RVS TECHNICAL CAMPUS – COIMBATORE

(*An Autonomous Institution*)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAAC with 'A' Grade
Kumaran Kottam Campus, Kannampalayam, Coimbatore – 641 402

REGULATIONS 2024

CHOICE BASED CREDIT SYSTEM

B.TECH. AGRICULTURAL ENGINEERING

CURRICULUM AND SYLLABI FOR SEMESTERS I TO VIII

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

I. To train and educate students with general knowledge and skills in agricultural water management, agricultural production process, farm machinery and farm management.
II. To provide a sound theoretical knowledge in engineering principles applied to agriculture.
III. To prepare students for a successful agricultural engineering career integrating all aspects of engineering in agriculture.
IV. To develop innovative capacity of students for increasing agricultural production with scarce water resources available.
V. To impart positive and responsive out their mission as engineers. reach attitudes, initiative and creative thinking in their mission as engineers.
VI. To understand ethical issues and responsibility of serving the society and the environment at large.

PROGRAM OUTCOMES (POs)

Graduates of the programme B.Tech. Agricultural Engineering will be able to:

1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **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.
3. **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.
4. **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.
5. **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.
6. **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.
7. **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.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **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.
11. **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.
12. **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.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Graduates of the programme B.Tech. Agricultural Engineering will be able to

1. To make expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill.
2. To enhance the ability of the students to formulate solutions to real-world problems pertaining to sustained agricultural productivity using modern technologies.
3. To inculcate entrepreneurial skills through strong Industry-Institution linkage.

RVS TECHNICAL CAMPUS COIMBATORE

AUTONOMOUS COLLEGES REGULATIONS 2024

CHOICE BASED CREDIT SYSTEM

B.TECH. AGRICULTURAL ENGINEERING

CURRICULUM AND SYLLABI FOR SEMESTERS I TO VIII

SEMESTER I

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	24UEN101	Professional English - I	HSMC	3	0	0	3	3
2.	24UMA102	Matrices and Calculus	BSC	3	1	0	4	4
3.	24UPH103	Engineering Physics	BSC	3	0	0	3	3
4.	24UCH104	Engineering Chemistry	BSC	3	0	0	3	3
5.	24UCS105	Problem Solving and Python Programming	ESC	3	0	0	3	3
6.	24UHT106	தமிழர் மரபு/Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
8.	24UCS121	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
9.	24UPC121	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
10.	24UEN121	English Laboratory[$]	EEC	0	0	2	2	1
			TOTAL	**16**	**1**	**10**	**27**	**22**

[$]Skill Based Course

SEMESTER II

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	24UEN201	Professional English - II	HSMC	2	0	0	2	2
2.	24UMA202	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	24UPC203	Principles and Practices of Crop Production	PCC	2	0	2	4	3
4.	24UBI204	Basic Electrical, Electronics and Instrumentation Engineering	ESC	3	0	0	3	3
5.	24UGE205	Engineering Graphics	ESC	2	0	4	6	4
6.	24UTT206	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	HSMC	1	0	0	1	1
PRACTICALS								
7.	24UGE221	Engineering Practices Laboratory	ESC	0	0	4	4	2
8.	24UBI221	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ESC	0	0	4	4	2
9.	24UEN221	Communication Laboratory / Foreign Language [$]	EEC	0	0	4	4	2
			TOTAL	**14**	**1**	**16**	**31**	**23**

[$]Skill Based Course

SEMESTER III

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	24UMA302	Fourier Series and Linear Programming	BSC	3	1	0	4	4
2.	24UME301	Engineering Mechanics	ESC	3	0	0	3	3
3.	24UAG301	Principles of Soil Science and Engineering	PCC	3	0	0	3	3
4.	24UAG302	Unit Operations in Agricultural Processing	PCC	2	0	2	4	3
5.	24UAG303	Engineering Thermodynamics	ESC	3	0	0	3	3
6.	24UAG304	Surveying and Levelling for Agricultural Engineering	PCC	3	0	0	3	3
PRACTICALS								
7.	24UAG321	Soil Science Laboratory	PCC	0	0	3	3	1.5
8.	24UAG322	Surveying and Levelling Laboratory for Agricultural Engineering	PCC	0	0	3	3	1.5
9.	24UAG323	CAD Essentials for Agricultural Engineering (2D)	PCC	0	0	4	4	2
10.	24UGE321	Professional Development[$]	EEC	0	0	2	2	1
11.	24UMX321	Presentation Skills	HSMC	3	0	0	3	0
			TOTAL	**20**	**1**	**14**	**35**	**25**

[$]Skill Based Course

SEMESTER IV

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	24UAG401	Tractors and Engine Systems	PCC	3	0	0	3	3
2.	24UAG402	Soil and Water Conservation Engineering	PCC	3	0	0	3	3
3.	24UAG403	Strength of Materials for Agricultural Engineering	PCC	3	0	0	3	3
4.	24UAG404	Fluid Mechanics and Pumps	PCC	3	0	0	3	3
5.	24UAG405	Theory of Machines	PCC	3	0	0	3	3
6.	24UGE401	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
PRACTICALS								
7.	24UAG421	Tractor and Farm Engines Laboratory	PCC	0	0	2	2	1
8.	24UAG422	Strength of Materials Laboratory for Agricultural Engineering	PCC	0	0	4	4	2
9.	24UAG423	Fluid Mechanics Laboratory	PCC	0	0	4	4	2
10.	24UAG424	Integrated CAD Design for Agricultural Engineering (3D)	PCC	0	0	4	4	2
11.	24UMX421	Aptitude and Logical Reasoning	EEC	3	0	0	3	0
			TOTAL	**20**	**0**	**14**	**34**	**24**

SEMESTER V

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	24UAG501	Farm Machinery and Equipment	PCC	3	0	0	3	3
2.	24UAG502	Hydrology and Water Resources Engineering	PCC	3	0	0	3	3
3.		Professional Elective I	PEC	3	0	0	3	3
4.		Professional Elective II	PEC	3	0	0	3	3
5.		Professional Elective III	PEC	3	0	0	3	3
6.		Professional Elective IV	PEC	3	0	0	3	3
7.		Mandatory Course - I	MC	3	0	0	3	0
PRACTICALS								
8.	24UAG521	Farm Machinery and Equipment Laboratory	PCC	0	0	4	4	2
9.	24UAG522	Agricultural IoT and Industry 4.0 Laboratory	PCC	0	0	4	4	2
10.	24UAG523	Summer Training (2 weeks)**	EEC	0	0	0	0	1
			TOTAL	**21**	**0**	**8**	**29**	**23**

[&]Mandatory Course - I is a Non-credit Course (Student shall select one course from the list given under MC-I)

****Summer training has to be completed during the summer vacation, after the completion of Semester IV.**

SEMESTER VI

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	24UAG601	Post-Harvest Technology	PCC	3	0	0	3	3
2.	24UAG602	Irrigation and Drainage Engineering	PCC	3	0	0	3	3
3.		Professional Elective V	PEC	3	0	0	3	3
4.		Professional Elective VI	PEC	3	0	0	3	3
5.		Professional Elective VII	PEC	3	0	0	3	3
6.		Open Elective–I*	OEC	3	0	0	3	3
7.		Mandatory Course-II[&]	MC	3	0	0	3	0
PRACTICALS								
8.	24UAG621	Post – Harvest Technology Laboratory	PCC	0	0	2	2	1
9.	24UAG622	Irrigation Field Laboratory	PCC	0	0	2	2	1
			TOTAL	**21**	**0**	**4**	**25**	**20**

***Open Elective –I shall be chosen from the emerging technologies**

[&]Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under MC-II)

SEMESTER VII

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	24UAG701	Remote Sensing and Geographical Information System	PCC	3	0	0	3	3
2.	24UAG702	Renewable Energy Engineering	PCC	3	0	0	3	3
3.	24UAG703	Human Values and Ethics	HSMC	2	0	0	2	2
4.	24UAG704	Total Quality Management	HSMC	3	0	0	3	3
5.		Open Elective–II**	OEC	3	0	0	3	3
6.		Open Elective–III***	OEC	3	0	0	3	3
7.		Open Elective–IV***	OEC	3	0	0	3	3
PRACTICALS								
8.	24UAG721	Remote Sensing and GIS Laboratory	PCC	0	0	4	4	2
9.	24UAG722	Renewable Energy Engineering Laboratory	PCC	0	0	2	2	1
			TOTAL	**20**	**0**	**6**	**26**	**23**

****Open Elective– II shall be chosen from the emerging technologies**

*****Open Elective III and IV (Shall be chosen from the list of open electives offered by other Programmes**

SEMESTER VIII

S. NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	24UAG821	Project Work/Internship	EEC	0	0	20	20	10
			TOTAL	**0**	**0**	**20**	**20**	**10**

TOTAL CREDITS: 170

MANDATORY COURSES I

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UMX521	Introduction to Women and Gender Studies	MC	3	0	0	3	0
2.	24UMX522	Elements of Literature	MC	3	0	0	3	0
3.	24UMX523	Film Appreciation	MC	3	0	0	3	0
4.	24UMX524	Disaster Risk Reduction and Management	MC	3	0	0	3	0

