PAAVAI ENGINEERING COLLEGE, NAMAKKAL -637018

(AUTONOMOUS)

DEPARTMENT OF AGRICULTURAL ENGINEERING

REGULATIONS 2023

CURRICULUM

(For candidates admitted during the Academic Year 2023 Onwards)

(CHOICE BASED CREDIT SYSTEM)

SEMESTER III

S.No.	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA23301	Transform Techniques and Partial Differential Equations	3	1	0	4
2	PC	AI23301	Principles and Practices of Horticultural Crop Production	3	0	0	3
3	PC	AI23302	Surveying and Levelling	3	0	0	3
4	PC	AI23303	Principles of Soil Science and Engineering	3	0	0	3
5	MC	MC23301	Environmental Sciences and Sustainability	2	0	0	0
Theory with Practical							
6	ES	AI23304	Fluid Mechanics and Hydraulics	3	0	2	4
Practical							
7	PC	AI23305	Surveying and Levelling Laboratory	0	0	4	2
8	PC	AI23306	Soil Science Laboratory	0	0	4	2
9	EE	GE23301	Professional Development I	0	0	2	1
			TOTAL	**17**	**1**	**12**	**22**

SEMESTER IV

S.No.	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA23403	Probability and Statistics	3	1	0	4
2	PC	AI23401	Strength of Materials for Agricultural Engineering	3	0	0	3
3	PC	AI23402	Hydrology and Water Resources Engineering	3	0	0	3
4	ES	AI23403	Mechanics of Machines	3	0	0	3
5	MC	MC23402	Human Values and Gender Equality	2	0	0	0
Theory with Practical							
6	PC	AI23404	Farm Tractors	3	0	2	4
Practical							
7	PC	AI23405	CAD Laboratory for Agricultural Engineering	0	0	4	2
8	PC	AI23406	Strength of Materials Laboratory	0	0	4	2
9	EE	GE23401	Professional Development II	0	0	2	1
			TOTAL	**17**	**1**	**12**	**22**

PAAVAI ENGINEERING COLLEGE, NAMAKKAL * BOARD OF STUDIES Agricultural Engineering * AUTONOMOUS

MA23301	TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS	3	1	0	4

(Common to Aero, Agri, BME, Biotech, Civil, Chemical, EEE, Food, Pharma, Mech, MCT, R&A)

COURSE OBJECTIVES

To enable the students to

1	develop the knowledge of periodic and non-periodic functions and their representations using fourier series.
2	acquaint the student with Fourier transform techniques used in wide variety of situations.
3	introduce the basic concepts of PDE for solving standard partial differential equations.
4	acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
5	develop Z transform techniques for discrete time systems.

UNIT I	FOURIER SERIES	12

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

UNIT II	FOURIER TRANSFORMS	12

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

UNIT III	PARTIAL DIFFERENTIAL EQUATIONS	12

Formation of partial differential equations; Lagrange's linear equation; Solutions of four standard types of first order partial differential equations; Linear partial differential equations of second order with constant coefficients.

UNIT IV	FOURIER SERIES SOLUTION TO PARTIAL DIFFERENTIAL EQUATIONS	12

Solutions of One-dimensional wave and heat equation; Steady state two-dimensional heat equation.

UNIT V	Z -TRANSFORMS AND DIFFERENCE EQUATIONS	12

Z-transforms - Elementary properties; Inverse Z-transform; Method of partial fraction ; Residue method; Convolution theorem; Solution of difference equations by Z-transform.

	TOTAL PERIODS	60

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	classify the properties of periodic and non-periodic vibrations with the help of Fourier series.	Applying (K3)
CO2	apply the Fourier transform to convert the function from frequency domain to time domain.	Applying (K3)
CO3	demonstrate partial differential equations that occur in many engineering	Applying (K3)

	applications.	
CO4	apply Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.	Applying (K3)
CO5	apply knowledge of Z transform to analyse linear time invariant systems.	Applying (K3)

TEXT BOOKS

1. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, New Delhi, (2018).

REFERENCES

1. Erwin Kreyszig , "Advanced Engineering Mathematics ", 10th Edition, Wiley Publications, New Delhi, India, 2016.
2. Ramana. B.V., "Higher Engineering Mathematics", Tata Mc-Graw Hill Publishing Company limited, New Delhi (2010).
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education (2007).
4. Wylie. R.C. and Barrett. L.C., "Advanced Engineering Mathematics", Tata Mc-Graw Hill Publishing Company limited, 6th Edition, New Delhi, 2012.

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	2	-	-	-	-	-	-	-	3	1	1
CO2	2	3	3	2	-	-	-	-	-	-	-	3	1	1
CO3	3	3	3	2	-	-	-	-	-	-	-	2	2	1
CO4	3	3	3	2	-	-	-	-	-	-	-	2	1	1
CO5	2	3	2	2	-	-	-	-	-	-	-	2	-	-

AI23301	PRINCIPLES AND PRACTICES OF HORTICULTURAL CROP PRODUCTION	3	0	0	3

COURSE OBJECTIVES	
To enable the students to	
1	demonstrate the basic knowledge of Horticulture crop production and propagation techniques.
2	illustrate the production practices of Horticulture crops.
3	explain the cultivation practices of fruits, spices and plantation crops.
4	acquire knowledge in production practices of vegetable crops.
5	outline the production practices of flowers and medicinal plants.

UNIT I	INTRODUCTION AND PROPAGATION OF HORTICULTURE CROPS	9

Horticulture crops - Scope and importance - Area and production - Exports and imports - fruit zones of India – Climatic factors influencing crop production; Propagation - Methods (seed, vegetative method and tissue culture) - advantages and disadvantages - Propagation techniques (Cutting, Grafting, Budding and Layering) - specialized plant parts for propagation; Tools used in propagation.

UNIT II	PRACTICES IN HORTICULTURE CROPS	12

System of planting in orchards (Square, Rectangular, Hexagonal, Quincunx, Contour and Triangular); Training and pruning methods - usefulness; Pollination and fruit set - Fruit drops - Causes and management; Growth regulators - Types - Role in horticulture crops: Landscaping - Scope and Importance - Components of Landscaping.

