase and corridor wiring - wiring accessories. Different types of safety measures - Earthing. The Laws of Illumination- Different types of electrical lamps.			
Unit - IV	**SEMICONDUCTOR DEVICES & APPLIATIONS**	Periods	**9**
Review of PN junction diodes - Zener diodes - characteristics. Transistors: PNP and NPN transistors - Theory of operation – Basics of semiconductor devices: FET - SCR - V-I characteristics – Applications: UPS – SMPS.			
Unit – V	**DIGITAL FUNDAMENTALS**	Periods	**9**
Number systems - Boolean laws – De-Morgan's Theorem - Logic gates – Universal Gates - Implementation of Boolean Expression using Gates - SOP and POS forms. Combinational Circuits – Adder and Subtractor, Sequential Circuits – Introduction to Flip Flops, Shift Registers and Counters.			
		Total Periods	**45**

Text Books	
1.	S.K.Bhattacharya, ―Basic Electrical and Electronics Engineering‖,Pearson,2017
2.	D.P. Kotharti and I.J Nagarath, ―Basic Electrical and Electronics Engineering‖, McGraw Hill, Third Edition, 2020.
References	
1.	S.B. Lal Seksena and Kaustuv Dasgupta, ―Fundaments of Electrical Engineering‖, Cambridge, 2016
2.	Mittle,Mittal, Basic Electrical Engineering, 2nd Edition, Tata McGraw-Hill Edition, 2016.
3.	T.K. Nagsarkar and M.S. Sukhija, ―Basic Electrical Engineering‖, Oxford, 2017.
4.	John Bird, ―Electrical and Electronic Principles and Technology‖, Fourth Edition, Elsevier, 2010.
5.	M. Morris Mano - Digital Logic and Computer Design, Pearson Education India, 2017.
E-Resources	
1.	https://nptel.ac.in/courses
2.	https://www.electrical4u.com/electrical-engineering-articles/illumination-engineering/
3.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/lecture-notes
4.	https://www.google.co.in/books/edition/_/4nJROSC7iK8C?hl=en&gbpv=1

VIVEKANANDHA

COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution Affiliated to Anna University Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	B.E/B.Tech.	Programme code	108	Regulation	2023
Department	**AGRICULTURAL ENGINEERING**		Semester		II

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23TA202	**தமிழரும் தொழில்நுட்பமும்/ TAMILS AND TECHNOLOGY**	1	0	0	1	40	60	100

Content of the syllabus

அலகு 1	**நெசவு மற்றும் பானைத்தொழில்நுட்பம்**	**Periods**	**3**

சங்ககாலத்தில் நெசவுத்தொழில் – பானைத் தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு 2	**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**	**Periods**	**3**

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு- சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச்சிற்பங்களும் , கோவில்களும் – சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர்காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலைநாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக்கலை.

அலகு 3	**உற்பத்தித் தொழில்நுட்பம்**	**Periods**	**3**

கப்பல்கட்டும்கலை – உலோகவியல் – இரும்புத்தொழிற்சாலை – இரும்பை உருக்குதல் ,எஃகு – வரலாற்றுச் சான்றுகளாக – செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணிஉருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடிமணிகள் – சுடுமண்மணிகள் – சங்குமணிகள் – எலும்புத்துண்டுகள் – தொல்லியல்சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு 4	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்	Periods	3
அணை, ஏரி, குளங்கள் ,மதகு – சோழர்காலக் குமுழித்தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார்அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டையஅறிவு – அறிவு சார் சமூகம்.			
அலகு 5	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்	Periods	3
அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மின்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின்நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்க்குவைத்திட்டம்.			
		Total Periods	**15**

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Programme	B.E/B.Tech.	Programme code	108	Regulation	2023
Department	**AGRICULTURAL ENGINEERING**		Semester		II

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23TA202	TAMILS AND TECHNOLOGY	1	0	0	1	40	60	100

	Content of the syllabus		
UNIT I	WEAVING AND CERAMIC TECHNOLOGY	**Periods**	**3**
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) –Graffiti on Potteries			
UNIT II	DESIGN AND CONSTRUCTION TECHNOLOGY	**Periods**	**3**

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- ThirumalaiNayakarMahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.			
UNIT III	MANUFACTURING TECHNOLOGY	**Periods**	**3**
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.			
UNIT IV	AGRICULTURE AND IRRIGATION TECHNOLOG	**Periods**	**3**
Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.			
UNIT V	SCIENTIFIC TAMIL & TAMIL COMPUTING	**Periods**	**3**
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.			
		Total Periods	**15**

TEXT-CUM-REFERENCE BOOKS

1	தமிழகவரலாறும் – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல்மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித்தமிழ் – முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
3	கீழடி – வைகைநதிக்கரையில் சங்க நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4	பொருநை - ஆற்றங்கரைநாகரிகம். (தொல்லியல்வெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text BookandEducational Services Corporation, Tamil Nadu)
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**B.Tech.**	Programme Code		**108**	Regulation		**2023**	
Department	**AGRICULTURAL ENGINEERING**				Semester		**II**	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CS203	**Python Programming**	3	0	2	4	50	50	100

Course Objective	The student should be made to, • Understand the fundamentals of Python programming • Handle list, tuples, sets and Dictionaries data types • Learn function prototypes and string functions. • Use files and modules for data processing • Understand packages in Python and data visualization	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	K3
	CO2: Perform operations on list, tuples, sets and Dictionaries using python.	K3
	CO3: Implement function prototypes and string functions.	K3
	CO4: Apply files and modules and perform operations on CSV files.	K3
	CO5: Perform data visualization and apply Python packages for CSV files	K3
Pre-requisites	Nil	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak

Cos	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	1	-	1	-	-	-	-	-	-	2	3	2
CO 2	3	3	1	1	2	-	-	-	-	-	-	2	3	2
CO 3	3	3	1	2	2	-	-	-	-	-	-	2	3	2
CO 4	3	3	1	2	2	-	-	-	-	-	-	2	3	2
CO 5	3	3	1	2	2	-	-	-	-	-	-	2	3	2

Course Assessment Methods

1. Continuous Assessment Test I, II & III
2. Assignments / Quiz
3. End-Semester examinations

1. Course - End survey

Content of the syllabus

Unit – I	**INTRODUCTION TO PYTHON**	Periods	**9**

Introduction to Python, features, installing Python, writing and executing Python program — native data types, comments, constants, variables, operators, expression, conditional statements, control statements, continue, pass, break.

Unit - II	**LISTS, TUPLES, SETS AND DICTIONARIES**	Periods	**9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Sets: methods and operators, Dictionaries: operations and methods.

Unit – III	**FUNCTIONS AND STRINGS**	Periods	**9**

Functions definition, declaration, arguments, parameters – formal and local, parameter passing

methods – types of arguments, recursion; Strings: string slices, immutability, string functions and methods, string module, regular expressions.

Unit - IV	FILES AND MODULES	Periods	9

Files and exception: Text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, accessing CSV file.

Unit – V	OBJECT ORIENTED CONCEPTS AND PYTHON PACKAGES	Periods	9

Object-oriented features: Class, Object, Abstraction, Encapsulation, Inheritance, Polymorphism. Packages: Numpy package – mean, medium and mode, pandas package, matplotlib.

Total Periods	**45**

Suggested List of Experiments

List of Experiments	CO's
1. Write a program to demonstrate different number data types in Python.	CO1
2. Write a program to perform different Arithmetic Operations on numbers in Python.	CO1
3. Write a program to create, append and remove lists and demonstrate the tuples in python.	CO2
4. Write a program to demonstrate working with dictionaries in python.	CO2
5. Write a program to create, concatenate and print a string and accessing sub-string from a given string.	CO3
6. Write a Python function to calculate the factorial of a number (a non-negative integer). The function accepts the number as an argument.	CO3
7. Write a program to compute the number of characters, words and lines in a file.	CO4
8. To write a Python program to find the most frequent words in a text read from a file.	CO4
9. Write a Python program using a class to find the Mean, Median, and Mode of a list of numbers.	CO5
10. Draw a horizontal bar chart with Matplotlib.	CO5

Lecture 45: Practical 30; Total: 75

Text Books

1.	Anurag Gupta,G.P BISWAS ," Python Programming – Problem solving, packages and Libraries, Edition 1, McGraw Hill, 2019
2.	E Balagurusamy, "Problem Solving and Python Programming", Edition1, McGraw Hill, 2018
3.	Reema Thareja, "Python Programming using Problem Solving Approach", OXFORD University Press, 2017.