MANDATORY COURSES II

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UMX621	Well Being with Traditional Practices- Yoga, Ayurveda and Siddha	MC	3	0	0	3	0
2.	24UMX622	History of Science and Technology in India	MC	3	0	0	3	0
3.	24UMX623	Political and Economic Thought for a Human e Society	MC	3	0	0	3	0
4.	24UMX624	State, Nation Building and Politics in India	MC	3	0	0	3	0
5.	24UMX625	Industrial Safety	MC	3	0	0	3	0

PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL I (Food Processing)	VERTICAL II (Farm Machinery)	VERTICAL III (Soil and water conservation and Protected cultivation)	VERTICAL IV (Renewable Energy)	VERTICAL V (IT and Agricultural Business management)
Refrigeration and cold Storage	Farm Power and Machinery Management	Watershed planning and Management	Biochemical and Thermo chemical Conversion of biomass	Automation in Agriculture
Food and Dairy Engineering	Testing and Evaluation of Farm Machinery and equipment	Ground water and Well Engineering	Waste and by product utilization	Agri Business Management and Entrepreneurship
Process Engineering of Fruits and Vegetables	Design of Agricultural Machinery	Design of Micro-irrigation system	Solar and Wind energy system	Sustainable Agriculture and Food Security
Storage and Packaging Technology	Hydraulic Drives And Controls	Protected Cultivation	Energy Auditing	Systems Analysis in Agricultural Engineering
Food Process Equipment and Design	Human Engineering and Safety in Farm Machinery Operations	Landscape Irrigation Design	Cogeneration and Waste Heat Recovery Systems	UAV and its applications in Agriculture
Food Safety Management Systems	Precision Farming Equipment	Irrigation Water Quality and Waste Water Management	Energy Conservation In Agro Based Industry	IT in Agricultural Systems
Emerging Technologies in Food Processing	Ergonomics and Safety in Farm Operations	Climate change and Adaptation	Biomass Conversion and Biorefinery	Landscape architecture

Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialisation. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI.

The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulations 2021, Clause 4.10. (Amendments)

PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL I: FOOD PROCESSING

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UAG3001	Refrigeration and cold Storage	PEC	3	0	0	3	3
2.	24UAG3002	Food and Dairy Engineering	PEC	3	0	0	3	3
3.	24UAG3003	Process Engineering of Fruits and Vegetables	PEC	3	0	0	3	3
4.	24UAG3004	Storage and Packaging Technology	PEC	3	0	0	3	3
5.	24UAG3005	Food Process Equipment and Design	PEC	3	0	0	3	3
6.	24UAG3006	Food Safety Management Systems	PEC	3	0	0	3	3
7.	24UAG3007	Emerging Technologies in Food Processing	PEC	3	0	0	3	3

VERTICAL II: FARM MACHINERY

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UAG3008	Farm Power and Machinery Management	PEC	3	0	0	3	3
2.	24UAG3009	Testing and Evaluation of Farm Machinery and equipment	PEC	3	0	0	3	3
3.	24UAG 3010	Design of Agricultural Machinery	PEC	3	0	0	3	3
4.	24UAG3011	Hydraulic Drives And Controls	PEC	3	0	0	3	3
5.	24UAG3012	Human Engineering and Safety in Farm Machinery Operations	PEC	3	0	0	3	3
6.	24UAG3013	Precision Farming Equipment	PEC	3	0	0	3	3
7.	24UAG3014	Ergonomics and Safety in Farm Operations	PEC	3	0	0	3	3

VERTICAL III: SOIL AND WATER CONSERVATION AND PROTECTED CULTIVATION

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UAG3015	Watershed planning and Management	PEC	3	0	0	3	3
2.	24UAG3016	Ground water and Well Engineering	PEC	3	0	0	3	3
3.	24UAG3017	Design of Micro-irrigation system	PEC	3	0	0	3	3
4.	24UAG3018	Protected Cultivation	PEC	3	0	0	3	3

5.	24UAG3019	Landscape Irrigation Design	PEC	3	0	0	3	3
6.	24UAG3020	Irrigation Water Quality and Waste Water Management	PEC	3	0	0	3	3
7.	24UAG3021	Climate change and Adaptation	PEC	3	0	0	3	3

VERTICAL IV: RENEWABLE ENERGY

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UAG3022	Biochemical and Thermo chemical Conversion of biomass	PEC	3	0	0	3	3
2.	24UAG3023	Waste and by product utilization	PEC	3	0	0	3	3
3.	24UAG3024	Solar and Wind energy system	PEC	3	0	0	3	3
4.	24UAG3025	Energy Auditing	PEC	3	0	0	3	3
5.	24UAG3026	Cogeneration and Waste Heat Recovery Systems	PEC	3	0	0	3	3
6.	24UAG3027	Energy Conservation In Agro Based Industry	PEC	3	0	0	3	3
7.	24UAG3028	Biomass Conversion and Biorefinery	PEC	3	0	0	3	3

VERTICAL V: IT AND AGRICULTURAL BUSINESS MANAGEMENT

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UAG3029	Automation in Agriculture	PEC	3	0	0	3	3
2.	24UAG3030	Agri Business Management and Entrepreneurship	PEC	3	0	0	3	3
3.	24UAG3031	Sustainable Agriculture and Food Security	PEC	3	0	0	3	3
4.	24UAG3032	Systems Analysis in Agricultural Engineering	PEC	3	0	0	3	3
5.	24UAG3033	UAV and its applications in Agriculture	PEC	3	0	0	3	3
6.	24UAG3034	IT in Agricultural Systems	PEC	3	0	0	3	3
7.	24UAG3035	Landscape architecture	PEC	3	0	0	3	3

OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories)

OPEN ELECTIVE I AND II (EMERGING TECHNOLOGIES)

To be offered other than Faculty of Information and Communication Engineering

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UOCS351	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2.	24UOCS352	IoT Concepts and Applications	OEC	2	0	2	4	3
3.	24UOCS353	Data Science Fundamentals	OEC	2	0	2	4	3
4.	24UCCS333	Augmented Reality/Virtual Reality	OEC	2	0	2	4	3

OPENELECTIVES – III

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UOHS351	English for Competitive Examinations	OEC	3	0	0	3	3
2.	24UOMG352	NGOs and Sustainable Development	OEC	3	0	0	3	3
3.	24UOMG353	Democracy and Good Governance	OEC	3	0	0	3	3
4.	24UCME365	Renewable Energy Technologies	OEC	3	0	0	3	3
5.	24UOME354	Applied Design Thinking	OEC	3	0	0	3	3
6.	24UMF3003	Reverse Engineering	OEC	3	0	0	3	3
7.	24UOPR351	Sustainable Manufacturing	OEC	3	0	0	3	3
8.	24UAU3791	Electric and Hybrid Vehicles	OEC	3	0	0	3	3
9.	24UOAS352	Space Engineering	OEC	3	0	0	3	3
10.	24UOIM351	Industrial Management	OEC	3	0	0	3	3
11.	24U OIE354	Quality Engineering	OEC	3	0	0	3	3
12.	24UOSF351	Fire Safety Engineering	OEC	3	0	0	3	3
13.	24UOML351	Introduction to Non-Destructive Testing	OEC	3	0	0	3	3
14.	24UOMR351	Mechatronics	OEC	3	0	0	3	3
15.	24UORA351	Foundation of Robotics	OEC	3	0	0	3	3
16.	24UOAE352	Fundamentals of Aeronautical Engineering	OEC	3	0	0	3	3
17.	24UOGI351	Remote Sensing Concepts	OEC	3	0	0	3	3
18.	24UOCE353	Lean Concepts, Tools and Practices	OEC	3	0	0	3	3

19.	24UOEN351	Drinking Water Supply and Treatment	OEC	3	0	0	3	3
20.	24UOEE352	Electric Vehicle Technology	OEC	3	0	0	3	3
21.	24UOEI353	Introduction to PLC Programming	OEC	3	0	0	3	3
22.	24UOCH351	Nano Technology	OEC	3	0	0	3	3
23.	24UOCH352	Functional Materials	OEC	3	0	0	3	3
24.	24UOFD352	Traditional Indian Foods	OEC	3	0	0	3	3
25.	24UOFD353	Introduction to Food Processing	OEC	3	0	0	3	3
26.	24UOPY352	IPR for Pharma Industry	OEC	3	0	0	3	3
27.	24UOTT351	Basics of Textile Finishing	OEC	3	0	0	3	3
28.	24UOTT352	Industrial Engineering for Garment Industry	OEC	3	0	0	3	3
29.	24UOTT353	Basics of Textile Manufacture	OEC	3	0	0	3	3
30.	24UOPE351	Introduction to Petroleum Refining and Petrochemicals	OEC	3	0	0	3	3
31.	24UCPE334	Energy Conservation and Management	OEC	3	0	0	3	3
32.	24UOPT351	Basics of Plastics Processing	OEC	3	0	0	3	3
33.	24UOEC351	Signals and Systems	OEC	3	0	0	3	3
34.	24UOEC352	Fundamentals of Electronic Devices and Circuits	OEC	3	0	0	3	3
35.	24UCBM348	Foundation Skills in Integrated Product Development	OEC	3	0	0	3	3
36.	24UCBM333	Assistive Technology	OEC	3	0	0	3	3
37.	24UOMA352	Operations Research	OEC	3	0	0	3	3
38.	24UOMA353	Algebra and Number Theory	OEC	3	0	0	3	3
39.	24UOMA354	Linear Algebra	OEC	3	0	0	3	3
40.	24UOBT352	Basics of Microbial Technology	OEC	3	0	0	3	3
41.	24UOBT353	Basics of Bio molecules	OEC	3	0	0	3	3
42.	24UOBT354	Fundamentals of Cell and Molecular Biology	OEC	3	0	0	3	3