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

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

UNIT IV	PRODUCTION PRACTICES OF VEGETABLE CROPS	8

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

UNIT V	PRODUCTION PRACTICES OF FLOWERS AND MEDICINAL PLANTS	6

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

	TOTAL PERIODS	45

COURSE OUTCOMES		BT MAPPED
At the end of this course, the students will be able to		(Highest Level)
CO1	discuss the different factors affecting growth and production of horticultural crops.	Understanding (K2)

CO2	demonstrate the horticultural crop management practices.	Understanding (K2)
CO3	interpret the choice of practices to be followed for better growth of fruits, spices and plantation crops.	Understanding (K2)
CO4	illustrate the best practices to be followed for higher yield of vegetable crops.	Analyzing (K4)
CO5	apply advanced technology of flowers and medicinal crop production.	Applying (K3)

TEXT BOOKS

1. Kumar, N., "Introduction to Horticulture", Medtech Publishers, New Delhi, 2023.
2. Krishan par, Shubham Gupta, Kuldeep Kumar Bhargav and Abhay Saini "Fundamentals of Horticulture" SR. Scientific Publication. Uttar Pradesh, 2023.
3. Fageria, M.S, Choudhary B.R, Dhaka, R.S "Production Technology of Vegetable Crops",Kalyanis publishers, New Delhi, 2002.
4. Chattopadyay, T.K, "A Text Book on Pomology (Vol.1-4)", Kalyani publishers, New Delhi,2021.

REFERENCES

1. Horticultural Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore.2020.
2. Singh, A.K, "Flower crops cultivation and management", New India Publishing Agency, New Delhi, 2006
3. Handbook of Horticulture. (Vol.1&2)", ICAR Publications, New Delhi.

CO PO MAPPING

Mapping of course outcome(CO'S) with programme outcomes (PO'S) and programme specific Outcomes (PSO'S)

(1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak

COs	(POs)												PSO'S	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	-	2	3	1	-	-	2	-	-	2	2	2
CO2	3	3	-	2	3	1	-	-	2	-	-	2	2	2
CO3	2	2	2	1	3	1	2	-	1	-	-	2	3	2
CO4	2	2	2	1	3	1	2	-	1	-	-	2	3	2
CO5	2	2	2	1	3	1	2	-	1	-	-	2	3	2

AI23302	SURVEYING AND LEVELLING	3	0	0	3

COURSE OBJECTIVES

To enable the students to

1	introduce the principles of surveying
2	provide exposure in various methods and applications of surveying
3	understand the advanced level of surveying equipments
4	knowledge about the applications of levelling
5	enrich knowledge on modern surveying

UNIT I **FUNDAMENTALS AND CHAIN SURVEYING** **9**

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

UNIT II **COMPASS AND PLANE TABLE SURVEYING** **9**

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

UNIT III **LEVELLING** **9**

Level line - Horizontal line - Datum - Bench marks - Levels and staves - temporary and permanent adjustments; Methods of levelling - Fly levelling - Check levelling - Procedure in levelling - Booking-Reduction - Curvature and refraction - Reciprocal levelling ; Sources of errors in leveling; Precise levelling - Types of instruments - Adjustments - Field procedure.

UNIT IV **CONTOURING** **9**

Longitudinal and Cross-section; Plotting - Contouring - Methods - Characteristics and uses of contours-Plotting- Methods of interpolating contours; Computation of cross sectional area and volumes-Earthwork calculations; Capacity of reservoirs ; Mass haul diagrams.

UNIT V **THEODOLITE AND MODERN SURVEYING** **9**

Theodolite – Types - Description - Horizontal and vertical angles - Temporary and Permanent adjustments- Height and distances - Tangential and Stadia Tachometry - Stadia constants - Anallactic lens - Traversing - Gale's table; Total Station ; Global Positioning System (GPS)- Advantages – System components - Signal structure - Selective - availability and antispoofing receiver components and antenna – Planning and data acquisition - Data processing -Errors in GPS - Field procedure and applications.

TOTAL PERIODS **45**

COURSE OUTCOMES		
At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	identify the basic concepts of linear measurements	Remembering (K3)
CO2	carryout the compass and plane table surveying	Applying (K3)
CO3	compute the levels and to calculate the area and volume	Applying (K3)
CO4	prepare LS & CS, contour maps and carryout surveying works related to engineering projects.	Applying (K3)
CO5	apply the principles, concepts and applications of digital surveying	Applying (K3)

TEXT BOOKS

1. Dr. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain "Surveying" , Volume I &II, Laxmi Publications (P) Ltd., 2016.
2. Surveying and Levelling, Volume I by S.S Bhavikatti ,November 2019.

REFERENCES

1. N.N. Basak , "Surveying and Levelling", Tata McGraw-Hill Education Pvt. Ltd., 2004.
2. Agor, R., "Surveying and Levelling", Khanna Publishers, New Delhi.
3. Punmia. B.C Surveying (Vol- I & Vol-II) Laxmi publications, New Delhi. 1991.
4. Kanetkar, T.P. & Kulkarni, S.V., Surveying & leveling Part I, A.V.G. Prakashan, Poona 1984

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
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CO1	3	3	1	-	-	-	-	-	3	-	-	1	2	-
CO2	3	2	1	-	-	1	-	-	3	-	-	1	2	-
CO3	3	2	1	-	-	1	-	-	-	-	-	1	2	-
CO4	3	2	1	-	-	2	-	-	1	-	-	1	2	-
CO5	2	1	1	-	-	1	-	-	1	-	-	1	3	2

AI23303	PRINCIPLES OF SOIL SCIENCE AND ENGINEERING	3	0	0	3

COURSE OBJECTIVES	
To enable students to	
1	extent the fundamental knowledge of soil physical and chemical properties
2	understand the various methods of soil survey and interpretative groupings
3	provide exposure in phase relationship of soils and various soil compaction methods
4	impart knowledge about engineering properties of different types of soil
5	relate the bearing capacity and slope stability of soil

UNIT I	INTRODUCTION AND SOIL PHYSICS	9

Soil - definition - major components - Soil forming minerals and processes; Soil profile - physical properties - soil texture - soil structures and types of soil structure - density – porosity - capillary and non-capillary - consistence - colour - specific gravity - plasticity; Soil air - soil temperature - soil water - classification of soil water - Movement of soil water; Soil colloids - organic and inorganic matter - Ion exchange - pH - plant nutrient availability.

UNIT II	SOIL CLASSIFICATION AND SURVEY	9

Soil taxonomy - Soils of Tamil Nadu and India; Soil survey - types and methods of soil survey - field mapping - mapping units - base maps - preparation of survey reports - concepts and uses; Land Capability classes and subclasses - soil suitability; Problem of soils - Acidic, Saline, calcareous soil, gypsiferous soils and sandy soils - Reclamation.

UNIT III	PHASE RELATIONSHIP AND SOIL COMPACTION	9

Phase relations - Basic definitions and interrelationships - Gradation analysis - Atterberg's Limits and Indices ; Engineering Classification of soil - particle size classification, textural classification, Unified soil classification system, IS classification system ; Soil compaction - factors affecting compaction- field and laboratory methods.