References

1.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist,,,,, 2nd edition, Updated for Python 3, Shroff/O,,Reilly Publishers, 2016.
2.	John V Guttag, — Introduction to Computation and Programming Using Python,,,,, Revised and expanded Edition, MIT Press , 2021
3.	Guido van Rossum (Author), The Python Development Team (Author), An Introduction to Python Tutorial and What"s New ,2022,Shroff Publishers first edition

E-Resources

1.	http://greenteapress.com/wp/think- python/)
2.	https://www.python.org/about/gettingstarted/
3.	https://beginnersbook.com/2018/03/python-tutorial-learn-programming/
4.	https://www.tutorialspoint.com/python/index.htm
5.	https://www.learnpython.org/
6.	https://www.udemy.com/topic/python/free

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Programme	**B.Tech.**	Programme Code	**108**	Regulation	**2023**
Department	**AGRICULTURAL ENGINEERING**			Semester	**II**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23EN202	**Professional Communication**	3	0	2	3	50	50	100

Course Objective

The main objective of this course is to:

- Provide suitable reading &writing tasks to develop communicative ability for academic and professional progress
- Inculcate reading to make learners proficient in the chosen professional writing contexts.
- Develop learners' vocabulary and grammar to supplement their language use at professional contexts
- Assist students to imbibe intellectual flexibility, creativity, and cultural literacy to support in life-long learning.
- Apply the language features of academic and professional writing and speaking

Course Outcome

At the end of the course, the student should be able to,	Knowledge Level
CO1: Gain sufficient command over language to speak at an academic or professional context.	K1
CO2: Excel in writing Professional texts through similar reading.	K1
CO3: Use language at length at technical and professional situations with enriched vocabulary and grammatical knowledge.	K2
CO4: Gather, understand, evaluate and synthesize information from a variety of written and electronic sources ethically.	K2
CO5: Acquire proficiency in oral communication and writing skills.	K3

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

Cos	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO 1						2			3	3		3	1		
CO 2						2			3	3		3	1		
CO 3						2			3	3		3	1		
CO 4						2			3	3		3	1		
CO 5						2			3	3		3	1		

Pre-requisites Nil

Course Assessment Methods

Direct

1. Continuous Assessment Test I & II
2. Continuous Assessment Test III in the Communication Skills Lab
3. Assignments
4. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I		Periods	**15**
Listening- Listening for Cultural Awareness, Listening to Professional Conversations, Talks, Interviews and Lectures **Speaking**- Developing Confidence, Discussion at a Corporate Context. **Reading**– Inferential Reading, Reading Short Messages and Technical Articles, **Writing**- Introduction to Letter Writing, Writing Formal and Informal Letters, Thanking Letters, Letters Calling for Quotations, Letters Placing an Order, Seeking clarification, Letters of Complaint. **Focus on Language**–Adjectives and Degrees of Comparisons			
Unit – II		Periods	**15**
Listening- Listening to specific information relating to technical content, Listening for statistical information **Speaking**- Expressing opinions, Formal Discussions, Describing Role Play in Business Context and Consolidating Ideas. **Reading**–Reading Technical Articles in Journals and Comparing Articles. **Writing**- Letter seeking permission to undergo practical training and to undertake project work. **Focus on Language**– Simple, compound and complex sentences and Transformation of Sentences.			
Unit – III		Periods	**15**
Listening- Listening to understand the overall meaning, Listening to Interviews and Presentations. **Speaking**- Giving Instructions, Showing Directions and Rephrasing Instructions. **Reading**– Skimming and Scanning, Reading Job Advertisements. **Writing**- Applying for a Job, Writing a CV, Interview Strategies. **Group Discussion:** Introduction – Topic Analysis – Thematic Expressions-Objective and content of discussion.			
Unit – IV		Periods	**15**
Listening- Listening and retrieving Information. **Speaking**- Developing fluency and Coherence, Accent Neutralization, Voice Modulation, and Intonation, Improving Voice Quality. **Reading**–Reading and understanding Advertisements. **Writing**- Letters to the Editor, Letter of Complaint, Various kinds of Reports, Permission to go for Industrial visits. **Presentation skills:** Making Self Introduction Effectively-Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Accents analysis – Stylistics.			
Unit – V		Periods	**15**
Listening- Listening to Fragmented Texts and Filling in the Blanks. **Speaking-**Mind Mapping, Developing Coherence and Self-Expression, Paralinguistic and Extra linguistic Features (body language), **Reading**– Predicting content, Interpreting Reports. **Writing**- Writing Proposals, Agenda, Minutes of the Meeting. **Soft Skills:** Introduction - Change in Today's Workplace: Soft Skills as a Competitive Weapon - Antiquity of Soft Skills - Classification of Soft skills - Ability to work as a team.			
		Total Periods	**75**

Text Books	
1.	Dr. S. R. Kannan, Sumant. S, Pereira Joyce, Professional Communication, Vijay Nicole Imprints Pvt. Ltd., 2023.
References	
1.	Norman Whitby - Business Benchmark Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2022.
2.	Dutt, Rajeevan, Prakash, A Course in Communication Skills (Anna University, Coimbatore edition) :. Cambridge University Press India Pvt. Ltd., 2020.
3.	Meenakshi Raman and Sangeeta Sharma-'Technical Communication English Skills for Engineers'; Oxford University Press, 2024.
4.	S.P. Dhanavel, English and Communication Skills for Students of Science and Engineering, Orient Blackswan Pvt, Ltd, 2020.
5.	Technical English – I & II, Sonaversity, Sona College of Technology, Salem, First Edition, 2022.
E-Resources	
1.	http://www.kalevleetaru.com/Publish/Book_Review_Who_Moved_My_Cheese.pdf
2.	http://www.bookbrowse.com/reviews/index.cfm/book_number/304/who-moved-my-cheese
3.	http://www.imdb.com/title/tt0482629/plotsummary

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Programme	**B.Tech.**	Programme Code	**108**	Regulation	**2023**
Department	**Agricultural Engineering**			Semester	**II**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23GE101	**Engineering Graphics**	2	0	3	3	50	50	100

Course Objective

The main objective of this course is to:

- Develop skills to enhance their ability to know the concept of engineering graphics and to draw the points kept in various positions, lines and planes.
- Project the drawing of various solids.
- Sketch sectioned views of solids.
- Draw the development of surfaces.
- Draw the isometric and orthographic projections for any given object to the required standard.

Course Outcomes

At the end of the course, the student should be able to	Knowledge Level
CO1: Construct plane curves and develop projection of points , lines and plane surfaces	K2
CO2: Construct projection of solids with various conditions.	K4
CO3: Design the section of solids and analyze the true shape of the section	K3
CO4: Design and develop the different solid surfaces.	K2
CO5: Construct isometric and orthographic projection of different solids.	K2

Pre - requisites: Nil

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	3	3	3	3	-	-	-	-	-	-	-	2	-	-
CO 2	3	3	2	2	2	-	-	-	-	-	-	-	2	-	-
CO 3	3	2	2	2	3	-	-	-	-	-	-	-	2	2	-
CO 4	3	2	3	3	2	-	-	-	-	-	-	-	2	-	-
CO 5	3	3	2	3	3	-	-	-	-	-	-	-	2	2	-

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment **3.** End-Semester examination
Indirect
1. Course - end survey

Content of the Syllabus

Concepts & Conventions (Not for Examination)	Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.	**Periods**	**1**
Unit – I	**PROJECTION OF POINTS, LINES AND PLANE SURFACES**	**Periods**	**3+8**
Introduction to Plane curves, Orthographic projection – principles – projection of points, straight lines (only first angle projections) and plane surfaces (polygonal and circular).			
Unit - II	**PROJECTION OF SOLIDS**	**Periods**	**3+8**
Projections of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane.			
Unit - III	**SECTION OF SOLIDS**	**Periods**	**3+8**
Sectioning of solids - prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other - Obtaining true shape of section.			
Unit - IV	**DEVELOPMENT OF SURFACES**	**Periods**	**3+8**
Development of lateral surfaces of simple solids like prisms, pyramids, cylinders and cones – development of simple truncated solids involving prisms, pyramids, cylinders and cones.			
Unit - V	**ISOMETRIC PROJECTIONS, ORTHOGRAPHIC VIEWS FROM PICTORIAL VIEWS**	**Periods**	**5+10**
Isometric Projection and Introduction to AutoCAD / Solid Edge: Principles of isometric projection - Isometric scale -Isometric projections of simple solids like prisms, pyramids, cylinders and cones & orthographic views from pictorial views.			
Demonstration only: **Computer Aided Drafting (Auto CAD / Solid Edge):** Introduction to drafting packages and demonstration of their use.			
		Total Periods	**60**

Text Book:

1.	Basant Agrawal and C.M Agrawal ,“Engineering Drawing ”,Tata McGraw Hill , 2019
2.	Jain and Gautam ,“Engineering Graphics & Design ”,Khanna Publishing House, 2020

Reference Book :

1.	Dr.P.Kannan and Dr.J.Bensam Raj, “Engineering Graphics”, JBR Tri Sea Publishers Pvt. Ltd, 2024.
2.	K.V Natarajan, "Engineering Drawing and Graphics", M/s. N.Dhanalakshmi, Chennai, 2020.
3.	K.Venugopal and V. Prabhu Raja, “Engineering Graphics” New Age International Publishers, 2016.
4.	N.S Parthasarathy and Velamurali, “ Engineering Graphics”, Oxford University, New Delhi,2015
5.	Bhatt N.D and Panchal V.M, “Engineering Drawing”, Charotar Publishing House, 2014

e-RESOURCES:

1.	http://nptel.ac.in/courses/105104148, “Engineering Graphics” - Dr. Nihar Ranjan Patra , IIT Kanpur
2.	http://cfd.annauniv.edu/webcontent.htm, “Engineering Graphics” - Dr.Velamurali
3.	http://link.springer.com/ “Engineering Graphics”-Springer Nature.