OPENELECTIVES – IV

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24UOHS352	Project Report Writing	OEC	3	0	0	3	3
2.	24UOMA355	Advanced Numerical Methods	OEC	3	0	0	3	3
3.	24UOMA356	Random Processes	OEC	3	0	0	3	3
4.	24UOMA357	Queuing and Reliability Modeling	OEC	3	0	0	3	3

5.	24UOMG354	Production and Operations Management for Entrepreneurs	OEC	3	0	0	3	3
6.	24UOMG355	Multi variate Data Analysis	OEC	3	0	0	3	3
7.	24UOME352	Additive Manufacturing	OEC	3	0	0	3	3
8.	24UCME343	New Product Development	OEC	3	0	0	3	3
9.	24UOME355	Industrial Design& Rapid Prototyping Techniques	OEC	3	0	0	3	3
10.	24UMF3010	Micro and Precision Engineering	OEC	3	0	0	3	3
11.	24UOMF354	Cost Management of Engineering Projects	OEC	3	0	0	3	3
12.	24UAU3002	Batteries and Management system	OEC	3	0	0	3	3
13.	24UAU3008	Sensors and Actuators	OEC	3	0	0	3	3
14.	24UOAS353	Space Vehicles	OEC	3	0	0	3	3
15.	24UOIM352	Management Science	OEC	3	0	0	3	3
16.	24UOIM353	Production Planning and Control	OEC	3	0	0	3	3
17.	24UOIE353	Operations Management	OEC	3	0	0	3	3
18.	24UOSF352	Industrial Hygiene	OEC	3	0	0	3	3
19.	24UOSF353	Chemical Process Safety	OEC	3	0	0	3	3
20.	24UOML352	Electrical, Electronic and Magnetic Materials	OEC	3	0	0	3	3
21.	24UOML353	Nano materials and Applications	OEC	3	0	0	3	3
22.	24UOMR352	Hydraulics and Pneumatics	OEC	3	0	0	3	3
23.	24UOMR353	Sensors	OEC	3	0	0	3	3
24.	24UORA352	Concepts in Mobile Robots	OEC	3	0	0	3	3
25.	24UMV3501	Marine Propulsion	OEC	3	0	0	3	3
26.	24UOMV351	Marine Merchant Vessels	OEC	3	0	0	3	3
27.	24UOMV352	Elements of Marine Engineering	OEC	3	0	0	3	3
28.	24UCRA332	Drone Technologies	OEC	3	0	0	3	3
29.	24UOGI352	Geographical Information System	OEC	3	0	0	3	3
30.	24UOCE354	Basics of Integrated Water Resources Management	OEC	3	0	0	3	3
31.	24UOEN352	Biodiversity Conservation	OEC	3	0	0	3	3
32.	24UOEE353	Introduction to Control Systems	OEC	3	0	0	3	3
33.	24UOEI354	Introduction to Industrial Automation Systems	OEC	3	0	0	3	3
34.	24UOCH353	Energy Technology	OEC	3	0	0	3	3
35.	24UOCH354	Surface Science	OEC	3	0	0	3	3

36.	24UOFD354	Fundamentals of Food Engineering	OEC	3	0	0	3	3
37.	24UOFD355	Food Safety and Quality Regulations	OEC	3	0	0	3	3
38.	24UOPY353	Nutra ceuticals	OEC	3	0	0	3	3
39.	24UOTT354	Basics of Dyeing and Printing	OEC	3	0	0	3	3
40.	24UFT3201	Fibre Science	OEC	3	0	0	3	3
41.	24UOTT355	Garment Manufacturing Technology	OEC	3	0	0	3	3
42.	24UOPE353	Industrial Safety	OEC	3	0	0	3	3
43.	24UOPE354	Unit Operations in Petro Chemical Industries	OEC	3	0	0	3	3
44.	24UOPT352	Plastic Materials for Engineers	OEC	3	0	0	3	3
45.	24UOPT353	Properties and Testing of Plastics	OEC	3	0	0	3	3
46.	24UOEC353	VLSI Design	OEC	3	0	0	3	3
47.	24UCBM370	Wearable Devices	OEC	3	0	0	3	3
48.	24UCBM356	Medical Informatics	OEC	3	0	0	3	3
49.	24UOBT355	Biotechnology for Waste Management	OEC	3	0	0	3	3
50.	24UOBT356	Life style Diseases	OEC	3	0	0	3	3
51.	24UOBT357	Bio technology in Health Care	OEC	3	0	0	3	3

SUMMARY

S.No.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL
		I	II	III	IV	V	VI	VII	VIII	
1.	**HSMC**	4	3					5		**12**
2.	**BSC**	12	4	4	2					**22**
3.	**ESC**	5	11	6						**22**
4.	**PCC**		3	14	22	10	8	9		**66**
5.	**PEC**					12	9			**21**
6.	**OEC**						3	9		**12**
7.	**EEC**	1	2	1		1			10	**15**
	Total	**22**	**23**	**25**	**24**	**23**	**20**	**23**	**10**	**170**
8.	**Mandatory Course (Non credit)**			**x**	**x**	**x**	**x**			

24UMA302 FOURIER SERIES AND LINEAR PROGRAMMING L T P C
3 1 0 4

COURSE OBJECTIVES:

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- 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 have knowledge in solving linear programming problems.
- To acquaint knowledge to solve transportation and assignment problems.
- To familiar with the method of solving non linear programming problems.

UNIT I FOURIER SERIES 9+3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series and cosine series – Root mean square value - Parseval's identity – Harmonic analysis.

UNIT II FOURIER TRANSFORMS 9+3

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties –Transforms of simple functions–Convolution theorem – Parseval's identity.

UNIT III LINEAR PROGRAMMING PROBLEMS 9+3

Mathematical formulation - Graphical method –Simplex method –Artificial variable techniques – Big M Method – Two phase Simplex method - Duality - Dual Simplex method.

UNIT IV TRANSPORTATION AND ASSIGNMENT PROBLEMS 9+3

Matrix form - Loops in T.P - Initial basic feasible solutions – Transportation algorithm - Degeneracy in T.P - Assignment and Routing problems.

UNIT V NON-LINEAR PROGRAMMING PROBLEMS 9+3

Lagrange multipliers – Equality constraints – Inequality constraints – Kuhn – Tucker Conditions – Quadratic programming.

TOTAL: 60PERIODS

COURSE OUTCOMES:

CO1: Apply Fourier series techniques used in wide variety of situations in which the functions used are not periodic and to solve boundary value problems.
CO2: Develop a fundamental understanding of linear programming models, able to develop a linear programming model from problem description, apply the Simplex method for solving linear programming problems.
CO3: Analyze the concept of developing, formulating, modeling and solving transportation and assignment problems.
CO4: Determine the optimum solution for non-linear programming problems.

TEXTBOOKS:

1. Grewal B.S., "Higher Engineering Mathematics",45th Edition, Khanna Publishers, New Delhi, 2024.
2. H.A. Taha, "Operations Research - An introduction", 11th Edition, Pearson Education, New Delhi, 2022.
3. Kanti Swarup, Guptha P.K. and Man Mohan, "Operations Research", 20th Edition, Sultan Chand & Sons, New Delhi, 2022.

REFERENCES:

1. Kreyszig E, "Advanced Engineering Mathematics", 10th Edition, JohnWiley, New Delhi, India, 2016.
2. Ravindran, Philips andSolberg "Operations Research, Principles and Practice", 2nd Edition, Wiley, , New Delhi, 2007.
3. Frederick S. Hillier and Gerald J. Lieberman – Introduction to Operations Research, 11th Edition' 2021
4. J.K. Sharma – Operations Research: Theory and Applications, 6th Edition, 2023

5. Richard Bronson & Govindasami Naadimuthu, "Operations Research" (Schaum's Outlines – TMH Edition) Tata Mc Graw Hill, 2nd Edition, New Delhi, 2004.

COs-PO's & PSO's MAPPING

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	2	0	0	0	0	0	0	2	0	0	2	-	-	-
CO2	3	2	0	0	0	0	0	0	2	0	0	2	-	-	-
CO3	3	2	0	0	0	0	0	0	2	0	0	2	-	-	-
CO4	3	2	0	0	0	0	0	0	2	0	0	2	-	-	-
CO5	3	2	0	0	0	0	0	0	2	0	0	2	-	-	-
Avg	3	2	0	0	0	0	0	0	2	0	0	2	-	-	-

24UME301 ENGINEERING MECHANICS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To Learn the use of scalar and vector analytical techniques for analyzing forces in statically determinate structures
- To introduce the equilibrium of rigid bodies, vector methods and free body diagram
- To study and understand the distributed forces, surface, loading on beam and intensity.
- To learn the principles of friction, forces and to determine the concepts of frictional forces at the contact surfaces of various engineering systems.
- To develop basic dynamics concepts–force, momentum, work and energy;

UNIT I STATICS OF PARTICLES 9

Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Statics of Particles- Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors. Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams, Forces in Space, Equilibrium of a Particle in Space.