UNIT IV	ENGINEERING PROPERTIES OF SOIL	9

Shear strength of cohesive and cohesion less - Mohr-Coulomb failure theory- measurement of shear strength - direct shear, Triaxial and vane shear test; Permeability - Coefficient of permeability - Darcy's law and its validity - field and lab methods - Assessment of seepage - Compressibility.

UNIT V	BEARING CAPACITY AND SLOPE STABILITY	9

Bearing capacity of soils - factors affecting Bearing Capacity- Terzaghi's formula - BIS standards; Slope stability - Types of slopes - Failure mechanism of slopes - Analysis of finite slopes - friction circle method - slope protection measures.

	TOTAL PERIODS	45

COURSE OUTCOMES At the end of this course, the students will be able to		BT MAPPED (Highest Level)
CO1	develop the ideas in fundamental of soil physical parameters	Understanding (K2)
CO2	compute the procedures involved in soil survey, field soil mapping and suitability of soil	Remember (K1)
CO3	formulate the engineering classification of soil and suitable compaction methods	Applying (K3)
CO4	examine the shear strength parameters for various soil conditions and assessment of seepage	Applying (K3)
CO5	analyse the concepts of bearing capacity, and slope stability	Analyzing (K4)

TEXT BOOKS

1. Nyle C. Brady, "The Nature and Properties of Soil", Macmillan Publishing Company, 15th Edition, New York, 2017.
2. Punmia, B.C., "Soil Mechanics and Foundation "Laxmi Publishers, New Delhi, 2017.

REFERENCES

1. Dilip Kumar Das, "Introductory Soil Science", Kalyani Publishers, New Delhi, 2020.
2. Arora, K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2020.
3. Murthy, V.N.S. "Soil Mechanics and Foundation Engineering", UBS Publishers and Distributors, New Delhi, 2018.
4. Sehgal, S.B., "Text Book of Soil Mechanics", CBS Publishers and Distributors New Delhi, 2012.

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COs	(PO's)												(PSO'S)	
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CO1	2	-	2	-	-	3	2	-	-	-	-	-	3	3
CO2	2	2	3	2	-	3	2	-	-	-	-	2	2	3
CO3	3	3	-	1	2	3	-	-	-	-	-	1	3	3
CO4	3	3	2	-	-	3	-	-	-	-	-	1	2	3
CO5	3	3	2	2	-	3	2	-	-	-	-	-	2	3

MC23301	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY	2	0	0	0

COURSE OBJECTIVES

To enable the students to

1	establish the knowledge of precious resources of the environment and their various impacts.
2	create awareness on ecosystem and biodiversity preserve.
3	learn scientific and technological solutions to current day pollution issues.
4	analyze climate changes, concept of carbon credit and the challenges of environmental management.
5	understand green materials, energy cycles and the role of sustainable urbanization.

UNIT I	ENVIRONMENT AND NATURAL RESOURCES	6

Definition, scope and importance of Environment. Forest resources: Use and over-exploitation, deforestation, - mining, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, dams-benefits and problems. Food resources: effects of modern agriculture, fertilizer-pesticide problems. Role of an individual in conservation of natural resources.

UNIT II	ECOSYSTEMS AND BIODIVERSITY	6

Concept of an ecosystem: Structure and function of an ecosystem - ecological succession - food chains and food webs. Ecosystems- Types of ecosystem: Introduction - forest ecosystem and lake ecosystems. Biodiversity: Introduction - definition (genetic - species - ecosystem). Diversity - Value of biodiversity - Hotspots of biodiversity - Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT III	ENVIRONMENTAL POLLUTION	6

Pollution: Définition - air pollution - water pollution - marine pollution - noise pollution. Solid waste management: Causes - effects - control measures of urban and industrial wastes. Role of an individual in prevention of pollution - Electronic waste -Sources-Causes and its effects- Pollution case studies-Field study of local polluted site – Industrial/Agricultural

UNIT IV	SUSTAINABILITY AND ENVIRONMENT	6

Sustainability - from unsustainability to sustainability-millennium development goals, and protocols. Sustainable development goals-targets, indicators and intervention areas. Climate change— acid rain - ozone layer depletion. Regional and local environmental issues and possible solutions-case studies. Concept of carbon credit, carbon footprint. Environmental management in industry-A case study.

UNIT V	SUSTAINABILITY PRACTICES	6

Zero waste and R concept, Circular economy, ISO 14000 Series, Environmental Impact Assessment - Sustainable energy: Non-conventional Sources, Green materials, Energy Cycles - carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socio economical and technological change.

	TOTAL PERIODS	30

COURSE OUTCOMES		
At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	find the method of conservation of natural resources	Understanding (K2)
CO2	understand ecosystem and the conservation of biodiversity.	Understanding (K2)
CO3	aware of environmental pollution and interpret its effects.	Understanding (K2)
CO4	apply sustainable development for technological advancement and societal development.	Applying (K3)
CO5	measure the sustainability practices for green energy cycles.	Analyzing (K4)

TEXT BOOKS

1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, 1st edition, 2017.
2. Gilbert M. Masters, Wendell P. Ela " Introduction to Environmental Engineering and Science", 3rd edition, Pearson, 2022.

REFERENCES

1. William P. Cunningham and Mary Ann Cunningham, "Environmental Science: A Global Concern", McGraw Hill, 16th edition, 2023.
2. C. S. Rao, Environmental Pollution and Control engineering, New Age International (P) ltd Publication, New Delhi, 4th edition, 2021.
3. Erach Bharucha, "Textbook of Environmental Studies", Universities Press Pvt. Ltd., edition, 2020.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 4th Edition, 2015.

CO-PO MAPPING :

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CO's	PO's												PSO's	
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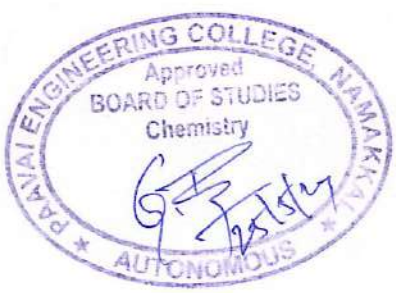
CO1	-	1	-	-	-	2	-	-	1	1	-	-	2	1
CO2	-	2	-	-	1	1	-	1	-	-	-	-	1	1
CO3	2	-	1	1	-	-	-	2	-	-	-	2	1	1
CO4	-	2	-	-	1	-	3	1	1	-	1	1	1	1
CO5	2	2	-	1	-	-	2	1	-	-	-	1	1	1



AI23304	FLUID MECHANICS AND HYDRAULICS	3	0	2	4

COURSE OBJECTIVES

To enable the students to

1	introduce the basic properties and behavior of fluids.
2	impart an idea of fluid statics and kinematics.
3	estimate the rate of flow through various elements
4	analyse the flow through open channels
5	study the working principle of different types of pumps.