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University,Chennai) Elayampalayam, Tiruchengode – 637 205					
Programme	**B.Tech.**	Programme Code	**108**	Regulation	**2023**	
Department	**Agricultural Engineering**			Semester	**II**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23PH202	**PHYSICS LABORATORY**	0	0	3	1	60	40	100

Course Objective	➢ Understand elastic behavior of Materials ➢ Predict viscous force in liquids. ➢ Gain knowledge in measuring the lowest thickness materials ➢ To Identify wavelengths of prominent lines using polychromatic lamp ➢ Observe heat conduction in bad conductor ➢ Understand the principle of interferometer ➢ To learn about the characteristics of Lasers	
Course Outcome	At the end of the course, the student will be able to	Knowledge Level
	CO1: Measure the young"s modulus of the materials, Rigidity modulus – Torsion pendulum	K3
	CO2: Calculate Coefficient of viscosity of liquid and thickness of thin wire using Air wedge	K3
	CO3: Observe and measure the different wavelengths of mercury Spectrum and dispersive power of a prism	K3
	CO4: Illustrate the conductivity of bad conductors. To know how to determine the velocity of ultrasonic waves in liquid	K3
	CO5: To understand the importance of laser beam compared to ordinary light	K2

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	1											2	
CO 2	3	3	1	2	2								2	
CO 3	3	2			2								3	
CO 4	3	3		1									1	
CO 5	3	1	1		1								2	

Course Assessment Methods

Direct
1. Prelab and post lab test 2. Execution of experiment and Viva-Voce **3.** End-Semester examinations
Indirect
Course - end survey

Content of the syllabus

PHYSICS LABORATORY

S.No.	Experiments	CO
1.	Determination of Young's modulus of the material - Uniform bending method	**CO1**
2.	Determination of Young's modulus of the material - Non uniform bending method	**CO1**
3.	Determination of Rigidity modulus – Torsion pendulum	**CO1**
4.	Determination of Coefficient of viscosity of a liquid – Poiseuille's method	**CO2**
5.	Determination of thickness of a thin material – Air wedge method	**CO2**
6.	Determination of wavelength of mercury spectrum – spectrometer grating	**CO3**
7.	Determination of Dispersive power of a prism – Spectrometer	**CO3**
8.	Determination of thermal conductivity of metallic glass using Lee's Disc Method	**CO4**
9.	Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer	**CO4**
10.	Determination of Wavelength and particle size using Laser	**CO5**
	Total Periods	**30**

Lab Manual

1.	R. Jayaraman, Engineering Physics Laboratory Manual, Pearson Pub, Edition-2021.
2.	A.K. Katiyar & C.K. Pandey Engineering Physics: Theory and Practical, Wiley Pub,2 nd Edition.
3.	Dr.P.Mani, "Physics laboratory manual ", Dhanam publisher, Chennai – 600 042. (2024)
4.	Dr.G.Senthil Kumar, "Physics laboratory manual", VRB Publishers Private Limited, Chennai. 2024.

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Programme	**B.TECH**	Programme Code	**108**	Regulation	**2023**
Department	**Agricultural Engineering**			Semester	**II**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23MCFY1	**Environmental Science and Engineering**	2	0	0	0	100	0	100

Course Objective

The main objective of this course is to:

- Familiarize basics of ecosystem and creating environmental awareness.
- Congregate about environmental pollution.
- Contrast on solid waste and social issues.
- Acquire knowledge in environmental legislation and protection.

Summarize population growth, human rights and Environment

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Acquire knowledge about Eco-system, Natural resources and Bio-diversity.	K1
	CO2: Be aware of Environmental Pollution and its control.	K3
	CO3: Infer and express Solid waste management and Social issues.	K3
	CO4: Acquire Knowledge about Environmental legislation and protection.	K3
	CO5: Awareness about population growth, human rights and Environment	K2

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

Cos	Programme Outcomes (POs)												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO 3**
CO 1	1	2	2			2	3					2	2		
CO 2	3	2	2		1	2	3				1	3	3		2
CO 3	3	2	2		1	3	3				1	2	3		2
CO 4	1	1	1			2	3				1	2	2		1
CO 5	1	2	1			2	2				1	3	1		1

Pre-requisites NIL

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	INTRODUCTION TO ENVIRONMENTAL SCIENCE AND ENGINEERING	Periods	6
Nature and scope of environmental education- natural resources – (forest, water, food,& land resources) problems and remedial measures. Ecosystem-Structure, characteristics and functions of ecosystem . Biodiversity – definition – conservation of biodiversity (in-situ and Ex-situ)-environmental awareness and sustainable development.			
Unit – II	**ENVIRONMENTAL POLLUTION AND ITS CONTROL**	Periods	**6**
Water pollution-causes, effects and control measures of water pollution- waste water treatment process (secondary-BOD,COD) . Air Pollution – types of air pollutants-CO_2, SO_2, NO_2, PAN-sources- control measures (electro static precipitator, bag house filter, wet scrubber and cyclone separator).			
Unit – III	**SOCIAL ISSUES AND SUSTAINABILITY**	Periods	**6**
Solid waste Management-Types (E-Waste, Hazardous waste, Bio-waste)-Disposal method. Sustainability-Definition-Sustainable development Goals-Environmental issues-global warming and Ozone depletion, Climate change, Acid rain, Carbon foot print-Possible solutions to Environmental issues.			
Unit – IV	**SUSTAINABILITY PRACTICES AND ENVIRONMENTAL LEGISLATION**	Periods	**6**
Zero waste and R-concept-circular economy, material life cycle assessment- energy efficiency and management-environmental legislation-air act, water act-wildlife protection act-environmental protection act.			
Unit – V	**HUMAN POPULATION AND THE ENVIRONMENT**	Periods	**6**
Population growth, human rights, value education, environment and human health, family welfare program,women and child welfare, role of information technology in environment – satellite, data base, GeographicalInformation System (GIS), Effects of Narcotic Drugs in human health and its social impact, Environmental impact Analysis (EIA) and human health.			
		Total Periods	**30**

Text Books

1.	Dr.S.Mageswari, Dr.G.Vijayakumar, A.Preethi-"Environment Science and Engineering" RK publication. Second Edition-2023
2.	Gilbert.M.Masters-"Environmental Science"-Pearson education. Edition-2-2013
3.	Dr.S. Vairam - "Environment Science and Engineering" Gems publication. Edition -2018

References

1.	Linda Williams- "Environmental Science"-Tata McGRAW – Hill Edition. Edition-I-2008
2.	T.G.Miller Jr-"Environmental Science"-Wadsworth publishing Co. Edition -10-2004
3.	William P. Cunningham, Barbara Woodworth Saigo- Tata McGraw Hill.Edition-4-2011
4.	NPTEL Course Notes
5.	Cunnighum and cooper-"Environmental Science"-Jaico Publ, House Edition-4-2007

E-Resources

1.	https://libraries.ou.edu/
2.	https://libguides.reading.ac.uk/
3.	https://www.loc.gov/, https://rdl.lib.uconn.edu/

VIVEKANANDHA
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Elayampalayam, Tiruchengode – 637 205

Programme	B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**		**Semester**		**III**

Course Code	Course Name	Category	Periods/week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA303	Transforms and Partial Differential Equations	BSC	3	1	0	4	40	60	100
U23AG301	Basics of Soil Science and Engineering	PCC	3	0	0	3	40	60	100
U23AG302	Surveying for Agricultural Engineering	PCC	3	0	0	3	40	60	100
U23CTP1	Verbal, Quantitative Aptitude and Reasoning – I	EEC	2	0	0	1	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23AG303	Principles and Practices of Crop Production	PCC	2	0	3	3	50	50	100
U23AG304	Fluid Mechanics & Machines	PCC	3	0	2	4	50	50	100
PRACTICAL									
U23AG305	Soil Science & Engineering Laboratory	PCC	0	0	2	1	60	40	100
U23AG306	Surveying Laboratory	PCC	0	0	3	1	60	40	100
CAREER TRACK COURSE									
U23CTCP2	Personality Development	CTC	2	0	0	1	100	-	100
					Total	**21**	480	420	900

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Programme	B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**		**Semester**		**IV**

Course Code	Course Name	Category	Periods /week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA408	Biostatistics	BSC	3	1	0	4	40	60	100
U23AG407	Strength of Materials for Agricultural Engineering	PCC	3	0	0	3	40	60	100
U23AG408	Mechanics of Machines	PCC	3	0	0	3	40	60	100
U23AG409	Tractors and Engines System	PCC	3	0	0	3	40	60	100
	Additional Language	MC	2	0	0	1	100	-	100
THEORY INTEGRATED WITH PRACTICAL									
U23AG410	Unit Operations in Agricultural Processing	PCC	3	0	2	4	50	50	100
PRACTICAL									
U23AG411	Strength of Materials Laboratory	PCC	0	0	3	1	60	40	100
U23AG412	Tractors & Engines Laboratory	PCC	0	0	2	1	60	40	100
CAREER TRACK COURSE									
	Career Track Course – I	CTC	2	0	0	1	100	-	100
					Total	**21**	530	370	900

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Programme	B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**		**Semester**		**V**