UNIT II EQUILIBRIUM OF RIGID BODIES 9

Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors, Moment of a Force about a Point, Varignon's Theorem, Rectangular Components of the Moment of a Force, Scalar Product of Two Vectors, Mixed Triple Product of Three Vectors, Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Addition of Couples, Resolution of a Given Force into a Force -Couple system, Further Reduction of a System of Forces, Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections.

UNIT III DISTRIBUTED FORCES 9

Centroids of lines and areas–symmetrical and unsymmetrical shapes, Determination of Centroids by Integration, Theorems of Pappus - Guldinus, Distributed Loads on Beams, Centre of Gravity of a Three-Dimensional Body, Centroid of a Volume, Composite Bodies, Determination of Centroids of Volumes by Integration. Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.

UNIT IV FRICTION 9

The Laws of Dry Friction, Coefficients of Friction, Angles of Friction, Wedge friction, Wheel Friction, Rolling Resistance, Ladder friction.

UNIT V DYNAMICS OF PARTICLES 9

Kinematics – Rectilinear Motion and Curvilinear Motion of Particles. Kinetics-Newton's Second Law of

Motion - Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods - Work of a Force, Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact of bodies.

TOTAL: 45PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Illustrate the vector and scalar representation of forces and moments

CO2: Understand the rigid body in equilibrium

CO3: Determine the properties of distributed forces

CO4: Determine the friction and the effects by the laws of friction

CO5: Calculate dynamic forces exerted in rigid body

TEXTBOOKS:

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, Mc Graw Higher Education. 12th Edition, 2019.
2. Vela Murali, "Engineering Mechanics –Statics and Dynamics", Oxford University Press, 2018.

REFERENCES:

1. Boresi Pand Schmidt J, Engineering Mechanics :Statics and Dynamics,1/e,Cengage learning,2008.
2. Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 14th edition, Prentice Hall, 2018.
3. Irving H.Shames,Krishna Mohana Rao G,Engineering Mechanics– Statics and Dynamics , 4th Edition, Pearson Education Asia Pvt.Ltd.,2014.
4. Meriam J Land Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 9th edition,Wiley student edition , 2021.
5. Timoshenko S,Young D H,Rao J V and Sukumar Pati, Engineering Mechanics, 5thEdition , Mc GrawHill Higher Education, 2013.

COs-PO's & PSO's MAPPING

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	2	2	1	-	-	-	-	-	-	-	2	3	1	1
CO2	3	2	2	1	-	-	-	-	-	-	-	2	3	1	1
CO3	3	2	3	1	-	-	-	-	-	-	-	2	3	1	2
CO4	3	2	3	1	-	-	-	-	-	-	-	2	3	1	2
CO5	3	2	3	1	-	-	-	-	-	-	-	2	3	1	2
Avg	3	2	2.6	1	-	-	-	-	-	-	-	2	3	1	1.6

24UAG301 PRINCIPLES OF SOIL SCIENCE AND ENGINEERING L T P C

3 0 0 3

COURSE OBJECTIVES:

- To expose the students to the fundamental knowledge on Soil physical parameters, Permeability—Compaction,BearingCapacityandtypesandmethodsofsoilsurveyand interpretative groupings

UNIT I INTRODUCTION AND SOIL PHYSICS 9

Soil-definition-major components–Soil forming minerals and processes-soil profile - Physical properties - texture—density-porosity-consistence-colour-specific gravity - capillary and non-capillary-plasticity. Soil air-soil temperature-soil water-classification of soil water-Movement 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 sub classes – soil suitability – Problem soils – Reclamation.

UNIT III PHASE RELATIONSHIP AND SOIL COMPACTION 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 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.

UNITV BEARING CAPACITY AND SLOPE STABILITY 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: 45PERIODS

TEXTBOOKS:

1. Nyle C.Brady, "The Nature and Properties of Soil", Mac millan Publishing Company, 14th Edition, New York, 2014.
2. Punmia, B.C., "Soil Mechanics and Foundation "Laxmi Publishers, 16th Edition, New Delhi, 2019.

REFERENCES:

1. Edward J.Plaster., "Soil Science", Cengage Learning India Ltd, New Delhi, 6th Edition, 2018.
2. Arora, K.R."Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 7th Edition, 2008.
3. Murthy, V.N.S. "Soil Mechanics and Foundation Engineering", UBS Publishers and Distributors, New Delhi, 2009.
4. Sehgal, S.B., "Text Book of Soil Mechanics", CBS Publishers and Distributors New Delhi, 2007.

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Understand the fundamental knowledge of soil physical parameters.

CO2: Perform soil survey and classify soil based on its characteristics

CO3: Explain the phase relationship and soil compaction.

CO4: Analyze Engineering properties of soil

CO5: Understand Concepts of bearing capacity and slope stability.

COs-PO's & PSO's MAPPING

PO/PSO		CO1	CO2	CO3	CO4	CO5	**Overall correlation of COs With POs**
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	2	1	2	1	2	2
PO3	Design/development of solutions	2	2	2	2	2	2
PO4	Investigation	1	1	1	1	1	1
PO5	Modern Tool Usage	-	1	1	1	1	1
PO6	Individual and Team work	1	1	1	1	1	1
PO7	Communication	2	-	-	2	1	1
PO8	Engineer and Society	-	-	-	-	-	-
PO9	Ethics	-	-	-	-	-	-

PO10	Environment and Sustainability	-	-	-	-	-	-
PO11	Project Management and Finance	-	-	-	-	-	-
PO12	Life Long Learning	1	1	1	1	1	1
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	2	2	1	2	2	2
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	1	1	1	1	1	1
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	1	1	1	1	1	1

24UAG302 UNIT OPERATIONS IN AGRICULTURAL PROCESSING L T P C
2 0 2 3

COURSE OBJECTIVES:

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

UNIT I EVAPORATION AND CONCENTRATION 6

Unit operations in food processing – conservation of mass and energy—overall view of an engineering process-dimensions and units – dimensional and unit consistency – dimensionless ratios-evaporation– definition — liquid characteristics — single and multiple effect evaporation-performance of evaporators and boiling point elevation – capacity – economy and heat balance- types of evaporators – once through and circulation evaporators – short tube evaporators and long tube evaporators – agitated film evaporator

UNIT II MECHANICAL SEPARATION 6

Filtration—definition–filter media—types and requirements-constant rate filtration—constant pressure filtration – filter cake resistance-filtration equipment – rotary vacuum filter – filter press-sedimentation – gravitational sedimentation of particles in a fluid – Stoke's law, sedimentation of particles in gas-cyclones – settling under sedimentation and gravitational sedimentation-centrifugal separations – rate of separations– liquid– liquid separation– centrifuge equipment.

UNIT III SIZE REDUCTION 6

Size reduction – grinding and cutting – principles of comminuting – characteristics of comminuted products – particle size distribution in comminuted products-energy and power requirements in comminuting – crushing efficiency – Rittinger's, Bond's and Kick's laws for crushing-size reduction equipment – crushers – jaw crusher, gyratory crusher-crushing rolls – grinders – hammer mills – rolling compression mills - attrition, rod, ball and tube mills – construction and operation.

UNIT IV CONTACT EQUILIBRIUM SEPARATION 6

Contact equilibrium separation processes–concentrations–gas-liquid and solid-liquid equilibrium –equilibrium concentration relationships–operating conditions-calculation of separation in contact —equilibrium processes-gas absorption—rate of gas absorption—stage—equilibrium gas—absorption equipment-properties of tower packing – types – construction – flow through packed towers-extraction – rate of extraction – stage equilibrium extraction-equipment for leaching coarse solids—intermediate solids—basket extractor-extraction of fine material—Dorr agitator— continuous leaching – decantation systems – extraction towers-washing – equipment

UNIT V CRYSTALLISATION AND DISTILLATION 6

Crystallization-Equilibrium –Rate of crystal growth stage-Equilibrium crystallization-Crystallizers-Equipment-Classification- Construction and operation —Crystallizers-Tank-Agitated batch- Swenson-Walker and Vacuum crystallizers-Distillation-Binary mixtures-Flash and differential distillation-Steam

distillation –Theory-Continuous distillation with rectification –Vacuum distillation - Batch distillation-Operation and process-Advantages and limitation-Distillation equipment- Construction and operation-Factors influencing the operation.

TOTAL: 30 PERIODS

PRACTICAL

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
11. Concentration of juice
12. Performance evaluation of a steam distillation process

TOTAL: 30 PERIODS

TEXTBOOKS:

1. K.M. Sahay and K.K Singh "Unit Operations of Agricultural Processing (Newly Added), 2009
2. Earle,R.L., "Unit operations in Food Processing", Pergamon Press, Oxford,U.K,1983.
3. McCabe, W.L., and Smith, J.C., "Unit Operations of Chemical Engineering", Mc-Graw-Hill Inc., Kosaido Printing Ltd., Tokyo, 2021.
4. Geankoplis, C.J."Transport Processes and Separation Process Principles", 5th Edition, Prentice Hall, 2021.