UNIT I	FLUID PROPERTIES	8

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

UNIT II	FLUID STATICS AND KINEMATICS	10

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

UNIT III	FLOW MEASUREMENT	9

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

UNIT IV	OPEN CHANNEL FLOW	9

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

UNIT V	PUMPS	9

Pumps - types; Centrifugal pump - components - working principle - priming – cavitation; Reciprocating pump - components - working principle - types; Other pumps - submersible pump - Jetpump - Air lift pump - Hydraulic ram

LIST OF EXPERIMENTS

A. Flow Measurement

1. Flow through Venturimeter
2. Flow through Orifice meter
3. Flow through Rectangular Notch

B. Losses in Pipes	
4. Determination of friction coefficient in pipes	
5. Determination of losses due to bends, fittings and elbows	
C. Pumps	
6. Performance test on centrifugal pump	
7. Performance test on reciprocating pump	
TOTAL PERIODS	**75**

COURSE OUTCOMES At the end of this course, the students will be able to		**BT MAPPED** (Highest Level)
CO1	infer knowledge about properties and behaviour of fluids.	Understanding(K2)
CO2	analyse the static and kinematic behaviour of fluids.	Analyzing(K4)
CO3	measure the discharge and loss of energy in flow through pipes.	Applying (K3)
CO4	estimate the flow through open channels.	Understanding(K2
CO5	classify the different types of pumps and its working principle	Understanding(K2

TEXT BOOKS

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

REFERENCES

1. Garde, R.J., "Fluid Mechanics through Problems". New Age International Publishers (P) Ltd., New Delhi, 2002.
2. Agor, R., "Surveying and Levelling", Khanna Publishers, New Delhi.
3. Jain A.L. Fluid Mechanics., Khanna Publishers,2010
4. Modi.P.N and Seth S.M , Hydraulics and Fluid Mechanics, Standard Publishers Distributors, NewDelhi.

CO PO MAPPING

*** Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's(1/2/3/Indicates strength of correleation) 3-Strong ,2-Medium,1-Weak**

COs	PO's												PSO's	
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CO1	2	3	2	3	-	-	-	-	-	-	-	1	1	1
CO2	2	3	2	3	-	-	-	-	-	-	-	1	1	1
CO3	2	3	2	3	-	-	-	-	-	-	-	1	3	3
CO4	2	3	2	3	-	-	-	-	-	-	-	1	2	2
CO5	2	3	2	3	-	-	-	-	-	-	-	1	3	3

AI23305	SURVEYING AND LEVELLING LABORATORY	0	0	4	2

COURSE OBJECTIVES

To enable the students to

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

LIST OF EXPERIMENTS

(A) Chain Surveying

1. Plotting the outline of the given building Cross staff survey
2. Determination of the area of closed traverse
3. Setting out works –single Room and Double Room

(B) Compass Surveying

4. Compass traversing Measuring Bearings & arriving included angles

(C) Plane Table Surveying

5. Plane Table Surveying Radiation methods
6. Plane Table Surveying Intersection methods

(D) Levelling

7. Fly levelling using Height of collimation method
8. Fly leveling using Rise and fall method

(E) Total Station And GPS

9. Study of Electric Total Station
10. Field observation of GPS
11. computation of area of an agricultural farm land using Total Station
12. Using Global positioning system (GPS) technology for tree making in an agricultural land.

TOTAL PERIODS	**60**

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	explain the principles and classification of chain surveying and handle the chain and tape survey in the field	Understanding (K2)
CO2	demonstrate the different types of bearing and plane table surveying	Applying (K3)
CO3	handle all types of leveling operations.	Applying (K3)

CO4	make use of the theodolite ,total station and global position system.	Applying (K3)

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	-	3	-	-	-	-	3	-	-	-	-	-
CO2	3	2	-	3	3	-	-	-	3	-	-	3	-	-
CO3	2	2	-	2	1	-	-	-	2	-	-	1	2	-
CO4	2	2	-	3	3	-	-	-	2	-	-	1	2	-

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Agriculture Engineering
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AI23306	SOIL SCIENCE LABORATORY	0	0	4	2

COURSE OBJECTIVES

To enable the students to

1	able to identify the types of rocks and minerals and learn the procedure for collecting soil samples
2	know the various quality aspects of soil and water by using lab equipment's.
3	to provide hands on experience on the textural analysis of soil
4	should be able to perform in situ tests on soil samples

LIST OF EXPERIMENTS

1. Identification of rocks and minerals and Collection and processing of soil samples
2. Determination of soil moisture, EC and pH and Specific gravity
3. Determination of plastic limit and liquid limit
4. Determination of field density by Core Cutter method
5. Determination of field density by Sand Replacement method
6. Determination of compaction by Proctor compaction method
7. Textural analysis of soil by International Pipette method
8. Grain size analysis by using Mechanical shaker
9. Determination of Organic carbon
10. Estimation of Gypsum requirements

TOTAL PERIODS	**60**

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	learn about the identification of rocks and minerals and collection of soil samples	Applying (K3)
CO2	analyze the field density of soil	Analyzing(K4)
CO3	investigate the soil parameters using various methods	Applying (K3)
CO4	update the techniques to determine various physical and chemical properties of soil that are applicable for agriculture	Analyzing(K4)

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	2	-	-	-	-	3	-	2	3	3	2
CO2	3	3	-	3	3	-	1	-	3	2	2	3	3	2
CO3	2	1	-	2	1	-	1			1	2	-	2	1
CO4	2	2	-	1	-	-	-			1	2	-	1	3

GE23301	PROFESSIONAL DEVELOPMENT I	0	0	2	1

COURSE OBJECTIVES

To enable the students to

1	enhance and evaluate the student's professional skills and introduce the function of corporate world.
2	enhance and develop the students behavioral, speaking and listening skills to face the interview.
3	solve advance level verbal aptitude tests to get placed in Tier I companies.
4	improve their reasoning skills to get placed in reputed companies.

UNIT I	SELF - UNDERSTANDING AND PERSONALITY ENHANCEMENT SKILLS	7

Introduction self-exploration; SWOT analysis - Types and barriers; Effective communication in workplace; Leadership skills; Decision making - Problem solving; Goal setting - Critical, strategic and lateral thinking; JAM level- I; Basic resume building level- I.

UNIT II	BEHAVIOURAL SKILLS, LISTENING AND SPEAKING SKILLS	7

Behaviouralskills; Time management; Emotional intelligence; Analytical thinking- Listening; Listening and hearing; Self-introduction; Group discussion - Types and importance, evaluation criteria, do's and don'ts of GD; GD Level-1.

UNIT III	QUANTITATIVE APTITUDE	8

Number System; LCM and HCF; Simple interest and compound interest; Average; Pipes and cisterns; Area; Profit and loss.