Course Code	Course Name	Category	Periods /week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23AG513	Engineering Thermodynamics	PCC	3	1	0	4	40	60	100
	Professional Elective I	PEC	3	0	0	3	40	60	100
	Professional Elective II	PEC	3	0	0	3	40	60	100
	Professional Elective III	PEC	3	0	0	3	40	60	100
	Professional Elective IV	PEC	3	0	0	3	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23AG514	Farm Equipment and Machinery	PCC	2	0	3	3	50	50	100
PRACTICAL									
U23AG515	ICT in agricultural Engineering laboratory	PCC	0	0	3	1	50	50	100
CAREER TRACK COURSE									
	Career Track Course – II	CTC	2	0	0	1	100	-	100
	Mini Project I	EEC	0	0	3	1	100	-	100
					Total	**22**	500	500	900

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Programme	B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**		**Semester**		**VI**

Course Code	Course Name	Category	Periods /week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23AG616	Post-harvest Technology	PCC	4	0	0	4	40	60	100
U23AG617	Irrigation Engineering	PCC	4	0	0	4	40	60	100
	Professional Elective V	PEC	3	0	0	3	40	60	100
	Professional Elective VI	PEC	3	0	0	3	40	60	100
	Open Elective – I	OEC	3	0	0	3	40	60	100
	Comprehensive Study for Agricultural Engineering	PCC	2	1	0	1	100	-	100
PRACTICAL									
U23AG618	CAD for Agricultural Engineering	PCC	0	0	3	2	50	50	100
U23AG619	Post-harvest Technology Laboratory	PCC	0	0	3	1	50	50	100
U23AG620	Irrigation Field Laboratory	PCC	0	0	3	1	50	50	100
CAREER TRACK COURSE									
	Career Track Course – III	CTC	2	0	0	1	100	-	100
	Mini Project II	EEC	0	0	3	1	100	-	100
					Total	**24**	650	450	1100

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Programme	B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**		**Semester**		**VII**

Course Code	Course Name	Category	Periods /week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23AG721	Remote Sensing & GIS	PCC	3	0	0	3	40	60	100
U23AG722	Renewable energy in Agricultural Engineering	PCC	3	0	2	3	40	60	100
	Total Quality Management	HSMC	3	0	0	3	40	60	100
	AI in Agricultural Food Processing	PCC	3	0	0	3	40	60	100
	Open Elective II	OEC	3	0	0	3	40	60	100
	Open Elective III	OEC	3	0	0	3	40	60	100
PRACTICAL									
U23AG723	Remote Sensing and GIS Laboratory	PCC	0	0	3	2	50	50	100
U23AG724	Internship & Project Phase-I	EEC	0	0	3	3	50	50	100
					Total	**23**	340	460	800

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Programme	B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**		**Semester**		**VIII**

Course Code	Course Name	Category	Periods /week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
PRACTICAL									
U23AG825	Project Phase II	EEC	0	0	20	10	60	40	100
					Total	**10**	60	40	100

Total Credits: 161

LIST OF VERTICALS AND COURSES

Vertical I	Vertical II	Vertical III	Vertical IV
Food Processing	Farm Machinery & Energy	Water Management & Protected Cultivation	IT & Agricultural Business Management
Food and Diary Engineering	Bio Mass Conversion Technologies	Subsurface water engineering	Integrated farming system
Storage and Packaging Technology	Solar & Wind Energy Systems	Hydrology and Water Resource Engineering	Agri Business management
Refrigeration & Cold Storage	Farm Power & Machinery Management	Watershed planning and Management	Sustainable agriculture and food security
Process engineering of Fruits & Vegetables	Assessment of Farm machinery and Equipment	Micro irrigation system	Systems analysis in agricultural engineering
Food Process Equipment & Design	Utilization of waste and by products	On-farm water management	IT in agricultural systems
Food Plant Design & Management	Safety aspects in Farm Machinery Operations	Water quality and waste water management	Automation in Agriculture
Emerging Technologies in Food Processing	Precision farming equipment in Modern Agriculture	Climate change and adaption	Landscape architecture

Semester – III

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Programme	B.E/B.Tech	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23MA303	**Transforms and Partial Differential Equations**	3	1	0	4	40	60	100

Course Objective

The Main Objective of the course is

- To solve boundary value problems by using Fourier series.
- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

Course Outcome

At the end of the course, the student should be able to,	Knowledge level
CO1: Understand the concepts of Fourier series which plays a vital role in engineering applications.	K4
CO2: Understand how to solve the given standard partial differential equations**.**	K4
CO3: Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.	K5
CO4: Understand the mathematical principles on transforms which will provide them the ability to formulate and solve some of the physical problems of engineering.	K5
CO5: Use Z transform techniques for analyzing discrete time systems.	K3

Pre-requisites

-

CO/PO Mapping (3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak													CO/PSO Mapping	
COs	**Programme Outcomes (POs)**												**PSOs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1														
3	2		1	1								2		
3	2	1	1									2		
3	2	1		1								2		
3	2	1	1									2		
3	2	1	1	1								2		

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**Fourier Series**	Periods	**9+3**

Dirichlet's conditions – General Fourier series – Change of interval – Odd and even functions – Half range Sine series – Half range Cosine series – Harmonic analysis.

Unit - II	**Partial Differential Equations**	Periods	**9+3**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –Solution of Standard types of first order partial differential equations -Lagrange's linear equation – Solution of homogeneous linear partial differential equations of higher order with constant coefficients.

Unit – III	**Applications of Partial Differential Equations**	Periods	**9+3**

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two dimensional heat equation (excluding insulated edges).

Unit - IV	**Fourier Transform**	Periods	**9+3**

Fourier Integral theorem (without proof) – Fourier transform pair – Properties (without proof) – Transforms of simple functions – Fourier Sine and Cosine transforms – Properties (without proof) – Convolution theorem and Parseval's identity (Statement and applications only).

Unit – V	**Z –Transform**	Periods	**9+3**

Definition – Z-transform of some basic functions – Elementary properties – Inverse Z-transform: Partial fraction method –Initial and Final value theorem- Convolution theorem – Applications of Z-transforms: Solution of difference equations.

Total Periods	**45+15=60**

Text Books	
1.	Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2020.
2.	Churchill, R.V. and Brown, J. W., Fourier series and boundary value problems.(8th Edition), McGraw-Hill, 2011.
References	
1.	Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013.
2.	Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John Wiley (2015).
3.	Ramana.B.V., " Higher Engineering Mathematics" , Tata Mc Graw Hill Publishing Company Limited, New Delhi, 2008.
4.	P.R.Vittal, " Differential equations Fourier and Laplce Transforms", Margham Publishers, 2nd Edition, 1999.
5.	Ray Wylie. C and Barrett.C, " Advanced Engineering Mathematics " Tata Mc Graw Hill Education Pvt Ltd, Sixth Edition ,New Delhi 2012.
E-Resources	
1.	https://learnengineering.in
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**III**

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG301	**Basics of Soil Science and Engineering**	3	0	0	3	40	60	100

Course Objectives

Main objective of the course is to

- Representing the students about the fundamental knowledge on physical and engineering parameters of soil, various methods of soil survey and interpretative groupings.

Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Know the basics of soil physical parameters.	K1
	CO2: Execute soil survey and identify soil & its characteristics	K2
	CO3: Describe the soil compaction and phase relationship	K2
	CO4: Examine various engineering properties of soil	K3
	CO5: Understand bearing capacity of soil and stability of slopes.	K3
Pre-requisites	-	

CO/PO Mapping

(3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

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

Course Assessment Methods

Direct
1. Continuous Assessment Test I, Test II and Test III 2. Assignment 3. End Semester Examination
Indirect
1. Course – End Survey

Content of the Syllabus			
Unit I	**Introduction and Soil Physics**	**Periods**	**9**
Concepts of soil – pedological and edaphological; soil genesis – rocks, minerals and weathering; soil formation factors soil profile and components – physical properties – texture – structure – density – porosity – color – consistence – plasticity; basics of soil taxonomy and major soils of India. Soil water – retention – movement and availability; soil air – soil temperature – soil reaction – pH, acidity, alkalinity, buffering and pH effect on nutrients.			
Unit II	**Crop Selection and Establishment**	**Periods**	**9**
Soil Colloids – inorganic and organic, silicate clays – structure and properties, sources of charge, ion exchanve – cation exchange capacity – base saturation. Soil organic matters – composition, properties and effects on soils; humic substances – nature and properties. Soil organisms – macro & micro organisms – roles and rhizoshpere.			
Unit III	**Phase Relationship and Soil Compaction**	**Periods**	**9**
Phase relations- Gradation analysis- Atterberg Limits and Indices- Engineering Classification of soil – Soil compaction- factors affecting compaction- field and laboratory methods.			
Unit IV	**Engineering Properties of Soil**	**Periods**	**9**
Shear strength of cohesive and cohesionless - Mohr-Coulomb failure theory- Measurement of shear strength, direct shear, Triaxial and vane shear test- -Permeability- Coefficient of Permeability-Darcy's law-field and lab methods - Assessment of seepage - Compressibility.			
Unit V	**Bearing Capacity and Slope Stability**	**Periods**	**9**
Bearing capacity of soils - Factors affecting Bearing Capacity- Shallow foundations-Terzaghi"s formula- BIS standards - Slope Stability-Analysis of infinite and finite slopes- friction circle method- slope protection measures.			
Total Periods			**45**

Text Books	
1	Aruri K S and Anuradha S., "Text book of Soil Physics", Kalyani Publishers New Delhi, 2012.
2	Punmia, B.C., "Soil Mechanics and Foundation "Laxmi Publishers, New Delhi, 2017.
References	
1	Edward J. Plaster., "Soil Science & Management", Cengage Learning India Ltd, New Delhi, 2009.
2	Arora, K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers andDistributors, New Delhi, 2007.
3	Murthy, V.N.S. "Soil Mechanics and Foundation Engineering", UBS Publishers and distributors, New Delhi, 2007.
E-Resources	
1	https://www.agrimoon.com/wp-content/uploads/Introduction-to-Soil-Science.pdf
2	https://ecoursesonline.iasri.res.in/course/view.php?id=125

VIVEKANANDHA
COLLEGE OF ENGINEERING FOR WOMEN
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Elayampalayam, Tiruchengode – 637 205

Programme	B.E/B.Tech	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG302	**Surveying for Agricultural Engineering**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is to

- Introduce the basics of plane and geodetic surveying and various methods of surveying.
- Apply the concepts of levelling and calculating reduced levels.
- Introduce the concepts of Control Surveying and applications of modern surveying.