REFERENCES:

1. Coulson, J.M and J.F. Richardson. Chemical Engineering. Volume I to V. The Pergamon Press. New York, 2017.
2. Albert Ibarz and Gustavo V. Barbosa-Cánovas. Unit Operations in Food Engineering. CRC Press LLC, Florida, 2014..

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Examine the evaporation process and types of evaporators for food industry
CO2: Understand the principles of filtration and mechanical separation equipment
CO3: Identify size reduction and grinding equipment and understand the factors affecting the process
CO4: Identify the gas-liquid and solid-liquid equilibrium concepts and factors influencing equilibrium separation process.
CO5: Differentiate crystallization and distillation processes and identify processing equipment.

COs-PO's & PSO's MAPPING

PO/PSO		CO1	CO2	CO3	CO4	CO5	Overall Correlation of Cos with POs
PO1	Knowledge of Engineering Sciences	2	2	2	2	2	2
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design/development of solutions	1	1	1	1	1	1
PO4	Investigation	2	2	1	1	2	2
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Individual and Team work	1	1	1	1	1	1
PO7	Communication	1	-	1	1	1	1
PO8	Engineer and Society	-	-	-	-	-	-
PO9	Ethics	-	-	-	-	-	-

PO10	Environment and Sustainability	-	-	-	-	-	-
PO11	Project Management and Finance	-	-	-	-	-	-
PO12	Life Long Learning	1	1	1	1	1	1
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	1	1	1	1	1	1
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	1	1	1	1	1	1
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	1	1	1	1	1	1

24UAG303 ENGINEERING THERMODYNAMICS L T P C
3 0 0 3

COURSE OBJECTIVES:

- Impart knowledge on the basics and application of zeroth and first law of thermodynamics.
- Impart knowledge on the second law of thermodynamics in analyzing the performance of thermal devices.
- Impart knowledge on availability and applications of second law of thermodynamics
- Teach the various properties of steam through steam tables and Mollier chart.
- Impart knowledge on the macroscopic properties of ideal and real gases.

UNIT I BASICS, ZEROTH AND FIRST LAW 9

Review of Basics – Thermodynamic systems, Properties and processes Thermodynamic Equilibrium - Displacement work - P-V diagram. Thermal equilibrium - Zeroth law – Concept of temperature and Temperature Scales. First law – application to closed and open systems – steady and unsteady flow processes.

UNIT II SECOND LAW AND ENTROPY 9

Heat Engine – Refrigerator - Heat pump. Statements of second law and their equivalence & corollaries. Carnot cycle - Reversed Carnot cycle - Performance - Clausius inequality. Concept of entropy - T-s diagram - Tds Equations - Entropy change for a pure substance. - NDVI analysis - Drought Prone Area Programme (DPAP).

UNIT III AVAILABILITYANDAPPLICATIONSOFIILAW 9

Ideal gases undergoing different processes - principle of increase in entropy. Applications of II Law. High and low grade energy. Availability and Irreversibility for open and closed system processes - I and II law Efficiency

UNIT IV PROPERTIESOFPURESUBSTANCES 9

Steam - formation and its thermodynamic properties - p-v, p-T, T-v, T-s, h-s diagrams. PVTsurface. Determination of dryness fraction. Calculation of work done and heat transfer in non-flow and flow processes using Steam Table and Mollier Chart.

UNIT V GASMIXTURESANDTHERMODYNAMICRELATIONS 9

Properties of Ideal gas, real gas - comparison. Equations of state for ideal and real gases. vander Waal's relation - Reduced properties - Compressibility factor - Principle of Corresponding states - Generalized Compressibility Chart. Maxwell relations - TdS Equations - heat capacities relations - Energy equation, Joule-Thomson experiment - Clausius-Clapeyron equation.

TOTAL:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students would be able to

CO1: Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems.

CO2: Apply the second law of thermodynamics in analyzing the performance of thermal devices through energy and entropy calculations.

CO3: Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart

CO4: Apply the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations.
CO5: Apply the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes.

TEXTBOOKS:

1. Nag.P.K., "EngineeringThermodynamics",6thEdition,TataMcGrawHill(2017), New Delhi.
2. Natarajan, E., "Engineering Thermodynamics: Fundamentals and Applications", 2nd Edition (2014), Anuragam Publications, Chennai

REFERENCES:

1. Cengel,Y and M.Boles, Thermodynamics-An Engineering Approach, Tata McGraw Hill,9th Edition, 2019.
2. Chattopadhyay,P, "Engineering Thermodynamics", 2nd Edition Oxford University Press, 2016.
3. Rathakrishnan, E., "Fundamentals of Engineering Thermodynamics", 2nd Edition, Prentice Hall of India Pvt. Ltd, 2006.
4. Claus Borgnakke and Richard E.Sonntag, "Fundamentals of Thermodynamics",10th Edition, Wiley Eastern, 2019.
5. Venkatesh.A, "Basic Engineering Thermodynamics", Universities Press (India) Limited, 2007.

COs-PO's & PSO's MAPPING

CO	**PO**												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	2	1								2			
2	3	3	2	1								2			
3	3	3	2	1					1		1	2	3		3
4	3	3	2	1		1			2		1	2	3	2	
5	3	3	2	1		1			2		1	2	3	2	3
Avg	**3**	**3**	**2**	**1**		**1**			**1**		**1**	**2**	**1.8**	**0.8**	**1.2**
Low(1) Medium(2); High(3)															

24UAG304 SURVEYING AND LEVELLING FOR AGRICULTURAL ENGINEERING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To introduce the rudiments of plane surveying and geodetic principles to Agricultural Engineers and to learn the various methods of plane and geodetic surveying to solve the real world problems. To introduce the basics of Astronomical 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- digital Planimeter.

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—Benchmarks—Levels and staves—Temporary and permanent adjustments—Methods of leveling—Fly leveling—Check leveling—Procedure in leveling–Booking–Reduction–Curvature and refraction–Reciprocal leveling–Precise leveling-Contouring.

UNIT IV THEODOLITE SURVEYING **9**

Horizontal and vertical angle measurements – Temporary and permanent adjustments – Heights and distances—Tacheometric surveying—Stadia Tacheometry—Tangential Tacheometry—Trigonometric leveling – Single Plane method – Double Plane method - Gale's table

UNIT V MODERN SURVEYING **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 antispoofing receiver components and antenna – Planning and data acquisition – Data processing—Errors in GPS —Field procedure and applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Introduce the rudiments of chain surveying and its principles.
CO2: Understand the knowledge of compass surveying and plane table surveying.
CO3: Imparts the knowledge in computation of levels of terrain and ground features
CO4: Apply the concepts of Theodolite Surveying for the complex surveying operations
CO5: Imparts the knowledge on modern surveying instruments

TEXTBOOKS:

1. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, Surveying Vol.I&II, Lakshmi Publications Pvt Ltd, New Delhi, 17th Edition, 2017.
2. T.P.Kanetkar and S.V.Kulkarni, Surveying and Levelling, Parts1&2, Pune Vidyarthi Griha Prakashan, Pune, 2024.

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 2001.
3. Bannister and S.Raymond, Surveying, Seventh Edition, Longman 2004.
4. S.K.Roy, Fundamentals of Surveying, Second Edition, Prenticeˆ Hall of India 2010.
5. K.R.Arora, Surveying Vol I&II, Standard Book house, Twelfth Edition 2013.
6. C.Venkatramaiah, Textbook of Surveying, Universities Press, Second Edition, 2011.

COs-PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of Cos to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES (PO)							
PO1	Knowledge of Engineering Sciences	2	3	3	3	3	3
PO2	Problem analysis	2	3	3	3	3	2
PO3	Design/development of solutions	3	2	3	3	3	3
PO4	Investigation	2	2	2	3	3	2
PO5	Modern Tool Usage	2	2	3	3	3	3
PO6	Individual and Team work	3	3	3	3	3	3
PO7	Communication	-	-	-	2	2	2
PO8	Engineer and Society	2	2	2	2	3	2
PO9	Ethics	2	2	2	3	2	2
PO10	Environment and Sustainability	-	-	-	-	-	-
PO11	Project Management and Finance	2	2	2	2	2	2
PO12	Life Long Learning	-	-	-	2	2	2
PROGRAM SPECIFIC OUTCOMES (PSO)							

PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering Problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of Engineering solutions to Civil Engineering	3	3	3	3	3	3

24UAG321 SOIL SCIENCE LABORATORY L T P C
0 0 3 1.5

COURSE OBJECTIVES:

- Able to verify various quality aspects of soil and water studied in theory by performing experiments in the laboratory.