UNIT IV	LOGICAL REASONING	8

Logical sequence; Analogy; Classification; Causes and effect; Making judgment; Directions.

	TOTAL PERIODS	30

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	define and analyze soft skills to improve the leadership skills.	Analyzing (K4)
CO2	demonstrate the behavioral skills through various activities.	Applying (K3)
CO3	develop the problem solving skills through quantitative aptitude.	Applying (K3)
CO4	illustrate the logical reasoning Skills to solve real world problems.	Analyzing (K4)

TEXT BOOKS

1. Agarwal, R.S. "Objective General English", S.Chand & Co.2021.
2. Agarwal, R.S. "Quantitative Aptitude", S.Chand & Co.2021.

REFERENCES

1. Abhijit Guha, "Quantitative Aptitude ", Tata-Mcgraw Hill, 2023.
2. Agarwal, R.S." a modern approach to Verbal & Non Verbal Reasoning", S.Chand & Co Ltd,

New Delhi.2021.

3. Word Power Made Easy By Norman Lewis, Wr.Goyal Publications, 2021.

CO-PO MAPPING :

Mapping of Course Outcomes (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

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

	PO's												PSO's	
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	3	3	2	3	-	3	1	1
CO2	-	-	-	-	-	-	2	3	2	3	-	3	1	1
CO3	3	2	2	2	-	1	-	-	-	-	2	-	2	2
CO4	2	1	3	2	-	3	3	1	-	1	2	-	2	2

MA23403	PROBABILITY AND STATISTICS	3	1	0	4

(Common to Agri, Biotech, Cyber, CSE, CSE(IOT), CSE(AI&ML), AI&DS, IT, Food, Pharma)

COURSE OBJECTIVES

To enable the students to

1.	analyse the concept of random variables and probability distribution in designing processes.
2.	differentiate the discrete and continuous two dimensional random variables.
3.	determine the concepts of hypotheses testing, its need and applications.
4.	equip with statistical techniques for designing experiments, analyzing, interpreting and presenting research data.
5.	emphasize the aspects of control charts in quality control.

UNIT I	RANDOM VARIABLES	12

Discrete and continuous random variables – Moments, Moment generating functions; Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions; Functions of random variables.

UNIT II	TWO - DIMENSIONAL RANDOM VARIABLES	12

Joint distributions; Marginal and conditional distributions; Covariance, Correlation and Linear regression; Transformation of random variables; Applications of Central limit theorem (for independent and identically distributed random variables).

UNIT III	TESTING OF HYPOTHESIS	12

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

UNIT IV	DESIGN OF EXPERIMENTS	12

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

UNIT V	STATISTICAL QUALITY CONTROL	12

Control charts for measurements (X and R charts) - Control charts for attributes (P, C and NP charts), Tolerance limits, Acceptance sampling - U-test and Sign test.

	TOTAL PERIODS	60

COURSE OUTCOMES

At the end of this course, the students will be able to		BT MAPPED (Highest Level)
CO1	assign suitable probability distributions in engineering problems.	Applying (K3)
CO2	apply the concept of discrete and continuous two dimensional random variables.	Applying (K3)

CO3	apply the concept of testing of hypothesis for small and large samples in real life problems	Applying (K3)
CO4	analyse the principles to be adopted for designing the experiments.	Analysing (K4)
CO5	examine statistical data using control chart in quality control	Applying (K3)

TEXT BOOKS

1. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
2. Johnson. R.A. and Gupta. C.B., Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th Edition, 2007.

REFERENCES

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2012.
2. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education Asia, 8th Edition, 2007.
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 3rd Edition, Elsevier, 2004.
4. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.

CO PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes :
(1,2,3 indicates the strength of correlation) 3 – Strong , 2 – Medium , 1 – Weak

Cos	(POs)												(PSO's)	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	1
CO2	3	2	3	3	-	-	-	-	-	-	-	3	1	-
CO3	3	3	3	2	-	-	-	-	-	-	-	2	1	1
CO4	3	3	2	2	-	-	-	-	-	-	-	2	2	2
CO5	3	3	2	3	-	-	-	-	-	-	-	2	1	1

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AI23401	STRENGTH OF MATERIALS FOR AGRICULTURAL ENGINEERING	3	0	0	3

COURSE OBJECTIVES

To enable the students to

1	impart knowledge in the fundamental concepts of stress and strain in mechanics of solids.
2	analyze the behaviour of beams under the action of various forces.
3	understand the concept of torsion of shafts and spring.
4	analyze the plane trusses, understand the methods of joints and tension co-efficient.
5	study the methods used for determination of deflection in beams, shells, springs

UNIT I **STRESSES AND STRAINS** **9**

Simple stresses and strains – Stress-Strain Curve-Factor of Safety- Strain Energy and Impact Loading - Stepped and Composite bars - Axial Stresses - Thermal Stress and Volumetric Stresses - Elastic constants and their relationship

UNIT II **SHEARFORCE AND BENDING MOMENT** **9**

Beams - Types of supports - loads and beams - Shear force and Bending Moment in Cantilever - simply supported beams - Point of contra flexure - Theory of Simple Bending, Section modulus - Bending stress and stress variation along the length and section of the beam.

UNIT III **TORSION IN SHAFT AND SPRING** **9**

Torsion - Stresses and deformation in circular and hollows shafts - Deflection in shafts fixed at the both ends - Stresses in helical springs - Deflection of helical springs- - carriage springs.

UNIT IV **ANALYSIS OF PLANE TRUSSES** **9**

Determinate and indeterminate plane trusses – determination of member forces by method of joints, method of sections and method of tension coefficient.

UNIT V **DEFLECTION OF BEAMS AND SHELLS** **9**

Slope and Deflection of cantilever and simply supported beams by Double Integration method - Macaulay's method; Deformation of thin cylindrical and spherical shell.

TOTAL PERIODS **45**

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	apply the simple stress and strain for one and two dimensional elements	Applying (K3)
CO2	examine the shear force, bending moment in beams under loading	Analyzing(K4)
CO3	apply torsion equation to the design of shafts and springs	Applying (K3)
CO4	analyze the frame work supporting a truss roof.	Analyzing(K4)
CO5	discover the slope and deflection of beams using different methods and discover the deformation of various shells.	Analyzing(K4)

TEXT BOOKS

1. S.S.Bhavikatti, Strength of Materials, Vikas Publishing House, New Delhi, Fourth edition 2013.
2. RK Rajput "Strength of Materials", by S. Chand Publishing., Laxmi Publications 2010.