Course Outcome

At the end of the course, the student should be able to,	Knowledge level
CO1: Introduce the basics of various surveying along with its principles.	K1
CO2: Imparts knowledge in computation of levels of terrain and ground features	K3
CO3: Imparts concepts of Theodolite Surveying for complex surveying operations	K3
CO4: Understand the procedure for establishing horizontal and vertical control	K2
CO5: Imparts the knowledge on modern surveying instruments.	K3

Pre-requisites -

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	2	3	1	2	3	-	-	2	-	-	-	2	3	3
CO 2	2	3	3	2	3	-	-	2	-	-	-	2	3	3
CO 3	2	3	3	3	3	-	-	1	-	-	-	2	3	3
CO 4	3	3	3	2	3	-	-	2	-	-	-	2	3	3
CO 5	2	3	3	3	3	-	-	2	-	1	2	2	3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**Fundamentals of Conventional Surveying**	Periods	**9**
Definition – Classifications – Basic principles – Equipment and accessories for ranging and chaining – Methods of ranging – Well conditioned triangles – Chain traversing – Compass – Basic principles – Types – Bearing – System and conversions – Sources of errors and Local attraction – Magnetic declination – Dip – compass traversing.			
Unit - II	**Levelling**	Periods	**9**
Level line – Horizontal line – Datum – Benchmarks – Levels and staves – Temporary and permanent adjustments – Methods of leveling – Fly leveling – Check leveling – Contouring.			
Unit – III	**Theodolite Surveying**	Periods	**9**
Horizontal and vertical angle measurements – Temporary and permanent adjustments – Heights and distances – Tacheometric surveying – Stadia Tacheometry – Tangential Tacheometry			
Unit - IV	**Control Surveying and Adjustment**	Periods	**9**
Horizontal and vertical control – Methods – Triangulation – Traversing – Trilateration – Concepts of measurements and errors – Error propagation and Linearization – Adjustment methods - Least square methods – Angles, lengths.			
Unit – V	**Modern Surveying**	Periods	**9**
Total Station: Digital Theodolite, EDM, Electronic field book – Advantages – Parts and accessories – Working principle – Observables – Errors - COGO functions – Field procedure and applications. GPS: Advantages – System components – Signal structure – Selective availability and anti-spoofing receiver components and antenna – Planning and data acquisition – Data processing – Errors in GPS – Field procedure and applications.			
		Total Periods	**45**

Text Books	
1.	Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, Sixteenth Edition, 2016.
2.	T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune VidyarthiGrihaPrakashan, Pune, 2019.
References	
1.	R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2.	James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, Mc Graw Hill 2002.
3.	Bannister and S. Raymond, Surveying, Ninth Edition, Longman 2008.
4.	S. K. Roy, Fundamentals of Surveying, Fourth Second Edition, Prenticeˆ Hall of India, 2002
5.	K. R. Arora, Surveying Vol I & II, Standard Book house, Fifteenth Edition 2000.
6.	C. Venkatramaiah, Textbook of Surveying, Universities Press, Second Edition, 2001.
E-Resources	
1.	https://teachmint.storage.googleapis.com/public/828334492/StudyMaterial/59b2e350-73c6-4b2a-86bb-f2ce7dd590f0.pdf
2.	https://agrimoon.com/wp-content/uploads/Surveying-and-Leveling.pdf

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**III**

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG303	**Principles and Practices of Crop Production**	2	0	3	3	50	50	100

Course Objectives

Main objective of the course is to

- Introduce the principles of agricultural and horticultural crop production.
- Understand selection and establishment procedures.
- Learn the production practices of different crops.

Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Acquire knowledge on the basic principles of crop production.	K1
	CO2: Select suitable crops and decide upon its establishment procedures	K2
	CO3: Acquire knowledge on the different crop management practices	K3
	CO4: Acquire knowledge in the area of production of agricultural and horticultural crops	K3
	CO5: Delineate their role in relation to various crop production practices	K2
Pre-requisites	-	

CO/PO Mapping

(3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

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

Course Assessment Methods

Direct
1. Continuous Assessment Test I, Test II and Test III 2. Practical 3. End Semester Examination
Indirect
1. Course – End Survey

Content of the Syllabus			
Unit I	**Introduction to Crop Production**	**Periods**	**6**
Introduction to Agriculture – Classification of field and horticultural crops – factors affecting crop production – Tillage and its implements.			
Unit II	**Agro-meteorology**	**Periods**	**6**
Weather and climate, agro-climatic zones of India and Tamil Nadu – cropping pattern and cropping systems.			
Unit III	**Crop Management**	**Periods**	**6**
Integrated water management (IWM), Integrated Nutrient Management (INM), Bio-fertilizers, Crop protection – Management of weeds, insects, pests, pathogens and nematodes.			
Unit IV	**Cultivation practices of Agricultural Crops**	**Periods**	**6**
Cereals – Millets – Pulses – Oil Seeds – Cotton – Sugarcane & Forage.			
Unit V	**Cultivation practices of Horticultural Crops**	**Periods**	**6**
Vegetables – fruits – flowers – spices – plantation crops – protected cultivation.			
		Total periods	**30**

Suggested list of Experiments	
1.	Identification of field and horticultural crops.
2.	Observing biometric parameters on crops.
3.	Identification of weeds and types of weeders.
4.	Calculation of seed rate & NPK for crops
5.	Identification of insect pests and components of IPM
6.	Identification of disease causing organisms & IDM
7.	Identification of tillage implements & plant protection equipment.
8.	A field visit.
	Lecture: 30; Practical: 30; Total: 60 Periods

Text Books	
1	Rajendra Prasad, Text Book of Field Crop Production. Directorate of Information and Publication, Krishi Anusandhan Bhavan, Pusa, New Delhi, 2019.
2	Reddy T. Sankara G.H. YellamandaReddi, Principles of Agronomy, Kalyani Publishers, New Delhi, 2021.
3	Handbook of Agriculture. ICAR Publications, New Delhi, 2020.

References	
1	Bose T. K. and L.P.Yadav. Commercial Flowers, Naya Prakash, Calcutta.2020.
2	Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore. 2022.
3	Kumar, N., Abdul Khader, M. Rangaswami, P. and Irulappan, I. Introduction to spices, plantation crops, medicinal and aromatic plants. Rajalakshmi Publications, Nagercoil. 2019.
E-Resources	
1	https://agritech.tnau.ac.in/pdf/AGRICULTURE.pdf
2	https://bmpbooks.com/media/Field-Crop-Production.pdf

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023		
Department	**Agricultural Engineering**			Semester	**III**		

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG304	**Fluid Mechanics & Machines**	3	0	2	4	50	50	100

Course Objectives	Main objective of the course is to • Introduce the students about the properties of the fluids, behavior of fluids under static, kinematic and dynamic conditions through the control volume approaches and model analysis. • Understand the basic concepts of open channel flows with significance to steady uniform flows along with flow measurements in open channels. • Acquire knowledge on classification of pumps the basic principles of working and to design centrifugal pump.	
Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Demonstrate the properties of fluid and its behavior in static conditions along with pressure measurements.	K1
	CO2: Apply the conservation laws applicable to fluid flows and its application through fluid kinematics and dynamics.	K3
	CO3: Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel and to understand the concept of application of dimensional analysis in model studies.	K3
	CO4: Describe the basics characteristics of open channel flows and analysis of steady uniform flow with hydraulically efficient channel sections and to measure the flows in artificial/natural channels	K2
	CO5: Explain the classification, design and working principles of various pumps.	K4
Pre-requisites	-	

CO/PO Mapping
(3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

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

Course Assessment Methods

Direct

1. Continuous Assessment Test I, Test II and Test III
2. Practical
3. End Semester Examination

Indirect

1. Course – End Survey

Content of the Syllabus

Unit I	Fluid Properties And Fluid Statics	Periods	6+3

Definition and properties of fluid - Mass density –Specific weight - Specific volume – Specific gravity - Equation of state – Perfect gas - Viscosity – Vapor pressure – Compressibility and elasticity - Surface tension – Capillarity

Unit II	Fluid Statics	Periods	6+3

Fluid statics – Fluid pressure and measurement – simple, differential and micro manometers - Mechanical gauges - Forces on plane and curved surfaces - Buoyancy and floatation - Stability of floating bodies. Classification of flows – Methods of analysis- Streamline, streak-line and path-lines – Stream function - Euler's equation of motion along a stream line - Bernoulli's equation - Linear momentum equation – Applications.