LISTOF EXPERIMENTS:

1. Identification of rocks and minerals
2. Collection and processing of soil samples
3. Determination of 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 International Pipette method
7. Grain size analysis by using Mechanical shaker
8. Determination of Organic carbon
9. Estimation of Gypsum requirements

TOTAL: 45 PERIODS

REFERENCES:

1. Punmia,B.C, "Soil Mechanics and Foundation Engineering", Laxmi Publishers, New Delhi. 2023.
2. Laboratory Manual, Centre for Water Resources, Anna University, Chennai. 2012.

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Explain soil physical properties and compare the properties based on soil and water system

CO2: Understand the soil chemical properties to classify the arable and problem soils to develop different reclamation practices

COs-PO's & PSO's MAPPING

PO/PSO		CO1	CO2	Overall correlation of Cos with POs
PO1	Knowledge of Engineering Sciences	2	2	2
PO2	Problem analysis	1	1	1
PO3	Design/development of solutions	1	1	1
PO4	Investigation	3	3	3
PO5	Modern Tool Usage	2	2	2
PO6	Individual and Team work	1	1	1
PO7	Communication	1	1	1
PO8	Engineer and Society	-	-	-
PO9	Ethics	-	-	-
PO10	Environment and Sustainability	-	-	-
PO11	Project Management and Finance	-	-	-
PO12	Life Long Learning	1	1	1
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with	2	2	2

	proper knowledge and skill			
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	2	2	2
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	1	1	1

24UAG322 SURVEYING AND LEVELLING LABORATORY FOR AGRICULTURAL ENGINEERING

L T P C
0 0 3 1.5

COURSEOBJECTIVES:

- Able to understand the knowledge about survey field techniques

LISTOF EXPERIMENTS:

Chain Survey

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

Compass Survey

3. Compass Traversing – Measuring Bearings & arriving included angles

Levelling-Study of levels and levelling staff

4. Fly levelling using Dumpy level & Tilting level
5. Check levelling

Theodolite-Study of Theodolite

6. Measurements of horizontal angles by reiteration and repetition and vertical angles
7. Determination of elevation of an object using single plane method when base is Accessible/inaccessible.

Tacheometry–Tangential system –Stadia system

8. Determination of Tacheometric Constants
9. Heights and distances by stadia Tacheometry
10. Heights and distances by Tangential Tacheometry

Total Station-Study of Total Station, Measuring Horizontal and vertical angles

11. Traverse using Total station and Area of Traverse
12. Determination of distance and difference in elevation between two inaccessible points using Total station

TOTAL: 45PERIODS

COURSEOUTCOMES

On completion of the course, the student is expected to

CO1: Impart the knowledge on basics of surveying and the usage of chain survey instruments
CO2: Able to use compass and plane table instruments for various surveying operations
CO3: Able to use theodolite for various surveying operations
CO4: Able to carry out necessary surveys for social infrastructures
CO5: Able to prepare planimetric maps

REFERENCES:

1. T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint, 2024.
2. Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, 17th Edition, 2017.
3. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh

Edition, McGraw Hill 2001
4. Bannister and 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, 2004.
5. David Clark and James Clen dinning, Plane and Geodetic Surveying for Engineers, Volume II, Constable and Company Ltd, London, CBS, 6thEdition, 2004.
6. S.K.Roy, Fundamentals of Surveying, Second Edition, Prentice 'Hall of India 2010
7. K.R.Arora, Surveying Vol.I & II, Standard Book house, Eleventh Edition, 2013.

COs-PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of Cos to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	2	2	1	3	3	2
PO3	Design/development of solutions	3	3	2	2	3	3
PO4	Investigation	3	-	-	3	2	3
PO5	Modern Tool Usage	2	3	3	2	2	3
PO6	Individual and Team work	3	3	2	3	3	3
PO7	Communication	2	3	-	3	3	3
PO8	Engineer and Society	3	3	-	2	2	3
PO9	Ethics	3	3	3	3	3	3
PO10	Environment and Sustainability	3	3	-	3	3	3
PO11	Project Management and Finance	3	3	-	3	3	3
PO12	Life Long Learning	1	1	2	1	1	1
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	3	3	3	3	3	3
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	3	3	3	3	3	3
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	3	3	3	3	3	3

24UAG323 CAD ESSENTIALS FOR AGRICULTURAL ENGINEERING L T P C

0 0 4 2

COURSE OBJECTIVES:

- This course is designed to provide agricultural engineering students and professionals with a comprehensive understanding of CAD/CAM/CAE Software Tools and their applications in the agricultural sector.

SOFTWARE TOOLS USED: AUTODESK AUTOCAD

MODULE 1: INTRODUCTION TO CAD/CAM/CAE

Learning Objectives:

- The role of CAD, CAM, and CAE in agricultural engineering.
- Familiarize with the interface of AutoCAD.

Topics Covered:

- Overview of CAD, CAM, and CAE
- Applications in agricultural engineering: irrigation layouts, farm buildings, machinery components
- Introduction to AutoCAD: UI, file management, units, coordinate systems

Practical Activities:

- Setting up a drawing template
- Exploring the AutoCAD workspace and tools

MODULE 2: 2D DRAFTING FUNDAMENTALS

Learning Objectives:

- Gain proficiency in basic 2D drawing and editing tools in AutoCAD.
- Create simple engineering drawings.

Topics Covered:

- Drawing commands: Line, Circle, Arc, Rectangle, Ellipse, Polygon
- Editing commands: Move, Copy, Rotate, Mirror, Offset, Trim, Extend
- Object snaps and grid settings
- Layers and properties
- Use of blocks and groups

Practical Activities:

- Drawing farm boundaries, tool shapes, and pipe layouts
- Creating and managing drawing layers
- Use of blocks for repeated farm equipment parts

MODULE 3: ADVANCED DRAFTING TECHNIQUES

Learning Objectives:

- Apply complex drawing and editing tools to design real-world agricultural systems.
- Learn external references and productivity tools.

Topics Covered:

- Advanced modify tools: Fillet, Chamfer, Array
- Polylines and splines
- Hatching and gradients
- External references (Xrefs)
- Use of design center and tool palettes
- Introduction to model space and paper space

Practical Activities:

- Drafting layouts for drip irrigation systems
- Floor plans of farmhouses, sheds, and greenhouses
- Use of Xrefs for multi-component projects

MODULE 4: DIMENSIONING AND ANNOTATION

Learning Objectives:

• Apply dimensioning standards to create readable engineering drawings.
• Learn annotation and plotting techniques.

Topics Covered:

• Dimension styles and types (linear, aligned, angular, radius, diameter)
• Multi-leaders and annotation scaling
• Text styles and formatting
• Title blocks and drawing templates
• Printing and plotting (layouts, paper space, plotting to PDF)

Practical Activities:

• Annotating a farm equipment drawing
• Creating and applying title blocks
• Preparing drawings for print with appropriate scale and layout

TOTAL: 60 PERIODS

OUTCOME:

CO1: Gain a solid understanding of CAD/CAM/CAE concepts and their applications.
CO2: Develop fundamental skills in 2D drafting using AutoCAD.
CO3: Master advanced drafting techniques for complex designs.
CO4: Be proficient in dimensioning and annotating drawings accurately.
CO5: Prepare detailed and professional 2D drafts for engineering and architectural projects.

24UGE321	PROFESSIONAL DEVELOPMENT	L T P C
		0 0 2 1

COURSE OBJECTIVES:

- To be proficient in important Microsoft Office tools: MSWORD, EXCEL, POWERPOINT.
- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the present ability and overall utility value of content.
- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered
- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, present ability, aesthetics, using media elements and enhance the overall quality of presentations.

MS WORD: **10Hours**

- Create and format a document
- Working with tables
- Working with Bullets and Lists
- Working with styles, shapes, smart art, charts
- Inserting objects, charts and importing objects from other office tools Creating and using document templates
- Inserting equations, symbols and special characters
- Working with Table of contents and References, citations Insert and review comments
- Create bookmarks, hyperlinks, end notes foot note
- Viewing document in different modes
- Working with document protection and security Inspect document for accessibility

MS EXCEL: **10 Hours**

- Create worksheets, insert and format data
- Work with different types of data: text, currency, date, numeric etc.
- Split, validate, consolidate, Convert data
- Sort and filter data
- Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.,)
- Work with Lookup and reference formulae
- Create and Work with different types of charts
- Use pivot tables to summarize and analyze data
- Perform data analysis using own formulae and functions
- Combine data from multiple worksheets using own formulae and built-in functions to generate results
- Export data and sheets to other file formats
- Working with macros
- Protecting data and Securing the workbook

MS POWERPOINT: **10 Hours**

- Select slide templates, layout and themes
- Formatting slide content and using bullets and numbering
- Insert and format images, smart art, tables, charts
- Using Slide master, notes and handout master
- Working with animation and transitions
- Organize and Group slides
- Import or create and use media objects: audio, video, animation
- Perform slideshow recording and Record narration and create presentable videos

TOTAL: 30 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements

CO2: Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding

CO3: Use MS Power Point to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

24UAG401 TRACTORS AND ENGINE SYSTEMS **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To introduce different systems and working principles of tractor, power tiller, makes of tractors and power tillers.

UNIT I TRACTORS **9**

Classification of tractors - types of engine – working principles of two stroke and four stroke engines-comparison - Tractor engines—construction of engine blocks, cylinder head and crankcase-features of cylinder, piston, connecting rod and crank shaft—firing order combustion chambers.