REFERENCES

1. R.K.Bansal., "A Textbook of Strength of Materials", Laxmi Publications, New Delhi, 2015.
2. Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series,2010.
3. Hibbeler, R.C., "Mechanics of Materials", Prentice-Hall, 9780138149291, 0138149291, 2010.
4. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., NewDelhi, 2009

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	2	-	2	-	-	-	2	-	3	1	-
CO2	3	3	2	2	-	2	-	-	-	2	-	3	1	-
CO3	3	3	2	-	-	2	-	-	-	2	-	3	1	-
CO4	3	3	2	3	-	-	-	-	-	-	-	-	2	2
CO5	3	3	2	2	-	2	-	-	-	2	-	3	2	-

AI23402	HYDROLOGY AND WATER RESOURCES ENGINEERING	3	0	0	3

COURSE OBJECTIVES

To enable the students to

1	acquire knowledge of concept of hydrological aspects and rainfall measurement
2	recognize of catchment characters and runoff measurement.
3	impart knowledge on groundwater investigation methods
4	extrapolate the students site selection, design of spillways and storage of sedimentation
5	generalize the governing equation and artificial ground water recharge.

UNIT I PRECIPITATION AND ABSTRACTIONS **9**

Hydrological cycle - Meteorological measurements - Types and forms of precipitation; intensity- duration – frequency Analysis; Rain gauges - Spatial analysis of rainfall –arithmetic mean method, Thiessen polygon method, Isohyetal methods; Evaporation - evaporation measurements - pan evaporimeter – evaporation suppression; Infiltration – single ring infiltrometer, double ring infiltrometer - infiltration indices.

UNIT II RUNOFF **9**

Watershed – Catchment - Morphological characteristics of catchment; Run off- Factors affecting runoff, Run off estimation using Strange's table and empirical methods; SCS-CN method; Stage discharge relationship - Flow measurements; Hydrograph – Unit Hydrograph.

UNIT III HYDRO-GEOLOGIC PARAMETERS AND INVESTIGATION **9**

Aquifer -Types of aquifer – confined aquifer, unconfined aquifer, perched, Leaky; Properties of aquifer; artesian well – Geological formation of ground water – aquifuge, aquitard, aquiclude; Geophysical investigation of groundwater - surface methods, Subsurface methods; Water Balance equation.

UNIT IV RESERVOIRS **9**

Reservoir-Classification of reservoirs, Site selection, General principles of design; Spillways – types of spillway; Elevation – Area - Capacity curve ; Sedimentation - Life of reservoirs – Rule curve.

UNIT V GROUND WATER MANAGEMENT **9**

Ground water-Origin, Occurrence, types of ground water; Steady flow - unsteady flow; Artificial ground water recharge – direct method, indirect method; Rain water harvesting – rural areas, urban areas.

TOTAL PERIODS **45**

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	comprehend the various parameters in meteorological measurements.	Understanding (K2)
CO2	ascertain the knowledge of hydrological processes and runoff estimation.	Applying (K3)
CO3	express the hydro-geologic parameters and investigation methods	Understanding (K2)
CO4	explore knowledge of reservoir and spillway design	Understanding (K2)

CO5	derive the governing equation and know about of groundwater management.	Applying (K3)

TEXT BOOKS

1. Subramanya K, "Engineering Hydrology"- Tata McGraw Hill, 2024
2. Jayarami Reddy P, "Hydrology", Laxmi Publications ltd., 2021.

REFERENCES

1. Dr. R P Rethaliya ."Water Resources Engineering And Hydrology ", Shree Hari Publications, 2021.
2. Garg. " Hydrology Flood Control & Ground Water Engineering Khanna Publications, 2020
3. Raghunath. H.M., " Hydrology Principles, analysis, design: ", New Age International Pvt Ltd, 2015
4. Nishant A.Upadhye, Water Resources Engineering, Tech Knowledge Publications, 2023

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

	PO's												PSO's	
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	2	-	1	1	-	-	-	-	-	-	-	1	-
CO2	2	2	1	2	-	-	1	-	-	-	-	-	2	2
CO3	1	1	-	-	1	-	-	-	-	-	-	-	1	2
CO4	2	-	3	1	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	2	-	-	-	-	-	-	-	-	-	-

AI23403	MECHANICS OF MACHINES	3	0	0	3

COURSE OBJECTIVES

To enable the students to

1	applying the basic components of mechanisms.
2	examine friction in machine elements.
3	designing the cam mechanism for specified output motions.
4	determine gear ratio for simple, compound, reverted and epicyclic gear train.
5	understand the function of flywheel.

UNIT I	MECHANISMS	9

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

UNIT II	FRICTION AND APPLICATIONS	9

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

UNIT III	MOTION OF CAM AND FOLLOWER	9

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

UNIT IV	DIFFERENTIAL UNIT	9

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

UNIT V	FLYWHEEL AND BALANCING	9

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

	TOTAL PERIODS	45

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	construct velocity and acceleration diagram of simple mechanism.	Applying (K3)
CO2	predict the life of bearings for different applications.	Applying (K3)
CO3	customize cam mechanisms for required particular output motions.	Applying (K3)
CO4	compare speed and torque ratio of major gear train.	Applying (K3)
CO5	solve the static and dynamic balancing of various mechanical system.	Applying (K3)

TEXT BOOKS

1. Khurmi, R.S. and Gupta, J.K, "Theory of machines", Eurasia Publication House, 2020.

2. Rattan, S.S, "Theory of Machines", Fifth Edition, Tata McGraw-Hill, 2019.

REFERENCES

1. Dr.R.K.Bansal and Dr.J. S. Brar, "A Text book of Theory of Machines", Laxmi publications, 2015.
2. Theory of Machines and Mechanisms, Fifth Edition. John J. Uicker, Jr., Gordon R. Pennock, and Joseph E.Shigley. Publication Date - 07 December 2016.
3. John J Uichker and Joesph E.Shigley, Theory of Machines and Mechanism, oxford university press.United States of America., 2017.
4. S S. Rattan, Theory of Machines, Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi, 2019

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

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

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	-	2	-	-	1	-	-	-	1	3	1
CO2	3	2	2	-	2	-	-	1	-	-	-	1	3	1
CO3	3	2	2	-	2	-	-	1	-	-	-	1	3	1
CO4	3	2	2	-	2	-	-	1	-	-	-	1	3	1
CO5	3	2	2	-	2	-	-	1	-	-	-	1	3	1

MC23402	HUMAN VALUES AND GENDER EQUALITY	2	0	0	0

COURSE OBJECTIVES	
To enable the students to	
1	define different types of human values and their impact on individual behaviour and societal norms.
2	apply principles of personal development such as self-confidence, self-discipline, and resilience to navigate modern challenges effectively.
3	evaluate the role of values in shaping professional ethics, civic sense and global citizenship.
4	examine the socio-economic factors influencing gender inequality and explore avenues for empowerment and advocacy.
5	critically analyze prevalent issues and challenges faced by women, including gender-based violence, discrimination, and cultural biases, and propose measures for their eradication.