Unit III	Fluid Dynamics	Periods	6+3

Reynolds experiment - Laminar flow through circular pipe - Darcy-Weisbach equation - Major and minor losses in pipe flow –Pipes in series and parallel- Equivalent pipes- Fundamental dimensions -Dimensional homogeneity - Buckingham Pi theorem

Unit IV	Flow through Pipes and Channels	Periods	6+3

Types of flow – Characteristics of open channel - Chezy's equation - Manning equation – Hydraulically efficient channel sections - Critical depth – Specific energy application to channel transitions – Flow measurement in channels – Notches – Weirs

Unit V	Pumps	Periods	6+3

Types of pumps – Head of pump – Losses and efficiencies - Centrifugal pump – Components – Working principle – Types of impellers - Priming –Turbine pump - Submersible pump - Jet pump – Air lift pump - Reciprocating pump

	Total Periods	45

Suggested list of Experiments	
Flow measurement	
1.	Calibration of Rotameter
2.	Flow through Orifice
3.	Flow through Triangular Notch
	Losses in Pipes
4.	Determination of losses due to bends, fittings and elbows
	Pumps
5.	Characteristics of Centrifugal pump
6.	Characteristics of Submersible pump
7.	Characteristics of Reciprocating pump

Text Books	
1	Streeter, V.L. Wylie, E. B. and Bedford K.W, Fluid Mechanics, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2002.
2	Modi P.N and Seth Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, New Delhi, 2017.
3	Subramanya K., Flow in Open Channels, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2009.
References	
1	Jain A. K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi,2002.
2	S K Som; Gautam Biswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, McGraw Hill Education (India) Pvt. Ltd., 2006.
3	Chandramouli P N, Applied Hydraulic Engineering, Yes Dee Publisher, 2002.
4	Ven Te Chow, Open Channel Hydraulics, McGraw Hill, New York, 2001.
5	Subramanya K, Fluid Mechanics and Hydraulic Machines: Problems and Solutions, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2006.
E-Resources	
1	https://shorturl.at/VvK0V
2	https://shorturl.at/AFatX

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**III**

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG305	**Soil Science and Engineering Laboratory**	0	0	2	1	60	40	100

Course Objectives	Main objective of the course is to • Students should able to verify various quality aspects of soil and water studies in theory by performing experiments in the laboratory.	
Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Explain soil physical properties and compare the properties based on soil	K1
	CO2: Analyze the soil chemical properties to classify the arable and problem soils to develop different reclamation practices.	K3
Pre-requisites	-	

CO/PO Mapping
(3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	1	3	2	1	1	-	-	-	-	1	2	2
CO2	2	1	1	3	2	1	1	-	-	-	-	1	2	2

Course Assessment Methods

Direct
1. Pre lab and Post lab Test 2. Execution of Experiment and Viva-voce 3. End semester examination
Indirect
1. Course – End Survey

List of Experiments

1.	Identification of rocks and minerals.
2.	Collection and processing of soil samples.
3.	Determination of Bulk density, soil moisture, EC and pH.
4.	Field density determination by Core Cutter and Sand Replacement method.

5.	Specific gravity determination by Pycnometer.
6.	Textural analysis of soil by Sedimentation Method
7.	Grain size analysis by using Mechanical shaker.
8.	Determination of Organic carbon.
Lab Manual	
1	Arun K S, Anuradha S, “Text Book of Soil Physics”, Kalyani Publishers, New Delhi, 2012.
2	Laboratory Manual, Centre for Water Resources, Anna University, Chennai. 2001.

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**III**

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG306	**Surveying Laboratory**	0	0	3	1	60	40	100

Course Objectives	Main objective of the course is to • Possess knowledge about survey field techniques	
Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Impart knowledge on the usage of basic surveying instruments like chain/tape, compass.	K1
	CO2: Able to use levelling instrument for surveying operations	K3
	CO3: Able to use theodolite for various surveying operations	K3
	CO4: Able to carry out necessary surveys for social infrastructures	K3
	CO5: Impart knowledge on advanced surveying.	K3
Pre-requisites	-	

CO/PO Mapping
(3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	3	3	2	3	2	3	3	3	3	1	3	3
CO2	3	2	3		3	3	3	3	3	3	3	1	3	3
CO3	3	1	2		3	2			3			2	3	3
CO4	3	3	2	3	2	3	3	2	3	3	3	1	3	3
CO5	3	3	3	2	2	3	3	2	3	3	3	1	3	3

Course Assessment Methods

Direct

1. Pre lab and Post lab Test
2. Execution of Experiment and Viva-voce
3. End semester examination

Indirect

1. Course – End Survey

List of Experiments

1.	Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset	
2.	Setting out works – Foundation marking using tapes single Room and Double Room	
3.	Compass Traversing – Measuring Bearings & arriving included angles	
4.	Fly levelling using Dumpy level & Tilting level.	
5.	Check levelling	
6.	Measurements of horizontal angles by reiteration and repetition and vertical angles	
7.	Determination of Tacheometric Constants	
8.	Heights and distances by stadia Tacheometry	
9.	Heights and distances by Tangential Tacheometry	
10.	Study on Total Station.	
Total Periods		**45**
Lab manual		
1	T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune VidyarthiGrihaPrakashan, Pune, 24th Reprint, 2002.	
2	Dr. B. C. Punmia, Ashok K. JainandArun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, 17th Edition, 1999.	
3	James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw Hill 2001.	
4	Bannisterand S. Raymond, Surveying, Seventh Edition, Longman 2004 a. David Clark, Plane and Geodetic Surveying for Engineers, Volume I, Constable and Company Ltd, London, CBS, 6th Edition, 2002.	

Semester - IV

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Programme	**B.E/B.Tech**	Programme Code	**108**	Regulation	**2023**
Department	**Agricultural Engineering**			Semester	**IV**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23MA408	**Biostatistics**	3	1	0	4	40	60	100

Course Objective

The main objective of the course is to

- Able to understand laws of Probability and the use of Baye's theorem
- Proficiently understand the expected value, variance, and higher-order moments of Random variables (for both discrete and continuous types).
- Identify and demonstrate suitable sampling and data collection process.
- Know about the different non-parametric tests.
- Introduce the basic concepts of statistical quality control.

Course Outcome

At the end of the course, the student should be able to,	Knowledge level
CO1: Apply the concept of probability to find the outcome of random events.	K3
CO2: Translate the density and distribution functions for discrete and continuous random variables.	K3
CO3: Apply appropriate modern technology to explore probability/statistical concepts.	K4
CO4: Use the different types of non-parametric tests and the test of randomness.	K4
CO5: Have the notion of sampling distributions and statistical techniques used in engineering and management problems.	K3

Pre-requisites -

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	1		1								2	
CO 2	3	2	1	1									2	
CO 3	3	2	1										2	
CO 4	3	2		1									2	
CO 5	3	2	1		1								2	

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**Introduction To Probability**	Periods	**9+3**
Introduction to Probability, Axioms of Probability: Sample spaces and events, axioms of Probability, sample spaces having equally likely outcomes – Conditional Probability and independence- Baye's theorem (without proof) and its applications.			
Unit – I	**Random Variables**	Periods	**9+3**
Random variables, Probability mass function, Probability generating function, moments, moment generating function and their properties-Chebyshev inequality.			
Unit - III	**Estimation Theory**	Periods	**9+3**
Unbiased estimators- Efficiency- Consistency- Sufficiency- Robustness- Method of moments- Method of maximum likelihood- Interval estimation of means- Differences between means, variations and ratio of two variables.			
Unit – IV	**Non- Parametric Tests**	Periods	**9+3**
Introduction-The sign test- The Signed- Rank test- Rank- Sum tests- The U test- The H test- Tests based on Runs- Test of randomness- The Kolmogorov tests.			
Unit – V	**Statistical Quality Control**	Periods	**9+3**
Control charts for measurements ($\overline{X}$ and R charts) - Control charts for attributes (p,c and np charts) – Tolerance limits – Acceptance sampling.			
		Total Periods	**45+15=60**

Text Books

1.	Montgomery, D.C. and Runger, C.G., Applied Statistics and Probability for Engineers, 7th Edition, Wiley Students Edition, Wiley, 2020.
2.	Ravichandran, J., Probability and statistics for Engineers, 1st Edition, Wiley India Ltd, 2012.

References

1.	Gupta S.C. and Kapoor V.K, Fundamentals of Mathematical Statistics, 12th Edition, Sultan an Sons, 2020.
2.	Devore, J.L., Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage Learning, 2014.
3.	Johnson, R.A., Miller, I. and Freund, J., Miller & Freund's Probability and Statistics for Engineers 9th Edition, Pearson Education, 2016.
4.	Ronald E.Walpole; Raymond H.M.yers; Stiaron L. Myers,"Probability and Statistics for Engineering and the Scientists",Pearson Publishers, 9th Edition,2010.
5.	Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5th Edition, Elsevier, 2004.