UNIT II ENGINE SYSTEMS **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 **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 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 - operators seat.

UNITV POWER TILLER, BULLDOZER AND TRACTOR TESTING 9

Power tiller-special features-clutch-gear box-steering and brake. Makes of tractors, power tillers 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: 45PERIODS

TEXTBOOKS:

1. Jain,S.C.and C.R.Rai. Farm tractor maintenance and repair. Standard publishers and distributors, New Delhi, 1999.

REFERENCES:

1. Barger,E.L.,J.B.Liljedahl and E.C.McKibben, Tractors and their Power Units. Wiley Eastern Pvt. Ltd., New Delhi, 1997.
2. Domkundwar A.V. A course in internal combustion engines. Dhanpat Rai & Co.(P)Ltd., Educational and Technical Publishers, Delhi,1999.
3. Black, P.O.Diesel engine manual. Taraporevala Sons & Co., Mumbai, 1996.
4. 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.
5. Jagadeeshwar Sahay, Elements of Agricultural Engineering, Standard Publishers Co., New Delhi, 2010.

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Get an idea on various machinery available for farm mechanization

CO2: Calculate the valve timing of an IC engine and represent by a drawing

CO3: Gain knowledge on the transmission system of a tractor

CO4: Understand the hydraulic system in a tractor and estimate the traction.

CO5: Gain knowledge on power tillers, bulldozers and different tractor testing procedures.

COs-PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	2	2	2	3	2	2
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design/development of solutions	1	3	3	3	3	3
PO4	Investigation	2	2	3	2	3	2
PO5	ModernTool Usage	3	3	3	3	3	3
PO6	Individual and Team work	-	-	-	-	-	-
PO7	Communication	-	-	-	-	-	-
PO8	Engineer and Society	2	2	1	2	2	2
PO9	Ethics	-	-	-	-	-	-
PO10	Environment and Sustainability	-	-	-	-	1	-
PO11	Project Management and Finance	-	-	-	-	2	2

PO12	Life Long Learning	2	2	2	2	2	2
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	3	3	3	3	3	3
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	3	3	3	3	3	3
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	3	2	2	2	2	2

24UAG402 SOIL AND WATER CONSERVATION ENGINEERING L T P C
3 0 0 3

COURSE OBJECTIVES:

- Get a sound knowledge in the problems associated with soil erosion.
- Study about the water conservation principles and techniques.
- Impart knowledge in various practices to control erosion.
- Introduce the estimation of soil erosion.
- Get an idea about sedimentation and its control measures.

UNIT I SOIL EROSION PRINCIPLES 9

Approaches to soil conservation—Soil conservation in India - Erosion — Agents - Causes – Mechanics of water erosion—Soil erosion problems-Types of water erosion: Rain drop erosion, Sheet erosion, Rill erosion, Gully erosion, Stream bank erosion—Classification of Gully—Gully Control Structures: Drop Spillway, Drop Inlet, Chute Spillways – Prerequisites for soil and water conservation measures.

UNIT II WATER CONSERVATION MEASURES 9

In-situ soil moisture conservation – Water harvesting principles and techniques: Micro catchments, catchment yield using morph metric analysis- Farm ponds: Components, Design, Construction and Protection—Check dams-Earthen dam—Retaining wall.

UNIT III EROSION CONTROL MEASURES 9

Agronomic practices: contour cultivation - strip cropping – tillage practices – Soil management practices—Bunding: Types and design specifications-Mechanical measures for hill slopes—Terracing: Classification and design specification of bench terrace – Grassed waterways: Location, construction and maintenance – Types of temporary and permanent gully control structures.

UNIT IV ESTIMATION OF SOIL EROSION 9

Run off computation for soil conservation: SCS-CN method – Evolution of Universal Soil Loss Equation: Applications and Limitations—Modified Universal Soil Loss Equation—Revised Universal Soil Loss Equation- Permissible erosion—Land use capability classification - Classification of eroded soils.

UNIT V SEDIMENTATION 9

Sediment: Sources – Types of sediment load – Mechanics of sediment transport – Estimation of bed load— Sediment Graph-Reservoir sedimentation: Basics-Factors affecting sediment distribution pattern, Rates of reservoir sedimentation - Silt Detention Tanks – sediment control methods.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Suresh,R., "Soil and Water Conservation Engineering", Standard Publication, NewDelhi,2007.
2. Ghanshyam Das, "Hydrology and Soil Conservation Engineering", Prentice Hall of India Private Limited, New Delhi, 2000.
3. "Sedimentation Engineering", 2006, ASCE manual and Report on Engineering Practice No. 54, Edited by Vito A. Vanoni. ASCE publishing.

REFERENCES:

1. Murthy, V.V.N., "Land and Water Management Engineering", KalyaniPublishers,Ludhiana, 1998.
2. Gurmail Singh, "A Manual on Soil and Water Conservation", ICAR Publication, NewDelhi, 1982.
3. Mal, B.C., "Introduction to Soil and Water Conservation Engineering", Kalyani Publishers, New Delhi, 2002

COURSEOUTCOMES:

On completion of the course, the student is expected to

CO1: Gain fundamental knowledge on the concepts of erosion and sedimentation.
CO2: Have sufficient knowledge on soil and water conservation measures.
CO3: Explain and design erosion control measures types and design specifications
CO4: Gain knowledge about evolution of Universal Soil Loss Equation: and its applications.
CO5: Have sufficient knowledge on reservoir sedimentation and sediment control methods.

COs-PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall correlation of Cos to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	2	3	2	2	3	2
PO2	Problem analysis	2	3	3	2	3	2
PO3	Design/development of solutions	3	3	3	3	3	3
PO4	Investigation	2	3	2	2	3	2
PO5	Modern Tool Usage	2	2	2	2	2	2
PO6	Individual and Team work	2	1	3	1	1	2
PO7	Communication	1	3	1	3	1	2
PO8	Engineer and Society	2	1	1	2	2	2
PO9	Ethics	1	1	1	2	2	1
PO10	Environment and Sustainability	3	2	1	3	3	2
PO11	Project Management and Finance	2	2	2	2	2	2
PO12	Life Long Learning	2	2	2	2	2	2
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	2	2	2	2	2	2
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	2	2	2	2	2	2
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	1	1	1	1	1	1

24UAG403 STRENGTH OF MATERIALS FOR AGRICULTURAL ENGINEERING L T P C
3 0 0 3

COURSE OBJECTIVES:

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

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Rigid bodies and deformable solids – Tension, Compression and Shear Stresses – Deformation of simple and compound bars—Thermal stresses—Elastic constants—Volumetric strains-Thin shells - circumferential and longitudinal stresses in thin cylinders - deformation of thin cylinder – stresses in spherical shells – Deformation of spherical shells.

UNIT II 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 III TRANSVERSE LOADING AND STRESSES IN BEAM 9

Beams—types transverse loading on beams—Shear force and bending moment in beams—Cantilevers—Simply supported beams and over-hanging beams. Theory of simple bending–bending stress distribution – Shear stress distribution - Flitched beams – carriage springs.

UNIT IV TORSION 9

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

UNIT V DEFLECTION OF BEAMS 9

Computation of slopes and deflections in determinate beams – Double Integration method –Macaulay's method – Area moment method – Conjugate beam method.

TOTAL: 45PERIODS

TEXTBOOKS:

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
4. Ferdin and P.Been, Russell Johnson, Jr. and John J.Dewole "Mechanics of Materials", Tata McGraw Hill Publishing „co. Ltd., New Delhi, 2005.

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Able to find the stress distribution and strains in regular and composite structures subjected to axial loads.

CO2: Calculate the stresses in plane trusses

CO3: Assess the shear force, bending moment and bending stresses in beams

CO4: Apply torsion equation in design of circular shafts and helical springs

CO5: Determine the slope and deflection of beams and buckling loads of columns under different boundary conditions

COs-PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall correlation of Cos with POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	1	2	2	1	2	2
PO3	Design/development of solutions	1	2	2	2	2	2
PO4	Investigation	1	1	1	1	1	1
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Individual and Team work	-	-	-	-	-	-
PO7	Communication	-	-	-	-	-	-
PO8	Engineer and Society	-	-	-	-	-	-
PO9	Ethics	-	-	-	-	-	-
PO10	Environment and Sustainability	-	-	-	-	-	-
PO11	Project Management and Finance	1	-	1	1	1	1
PO12	Life Long Learning	1	1	1	1	1	1
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	3	3	3	3	3	3
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	3	3	3	3	3	3
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	1	1	1	1	1	1

24UAG404 FLUID MECHANICS AND PUMPS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To introduce about the properties of the fluids, behavior of fluids under static, kinematic and dynamic conditions through the control volume approach and expose them to the applications of the conservation laws and to impart basic knowledge of the dimensional analysis and model studies along with flow through pipes.
- To expose the basic concepts of open channel flows with significance to steady uniform flows along with flow measurements in open channels.
- To expose the classification of pumps the basic principles of working and to design centrifugal pump.