UNIT I	HUMAN VALUES	6

Value Education - Definition, Types of values; Human values - Acceptance, Consideration. Appreciation, Listening. Empathy, Sympathy, Honesty, Integrity, Wisdom, Decision making, Self-actualization, Character formation towards positive personality, Contentment; - Religious Values - Humility, Compassion, Gratitude, Peace, Justice, Freedom, Equality.

UNIT II	PERSONALITY DEVELOPMENT	6

Personal Development - Introspection, Self-confidence, Self-discipline; Flexibility -Peer pressure - Sensitization towards Gender Equality; Reliability; Unity; Modern Challenges of Adolescent Emotions and behavior - Comparison and Competition, Positive and Negative attitudes; Family values; Self- improvement - Physical exercises, Meditation ,Yoga.

UNIT III	VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT	6

Professional Values -. Integrity, Responsibility, Punctuality, Dedication - Perseverance - Competence; Civic sense and Responsibility; Global Values - Computer Ethics, Moral Leadership, Code of Conduct; Corporate Social Responsibility; Aesthetic values; National Integration and International understanding of Religious Values – Spirituality, thought process.

UNIT IV	GENDER EQUALITY	6

Gender Equality - Definition, Empowerment, Economic Equality; Condition of Women in India-Education, Healthcare, Political Representation, Gender-based Violence; Challenging Stereotypes: Parental and Caregiving Responsibilities; Legal and Policy Reform; Cultural Shifts; Global Perspective; Male Chauvinism; Sustainable Development..

UNIT V	WOMEN ISSUES AND CHALLENGES	6

Women Issues and Challenges - female feticide, violence against women; Domestic violence- dowry

related abuse and deaths, Physical violence, Emotional abuse; Sexual assault; Honour killing; Eve-teasing- Stalking, e-stalking (cyber-crime).	
TOTAL PERIODS	**30**

COURSE OUTCOMES		
At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	discuss the concept of human values and their significance in personal and societal development.	Understanding (K2)
CO2	demonstrate introspective skills to enhance personal growth and self-awareness.	Applying (K3)
CO3	recognize the importance of gender equality in promoting a just and equitable society.	Understanding (K2)
CO4	cultivate a sense of social responsibility and ethical conduct towards achieving national and global development.	Analyzing(K4)
CO5	analyse the challenges faced by women in various spheres and identify strategies for addressing them.	Analyzing(K4)

TEXT BOOKS

1. A Foundation Course in Human Values and Professional Ethics: Presenting a Universal Approach to Value Education - Through Self-exploration. New Delhi, 2016.
2. Aurther, John. Personality Development. Lotus Press, 2018.

REFERENCES

1. Joshi, Dhananjay. Value Education in Global Perspective. Lotus Press, 2014.
2. Mahrotra, Mamta. Gender Inequality in India: Challenging Social Norms. Prabhat Books, 2015.

CO-PO MAPPING:

Mapping of Course Outcomes (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

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

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	1	-	1	1	1	2	3	2	1	1	3	-	-
CO2	-	1	-	1	1	1	3	3	2	2	1	1	-	-
CO3	-	1	-	1	1	1	2	3	1	1	1	3	-	-
CO4	-	1	-	1	1	1	2	3	2	2	1	2	-	-
CO5	-	1	-	1	1	1	1	3	2	2	1	3	-	-

AI23404	FARM TRACTORS	3	0	2	4

COURSE OBJECTIVES

To enable the students to

1	identify the various practices in farms and working principles of tractor engine
2	develop skills on tractor components and efficient use of tractors
3	identify the method and functioning of transmission system
4	construct the hydraulic systems involved in tractors
5	discover the knowledge on test procedures to assess the performance of tractors

UNIT I **INTRODUCTION TO TRACTOR** **9**

History; Classification of tractors with their applications of ploughing, tilling, sowing, harrowing, harvesting, puddling and rotavation; Tractor engine - construction of engine blocks, cylinder head and crankcase - features of cylinder, piston, connecting rod and crankshaft; Two stroke and Four stroke engine; Firing order of combustion chambers.

UNIT II **ENGINE SYSTEMS** **9**

Valves-inlet and outlet valves – valve timing diagram; Engine cooling systems - air and water cooling; Lubricating systems; Fuel supply system for tractor engine; Governor-working and types; Electrical system of tractor.

UNIT III **TRANSMISSION SYSTEM** **9**

Need of transmission; Clutch-single and multiple clutch system; Gear box - sliding mesh gear - constant mesh gear - synchro mesh gear; Differential- final drive and wheels; Steering systems - front axle and wheel alignment; Brake - mechanical brake and hydraulic brake.

UNIT IV **HYDRAULIC SYSTEMS** **9**

Hydraulic system - working principles and applications; Three point linkage - draft control - weight transfer - theory of traction - tractive efficiency – tractor chassis mechanics - stability - longitudinal and lateral controls - visibility - operators seat.

UNIT V **ADVANCED TRACTOR TECHNOLOGY AND TRACTOR TESTING** **9**

Role of tractors in modern agriculture; Autonomous Tractors; Tractors using Internet of Things (IoT); Tractors with Global Navigation Satellite Systems (GNSS) Technology; Tractors with Robotics; Types of tractor tests - test procedure - need for testing & evaluation of farm tractor; Test code for performance testing of tractors.

LIST OF EXPERIMENTS

1. Identification of engine components and working functions
2. To conduct the dismantling and assembly of diesel engine system
3. To conduct the dismantling and assembly of petrol engine system

4.	Identification of engine and clutch components and working functions
5.	Infer the differential and final drive components and working functions
6.	Infer the brake and steering components and working functions
7.	Summarize the hydraulic system and PTO systems
8.	Examine of tractor testing procedure
	TOTAL PERIODS **75**

COURSE OUTCOMES At the end of this course, the students will be able to		**BT MAPPED** (Highest Level)
CO1	classify the various components used in tractor	Understanding (K2)
CO2	identify the tractor engine components	Understanding (K2)
CO3	discover the knowledge of transmission system and ergonomic aspects of tractors	Applying (K3)
CO4	construct knowledge on hydraulic systems in tractor	Understanding (K2)
CO5	outline the knowledge of test procedures and performance of tractors	Applying (K3)

TEXT BOOKS

1. JagadeeshwarSahay, Elements of Agricultural Engineering, Standard Publishers and Distributors Pvt Ltd., New Delhi, 2020.
2. Jain, S.C. and C.R. Rai. Farm tractor Maintenance and Repair. Standard publishers and Distributors, New Delhi, 2012.