E-Resources	
1.	https://online.stanford.edu
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**IV**

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG407	**Strength of Materials for Agricultural Engineering**	3	0	0	3	40	60	100

Course Objectives

Main objective of the course is to

- To understand the stresses developed in bars, compound, bars, beams, shafts, cylinders andspheres.

Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Find the stress distribution and strains in regular and composite structures subjected to axialloads.	K1
	CO2: Evaluate the stresses in plane trusses	K2
	CO3: Assess the shear force, bending moment and bending stresses in beams	K2
	CO4: Apply torsion equation in design of circular shafts and helical springs	K3
	CO5: Evaluate the slope and deflection of beams and buckling loads of columns under differentboundary conditions	K4
Pre-requisites	-	

CO/PO Mapping
(3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

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

Course Assessment Methods

Direct

1. Continuous Assessment Test I, Test II and Test III
2. Assignment
3. End Semester Examination

Indirect

Course – End Survey			
Content of the Syllabus			
Unit I	**Stress, Strain And Deformation of Solids**	**Periods 9**	
Rigid bodies and deformable solids – Tension, Compression and Shear Stresses – Deformation of simple and compound bars – Thermal stresses – Elastic constants – Volumetric strains.			
Unit II	**Analysis of Plane Trusses**	**Periods**	**9**
Determinate and indeterminate plane trusses — determination of member forces by method of joints, method of tension coefficient.			
Unit III	**Properties of surfaces and bending moment**	**Periods**	**9**
Centroid, First, Second, Product moment of Inertia of plane figures. Beams – type's transverse loading on beams – Shear force and bending moment in beams – Cantilever – Simply supported beam. Overhanging Beams.			
Unit IV	**Torsion**	**Periods**	**9**
Torsion formula - stresses and deformation in circular and hollows shafts — Stresses in helical springs — Deflection of helical springs.			
Unit V	**Simple bending and deflection in beams**	**Periods**	**9**
Theory of simple bending - Computation of slopes and deflections in determinate beams - Double Integration method – Macaulay's method.			
Total Periods		**45**	
Text Books			
1	Bansal, R.K., "Strength of Materials", Laxmi Publications (P) Ltd., 2007		
2	Jindal U.C., "Strength of Materials", Asian Books Pvt. Ltd., New Delhi, 2007		
References			
1	Egor. P.Popov "Engineering Mechanics of Solids" Prentice Hall of India, New Delhi, 2001		
2	Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, 2007.		
3	Hibbeler, R.C., "Mechanics of Materials", Pearson Education, Low Price Edition, 2007		
E-Resources			
1	https://www.engineersedge.com/strength_of_materials.htm		
2	https://vipulzblog.wordpress.com/wp-content/uploads/2018/08/strength-of-material-by-r-k-bansal-31.pdf		

VIVEKANANDHA

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Elayampalayam, Tiruchengode – 637 205

Programme	B.E/B.Tech	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG408	**Mechanics of Machines**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is to

- Impart the knowledge on the concept of simple mechanisms.
- Study and construct the cam profile for the various types of follower motion.
- Learn the kinematics terminologies of gear and calculate speed ratio of various types of gear train.
- Learn and analyze the force-motion relationship in components subjected to external forces and analyzing of standard mechanisms and design of flywheel.
- Learn the concept and effect of dynamics of undesirable vibrations.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Identify the simple mechanisms based on application.	K1
	CO2: Construct the cam profile for different types of follower motion	K3
	CO3: Solve problems on gears and gear trains	K4
	CO4: Perform static, dynamic analysis of simple mechanism and design of fly wheel	K3
	CO5: Evaluate natural frequency of free and forced vibrations	K3

Pre-requisites -

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	2		2			1				1	3	1
CO 2	3	2	2		2			1				1	3	1
CO 3	3	2	2		2			1				1	3	1
CO 4	3	2	2		2			1				1	3	1
CO 5	3	2	2		2			1				1	3	1

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment **3.** End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**Fundamentals of Mechanism**	Periods	**9**
Basic Terminology - Kinematic link, Pair, joints, Structure, Machine, Degree of freedom, Grubler & Kutzbach Criterion - Inversions of four bar mechanism, Mechanical advantage - Transmission Angle , Inversion of single slider and double slider crank mechanisms.			
Unit - II	**Cam and Follower Mechanism**	Periods	**9**
Introduction - Terminology, Classifications, Types of follower motion - Uniform velocity Motion, Simple Harmonic Motion, Uniform Acceleration and Retardation Motion and Cycloidal Motion- Construction of cam profile - Knife edge follower, Roller and flat faced follower.			
Unit – III	**Gears and Gear Trains**	Periods	**9**
Theory of Gearing – Gear Nomenclature – Law of Gearing – Tooth Forms – Minimum Number Teeth – Length of Arc of Contact – Velocity and Torque Calculation- Contact Ratio and Interference. Gear Trains: Types - Parallel Axis and Epicyclic Gear Trains.			
Unit - IV	**Force Analysis of Mechanisms**	Periods	**9**
Static Force Analysis, Free Body Diagrams, Conditions of Two, Three and Four Force Members. Inertia Forces and D'Alembert's Principle – Inertia Force Analysis in Reciprocating Engines – Crank Shaft Torque. Flywheels – Turning Moment Diagrams and Fluctuation of Energy of Reciprocating Engine Mechanisms, Coefficient of Fluctuation of Energy and Speed.			
Unit – V	**Vibration**	Periods	**9**
Elements of vibration, free undamped vibration, Free Damped vibration (Viscus Damping) - Damping ratio and logarithmic decrement. Forced damped vibration - Transverse vibration, Shaft carrying several loads, whirling of shafts. Torsional vibration- effect of inertia on torsional vibration-Torsional equivalent Shaft, Rotor system.			
		Total Periods	**45**

Text Books

1.	Rattan S.S. “Theory of Machines”. 5th Edition, McGraw Hill Publishing Company, Chennai, 2019.
2.	Ramamurthi. V, “Mechanics of Machines”, Narosa Publishing House, 2002.

References

1.	AmitabhaGhosh and Asok Kumar Mallik, “Theory of Mechanisms and Machines”, Affiliated East-West Pvt. Ltd., 2000.
2.	Rao.J.S. and Dukkipati.R.V. “Mechanism and Machine Theory”, New Age International Pvt. Ltd., 2011.

3.	Rattan, S.S, “Theory of Machines”, McGraw-Hill Education Pvt. Ltd., 2009.
4.	Robert L. Norton, Kinematics and Dynamics of Machinery, Tata McGraw-Hill, 2008.
5.	Wilson and Sadler, Kinematics and Dynamics of Machinery, Pearson, 2008.
E-Resources	
1.	https://shorturl.at/k5dfM
2.	https://shorturl.at/NSrYq

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**IV**

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG409	**Tractors and Engine Systems**	3	0	0	3	40	60	100

Course Objectives

Main objective of the course is to

- Introduce the students to the different systems and working principles of tractor, power tiller, makes of tractors and power tillers.

Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Get an idea on various machinery available for farm mechanization.	K1
	CO2: Calculate the valve timing of an IC engine and represent by a drawing.	K2
	CO3: Gain knowledge on the transmission system of a tractor	K2
	Co4: Understand the hydraulic system in a tractor and estimate the traction.	K3
	CO5: Gain knowledge on power tillers, bulldozers and different tractor testing procedures.	K3

Pre-requisites: Mechanics of Machines

CO/PO Mapping
(3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

COs	Programme Outcomes (POs)											PSOs			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	2	3	-	-	2	-	-	-	2	3	3	3
CO2	2	3	3	2	3	-	-	2	-	-	-	2	3	3	2
CO3	2	3	3	3	3	-	-	1	-	-	-	2	3	3	2
CO4	3	3	3	2	3	-	-	2	-	-	-	2	3	3	2
CO5	2	3	3	3	3	-	-	2	-	1	2	2	3	3	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, Test II and Test III
2. Assignment
3. End Semester Examination