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1. Jain, S.C. and C.R. Rai. Farm Tractor Power tiller Maintenance and Repair. Standard publishers and distributors, New Delhi, 2018.
2. Sharma D.N and S. Mukesh. Design of Agricultural Tractor. Jain Brothers,New Delhi, 2016
3. Manoj Kumar Ghosal and Dhirendra Kumar Das. Farm Power. Kalyani Publishers, 2008
4. Sanjay Kumar. Farm Power and Machinery.Kalyani Publishers, 2018

CO PO MAPPING

*** Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's(1/2/3/Indicates strength of correleation) 3-Strong ,2-Medium,1-Weak**

COs	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	2	3	-	-	-	-	-	-	-	1	1	1
CO2	2	3	2	3	-	-	-	-	-	-	-	1	1	1
CO3	2	3	2	3	-	-	-	-	-	-	-	1	3	3
CO4	2	3	2	3	-	-	-	-	-	-	-	1	2	2
CO5	2	3	2	3	-	-	-	-	-	-	-	1	3	3

AI23405	CAD LABORATORY FOR AGRICULTURAL ENGINEERING	0	0	4	2

COURSE OBJECTIVES

To enable the students to

1	formulate the agricultural engineering related machineries and structures by computer aided methods.
2	understand the plan and layout of irrigation and underground pipeline systems.
3	make use of components of irrigation systems using CAD.
4	develop an idea about design of post harvesting units and check dams.

LIST OF EXPERIMENTS

1. Study of basic CAD.
2. Design and drawing of underground pipeline system.
3. Design and drawing of drip irrigation system.
4. Design and drawing of check dam cum percolation pond.
5. Design and drawing of mould board plough.
6. Design and drawing of disk plough.
7. Design and drawing of seed drill.
8. Design and drawing of thresher.
9. Design and drawing of winnower.
10. Design and drawing of farmstead.
11. Design and drawing of poultry shed.
12. Design and drawing of biogas plant.
13. Design and drawing of shaft coupling.
14. Design and drawing of gears.
15. Design and drawing of connecting rod.

TOTAL PERIODS	**60**

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	draft the farm machinery and structures by using computers.	Applying (K3)
CO2	draw the components of irrigation system using CAD.	Applying (K3)
CO3	plot the post harvesting units and check dams.	Applying (K3)
CO4	construct the gears and connecting rod.	Applying (K3)

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	-	1	-	-	-	2	1	2	3	3
CO2	3	2	2	2	-	1	-	-	-	2	1	2	3	3
CO3	3	2	2	2	-	1	-	-	-	2	1	2	3	3
CO4	3	2	2	2	-	2	-	-	-	2	1	2	3	3

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AI23406	STRENGTH OF MATERIALS LABORATORY	0	0	4	2

COURSE OBJECTIVES

To enable the students to

1	expose the students to the testing of different materials under the action of various forces
2	determination of material properties experimentally.
3	experimental study on the deflection of beams.
4	exposure on hardness test on metals.

LIST OF 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. Izod Impact test on metal specimen.
6. Charpy Impact test on metal specimen.
7. Rockwell Hardness test on metals.
8. Brinell Hardness test on metals.
9. Deflection test on metal beam.
10. Compression test on helical spring.
11. Deflection test on carriage spring.

TOTAL PERIODS | **60**

COURSE OUTCOMES

At the end of this course, students will be able to		**BT Mapped (Highest Level)**
CO1	solve the various material behaviour under tension, compression, shear and torsion.	Applying (K3)
CO2	analyse the impact strength and hardness of the material	Analyzing(K4)
CO3	inspect strength of materials under stiffness and strain	Applying (K3)
CO4	discover the deflection of Beam and Spring	Analyzing(K4)

CO-PO MAPPING :

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

	PO's												PSO's	
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	1	2	-	3	-	1	1	-	-	2	2	3
CO2	3	2	1	2	-	3	-	1	1	-	-	2	2	3
CO3	3	2	1	2	-	3	-	1	1	-	-	2	2	3
CO4	3	2	1	2	-	3	-	1	1	-	-	2	2	3

GE23401	PROFESSIONAL DEVELOPMENT II	0	0	2	1

COURSE OBJECTIVES

To enable the students to

1	enhance their own behavioural skills to survive in corporate world.
2	evaluate their listening and speaking skills to face the interviews in a successful way.
3	solve advance level verbal aptitude tests to get placed in Tier I companies.
4	improve their reasoning skills to get placed in reputed companies.

UNIT I	WRITING SKILLS	7

Email writing; Fixing and cancelling appointments; Paper submission for seminars and conferences; Business communication; Stress management; Body language; Dress code; Self-introduction II; Update resume building II; JAM level -3.

UNIT II	PRESENTATION SKILLS	7

Presentation skills - Types and methods of delivering presentation, ways and methods to improve presentation skills; Mini presentation in smaller groups; Situational role play; Face to face interview; Group discussion level IL; JAM Level-4.

UNIT III	QUANTITATIVE APTITUDE - I	8

Simplification; Time, speed and distance; Trains; Boats and streams; Ratio and proportion; Partnership; Percentage.

UNIT IV	LOGICAL REASONING	8

Seating arrangement; Arithmetic reasoning; Character puzzle; Syllogisms; Matching definitions; Statements and arguments.

	TOTAL PERIODS	30

COURSE OUTCOMES

At the end of this course, students will be able to		BT Mapped (Highest Level)
CO1	interpret the personality development through various activities.	Understanding (K2)
CO2	examine speaking and listening skills to excel in their jobs.	Analyzing (K4)
CO3	develop the quantitative skills and analytical skills to face the interview.	Applying (K3)
CO4	extend the reasoning abilities by scoring exceeded percentage to get placed in reputed companies.	Understanding (K2)

TEXT BOOKS

1. Agarwal, R.S. "Objective General English", S.Chand & Co.; 2021.
2. Agarwal, R.S. "Quantitative Aptitude", S.Chand & Co., 2021.

REFERENCES

1. Abhijit Guha, "Quantitative Aptitude ", Tata-Mcgraw Hill, 2023.

2. Agarwal, R.S." a modern approach to Verbal & Non Verbal Reasoning", S.Chand & Co Ltd, New Delhi., 2021.

3. Word Power Made Easy By Norman Lewis, Wr.Goyal Publications, 2021.

CO-PO MAPPING :

Mapping of Course Outcomes (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

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

	PO's												PSO's	
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	3	3	2	3	-	3	1	2
CO2	-	-	-	-	-	-	2	3	2	3	-	3	1	2
CO3	3	2	2	-	-	1	-	-	-	-	2	-	2	2
CO4	2	3	3	2	-	3	3	1	-	1	2	-	2	2