Indirect

1. Course – End Survey

Content of the Syllabus			
Unit I	**Tractors**	**Periods**	**9**
Classification of tractors - Tractor engines — construction of engine blocks, cylinder head and crankcase - features of cylinder, piston, connecting rod and crankshaft – firing order combustionchambers.			
Unit II	**Engine Systems**	**Periods**	**9**
Valves-inlet and outlet valves – valve timing diagram. Air cleaner- exhaust – silencer. Cooling systems - lubricating systems - fuel system – governor- electrical system.			
Unit III	**Transmission Systems**	**Periods**	**9**
Transmission - clutch - gear box - sliding mesh - constant mesh - synchro mesh. Differential, final drive and wheels. Steering geometry - steering systems - front axle and wheel alignment. Brake - types - system.			
Unit IV	**Hydraulic Systems**	**Periods**	**9**
Hydraulic system - working principles, three point linkage - draft control - weight transfer, theory of traction - tractive efficiency — tractor chassis mechanics - stability - longitudinal and lateral. Controls - visibility – operator's seat.			
Unit V	**Power Tiller, Bulldozer And Tractor Testing**	**Periods**	**9**
Power tiller - special features - clutch - gear box - steering and brake. Makes of tractors, powertillers and bulldozers. Bulldozer- salient features — turning mechanism, track mechanism, components — operations performed by bulldozers. Types of tests- test procedure - need for testing & evaluation of farm tractor -Test code for performance testing of tractors and power tillers.			
		Total Periods	**45**
Text Books			
1	Jain, S.C. and C.R. Rai. Farm tractor maintenance and repair. Standard publishers anddistributors, New Delhi, 1999.		
2	Barger, E.L., J.B. Liljedahl and E.C. McKibben, Tractors and their Power Units. WileyEastern Pvt. Ltd., New Delhi, 1997.		
References			
1	Domkundwar A.V. A course in internal combustion engines. Dhanpat Rai & Co. (P) Ltd., Educational and Technical Publishers, Delhi,1999.		
2	Black, P.O. Diesel engine manual. Taraporevala Sons& Co., Mumbai, 1996.		
3	Grouse, W.H. and Anglin, D.L. Automative mechanics. Macmillan McGraw- Hill, Singapore,Indian Standard Codes for Agricultural Implements Published by ISI, New Delhi, 1993.		
4	Jagadeeshwar Sahay, Elements of Agricultural Engineering, Standard Publishers Co.,New Delhi, 2010.		
E-Resources			
1	https://elibrary.asabe.org/textbook.asp?confid=etp2004		
2	https://www.scribd.com/document/696986287/AI3401-TRACTORS-AND-ENGINE-SYSTEMS		

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**IV**

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG410	**Unit Operations in Agricultural Processing**	3	0	2	4	50	50	100

Course Objectives

Main objective of the course is to

- The students would be exposed to the fundamental knowledge in Evaporation, Filtration, Sedimentation, Processing, Sieve analysis, Crystallization and Distillation in processing of agricultural produce.

Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Examine the evaporation process and types of evaporators for food industry	K1
	CO2: Analyze the principles of filtration and mechanical separation equipment	K4
	CO3: Identify size reduction and grinding equipment and understand the factors affecting the process	K3
	CO4: Identify the gas-liquid and solid-liquid equilibrium concepts and factors influencing equilibrium separation process.	K3
	CO5: Differentiate crystallization and distillation processes and identify processing equipment	K2
Pre-requisites	-	

CO/PO Mapping

(3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

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

Course Assessment Methods

Direct
1. Continuous Assessment Test I, Test II and Test III 2. Practical 3. End Semester Examination
Indirect
Course – End Survey

Content of the Syllabus			
Unit I	**Evaporation And Concentration**	**Periods**	**6**
Unit operations in food processing –conservation of mass and energy – overall view of an engineering process-evaporation – liquid characteristics – single and multiple effect evaporation performance of evaporators – economy and heat balance types of evaporators.			
Unit II	**Mechanical Separation**	**Periods**	**6**
Filtration – filter media – types and requirements-constant rate filtration – constant pressure filtration – filter cake resistance-filtration equipment – filter pressed sedimentation, sedimentation of particles in gas-cyclones – settling under sedimentation and gravitational sedimentation-centrifugal separations – centrifuge equipment.			
Unit III	**Size Reduction**	**Periods**	**6**
Size reduction – grinding and cutting – principles of comminuting – characteristics of comminuted products – particle size distribution in comminuted products-energy – crushing efficiency – Rittinger's, Bond's and Kick's laws for crushing-size reduction equipment – attrition, rod, ball and tube mills – construction and operation.			
Unit IV	**Contact Equilibrium Separation**	**Periods**	**6**
Contact equilibrium separation processes – concentrations – gas-liquid and solid-liquid equilibrium – gas absorption – equilibrium gas – absorption equipment-properties of tower packing – types – construction – flow through packed towers-extraction – extraction of fine material – continuous leaching – decantation systems – extraction towers-washing – equipment			
Unit V	**Crystallization And Distillation**	**Periods**	**6**
Crystallization-Equilibrium –Rate of crystal growth stage-Equilibrium crystallization-Crystallizers Equipment-Classification- Construction and operation – Binary mixtures-Flash and differential distillation-Steam distillation – Theory- Vacuum distillation – Batch distillation-Distillation equipment Construction and operation.			
		Total periods	**30**

Suggested list of Experiments	
1.	Determination of thermal efficiency and economy of evaporator
2.	Determination of separation efficiency of centrifugal separator
3.	Determination of collection efficiency in cyclone separator
4.	Determination of efficiency of liquid-solid separation by filtration
5.	Determination of absorption efficiency in a packing tower
6.	Performance evaluation of a sieve and determination of particle size of granular foods by sieve analysis

7.	Determination of energy requirement in size reduction using the burr mill
8.	Determination of energy requirement in size reduction using the ball mill and hammer mill
9.	Determination of mixing index for solids
10.	Determination of economy and thermal efficiency of rotary flash evaporator for concentration of juice
11.	Performance evaluation of a steam distillation process
	Lecture: 30; Practical: 30; Total: 60 Periods
Text Books	
1	Earle, R.L., "Unit operations in Food Processing", Pergamon Press, Oxford, U.K, 1985.
2	McCabe, W.L., and Smith, J.C., "Unit Operations of Chemical Engineering", Mc-Graw-Hill Inc., Kosaido Printing Ltd., Tokyo, 1990.
3	Geankoplis, C.J. "Transport Processes and Separation Process Principles", 4th Edition, Prentice Hall, 2003.
References	
1	Coulson, J.M and J.F. Richardson. Chemical Engineering. Volume I to V. The Pergamon Press. New York, 1999.
2	Albert Ibarz and Gustavo V. Barbosa-Cánovas. Unit Operations in Food Engineering. CRC Press LLC, Florida, 2003.
E-Resources	
1	https://shorturl.at/A3oTE
2	https://shorturl.at/5CSRh

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**IV**

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG411	**Strength of Materials Laboratory**	0	0	3	1	60	40	100

Course Objectives	Main objective of the course is to • To expose the students to the testing of different materials under the action of variousforces and determination of their characteristics experimentally.	
Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Find the stress distribution and strains in regular and composite structures subjected to axialloads.	K1
	CO2: Assess the shear force, bending moment and bending stresses in beams	K2
	CO3: Apply torsion equation in design of circular shafts and helical springs	K3
Pre-requisites	-	

CO/PO Mapping
(3/2/1 Indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

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

Course Assessment Methods

Direct
1. Pre lab and Post lab Test 2. Execution of Experiment and Viva-voce 3. End semester examination
Indirect
Course – End Survey

Suggested list of Experiments

S. No.	Experiments
1.	Tension test on steel rod

2.	Compression test on wood	
3.	Double shear test on metal	
4.	Torsion test on mild steel rod	
5.	Impact test on metal specimen (Izod and Charpy)	
6.	Hardness test on metals (Rockwell and Brinell Hardness Tests)	
7.	Deflection test on metal beam	
8.	Compression test on open coiled helical spring	
9.	Tension test on close coiled helical spring	
	Total Periods	**45**
Lab manual		
1	Strength of Materials Laboratory Manual, Anna University, Chennai - 600 025.	
2	IS 1786-2008 (Fourth Revision, Reaffirmed 2013), 'High strength deformed bars and wiresfor concrete reinforcement – Specification', 2008.	

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Programme	B.E./B.Tech.	Programme Code	108	Regulation	2023
Department	**Agricultural Engineering**			Semester	**IV**

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23AG412	**Tractors and Engines Laboratory**	0	0	2	1	60	40	100

Course Objectives	Main objective of the course is to • To make the students conversant with the anatomy of farm tractor and farm engines • To make them understand the working principle of IC engines, clutch, gear box, differential and final drive	
Course Outcome	On completion of the course student will be able to	Knowledge level
	CO1: Understand the working of tractors, power tillers and their functions	K1
	CO2: Identify and rectify problems in the functioning of tractors and power tillers.	K2
	CO3: Summarize the ergonomics of tractors and power tillers.	K3
Pre-requisites	-	

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

Course Assessment Methods

Direct

1. Pre lab and Post lab Test
2. Execution of Experiment and Viva-voce
3. End semester examination

Indirect

Course – End Survey

Suggested List of Experiments

S. No.	Experiments
1.	Identification and study of different components of diesel engine
2.	Identification and study of different components of petrol engine
3.	Method of working of diesel engine with the help of working models
4.	Method of working of diesel engine with the help of working models

5.	Dismantling and assembly of diesel engine	
6.	Dismantling and assembly of petrol engine	
7.	Study of clutch – components and method of working	
8.	Study of gear box – components and method of working	
9.	Study of differential and final drive– components and method of working	
10.	Study of braking system and steering system – components and method of working	
11.	Study of hydraulic system and PTO system in a tractor	
12.	Study of electrical system, instruments in the dashboard and controls — components: dynamo, starting motor, battery, lights, horn, odometer, ampere meter, accelerator, brake, differential lock, PTO lever, hydraulic lever, draft and position control lever.	
	Total Periods	**45**

Lab manual

1	Jagdishwar Sahay. 2019. Elements of Agricultural Engineering. Standard Publishers Distributors, Delhi.
2	Michael, A.M. and Ohja, T.P. 2018. Principles of Agricultural Engineering Volume I. Jain Brothers, Jodhpur.