UNIT I FLUID PROPERTIES AND FLUID STATICS 9

Definition and properties of fluid-Mass density—Specific weight-Specific volume—Specific gravity-Equation of state—Viscosity—Vapour pressure—Compressibility - Surface tension – Capillarity- 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.

UNIT II FLUID KINEMATICS AND FLUID DYNAMICS 9

Classification of flows - Methods of analysis- Continuum hypothesis - System and Control volume approach - Streamline, streak-line and path-lines – Stream function – Velocity potentials – Flow nets Application of control volume to continuity, energy and momentum-Euler's equation of motion along a streamline-Bernoulli's equation-Linear momentum equation—Applications.

UNIT III FLOWTHROUGHPIPESANDMODELSTUDIES 9

Reynolds experiment – Laminar flow through circular pipe - Darcy-Weis bach equation - Moody diagram-Majorandminorlossesinpipeflow—Totalenergyline—Hydraulicgradeline—Siphon- Pipes in series and parallel- Equivalent pipes- Fundamental dimensions - Dimensional homogeneity-Buckingham Pi theorem – Dimensionless parameters- Similitude and model studies

- Distorted and undistorted models.

UNIT IV OPENCHANNELFLOWS 9

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 - Parshall flume - Flow measurement in natural streams – float method – current meter.

UNIT V PUMPS 9

Types of pumps—Head of pump—Losses and efficiencies -Selection of pump capacity - Centrifugalpump—Components—Workingprinciple—Typesofimpellers-Priming—NPSH-Cavitation – Minimum speed to start the pump - Specific speed – Characteristics curves - Turbine pump - Submersible pump - Jet pump – Air lift pump - Reciprocating pump - Sludge pump.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Streeter,V.L. Wylie,E. B.and Bedford K.W, Fluid Mechanics, McGraw Hill Education(India) Pvt. Ltd., New Delhi, 2017.
2. Modi P.N and Seth Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, New Delhi, 2019.
3. Subramanya K., Flow in Open Channels, McGraw Hill Education (India) Pvt. Ltd., New Delhi,2019.

REFERENCES:

1. Jain A.K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi,2014.
2. SKSom; Gautam Biswas and S Chakra borty, Introduction to Fluid Mechanics and Fluid Machines, McGraw Hill Education (India) Pvt. Ltd., 2017.
3. Chandramouli PN, Applied Hydraulic Engineering, Yes Dee Publisher, 2017
4. Ven Te Chow, Open Channel Hydraulics, McGraw Hill, NewYork,2009.
5. Subramanya K,Fluid Mechanics and Hydraulic Machines: Problems and Solutions, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2018.

COURSEOUTCOMES:

On completion of the course, the student is expected to

CO1: Demonstrate the properties of fluid and its behavior in static conditions along with pressure measurements.

CO2: Apply the conservation laws applicable to fluid flows and its application through fluid kinematics and dynamics.

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.

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.

CO5: Explain the classification, design and working principles of various pumps.

COs-PO's & PSO's MAPPING

PO/PSO	CO1	CO2	CO3	CO4	CO5	Overall correlation of Cos with POs

PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design/development of solutions	1	2	2	3	3	2
PO4	Investigation	1	1	3	3	3	3
PO5	Modern Tool Usage	1	1	3	3	3	3
PO6	Individual and Team work	2	2	2	2	2	2
PO7	Communication	1	2	2	3	3	2
PO8	Engineer and Society	1	2	3	3	3	3
PO9	Ethics	1	1	2	2	2	2
PO10	Environment and Sustainability	2	2	2	2	2	2
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	2	2	2
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	3	3	3	3	3	3
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	2	3	3	3	3	3
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	1	2	2	3	3	2

24UAG405 THEORY OF MACHINES L T P C
3 0 0 3

COURSE OBJECTIVES:

- Applying the basic components of mechanisms, analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism and design cam mechanisms for specified output motions.
- Applying the basic concepts of gearing and kinematics of gear trains
- Analyzing the effects of friction in machine elements
- Analyzing the force-motion relationship in components subjected to external forces and analyzing of standard mechanisms.
- Analyzing the undesirable effects of unbalances resulting from prescribed motions in mechanism and the effect of dynamics of undesirable vibrations.

UNIT I KINEMATICS OF MECHANISMS 9

Mechanisms–Terminology and definitions–kinematics in versions of 4bar and slide crank chain — kinematics analysis in simple mechanisms—velocity and acceleration polygons–Analytical methods – computer approach – cams – classifications – displacement diagrams - layout of plate cam profiles – derivatives of followers motion – circular arc and tangent cams.

UNIT II GEARS AND GEAR TRAINS 9

Spur gear – law of toothed gearing – in volute gearing – Inter changeable gears – Gear tooth action interference and undercutting—non standard teeth—gear trains—parallel axis gears trains— epi cyclic gear trains – automotive transmission gear trains.

UNIT III FRICTION IN MACHINE ELEMENTS 9

Surface contacts—Sliding and Rolling friction—Friction drives—Friction in screw threads—Bearings and lubrication–Friction clutches–Belt and rope drives–Friction aspects in brakes–Friction in vehicle propulsion and braking.

UNIT IV FORCE ANALYSIS **9**

Applied and Constrained Forces—Free body diagrams—static Equilibrium conditions—Two, Three and four members – Static Force analysis in simple machine members – Dynamic Force Analysis – Inertia Forces and Inertia Torque – D'Alembert's principle – superposition principle – dynamic Force Analysis in simple machine members

UNIT V BALANCING AND VIBRATION **9**

Static and Dynamic balancing–Balancing of revolving and reciprocating masses–Balancing machines—free vibrations—Equations of motion—natural Frequency—Damped Vibration— bending critical speed of simple shaft – Torsional vibration – Forced vibration – harmonic Forcing – Vibration isolation.(gyroscopic principles)

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Discuss the basics of mechanism.
CO2: Solve problems on gears and gear trains.
CO3: Examine friction in machine elements.
CO4: Calculate static and dynamic forces of mechanisms.
CO5: Calculate the balancing masses and their locations of reciprocating and rotating masses. Computing the frequency of free vibration, forced vibration and damping coefficient.

TEXTBOOKS:

1. Uicker,J.J.,PennockG.RandShigley,J.E., "Theory of Machines and Mechanisms", Oxford University Press, 2017.
2. Ramamurthi.V, "Mechanics of Machines", Narosa Publishing House,2002.

REFERENCES:

1. Amitabha Ghosh and Asok Kumar Mallik, "Theory of Mechanisms and Machines", Affiliated East-West Pvt. Ltd., 1988.
2. Rao.J.S. and Dukkipati.R.V. "Mechanism and MachineTheory", New Age International Pvt. Ltd., 2006.
3. Rattan,S.S, "Theory of Machines", McGraw-Hill Education Pvt. Ltd.,2014.
4. RobertL.Norton, Kinematics and Dynamics of Machinery, Tata McGraw-Hill,2009.
5. Wilson and Sadler, Kinematics and Dynamics of Machinery, Pearson,2008.

COs-PO's & PSO's MAPPING

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	2		2			1				1	3		1
2	3	2	2		2			1				1	3		1
3	3	2	2		2			1				1	3		1
4	3	2	2		2			1				1	3		1
5	3	2	2		2			1				1	3		1
Avg	**3**	**2**	**2**		**2**			**1**				**1**	**3**		**1**
Low(1); Medium(2); High (3)															

24UGE401 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY **L T P C**
2 0 0 2

COURSE OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.

- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.

UNIT I ENVIRONMENT AND BIO DIVERSITY 6

Definition, scope and importance of environment—need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and eco system diversity– values of biodiversity, India as a mega-diversity nation—hot-spots of bio diversity—threats to bio diversity: habit at loss, poaching of wild life, man-wild life conflicts—endangered and endemic species of India—conservation of bio diversity: In-situ and ex-situ.

UNIT II ENVIRONMENTAL POLLUTION 6

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts .

UNIT III RENEWABLE SOURCES OF ENERGY 6

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of - Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

UNIT IV SUSTAINABILITY AND MANAGEMENT 6

Development , GDP ,Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from un sustainability to sustainability-millennium development goals, and protocols-Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, 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, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles- carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socio- economical and technological change.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Understand the functions of environment, ecosystems and biodiversity and their conservation.

CO2: Identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.

CO3: Identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.

CO4: Recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.

CO5: Demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

TEXTBOOKS:

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata Mc Graw-Hill, NewDelhi, 2016.
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2ndedition, Pearson Education, 2004.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.

5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
7. Mackenthun,K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

REFERENCES:

1. R.K.Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38 . edition 2010.
2. Cunningham, W.P.Cooper, T.H.Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi,2007.
4. Rajagopalan,R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015.
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

COs-PO's & PSO's MAPPING

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
2	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
3	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
4	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
5	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
Avg.	**2.8**	**1.8**	**1**	**1**	**-**	**2.2**	**2.4**	**-**	**-**	**-**	**-**	**1.8**	-	-	-

- 1-low,2-medium,3-high,'-"-no correlation

24UAG421 TRACTOR AND FARM ENGINES LABORATORY L T P C
0 0 2 1

COURSE OBJECTIVES:

- To make them 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

LISTOF 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 differentia land 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 dash board and controls —components: dynamo, starting motor, battery, lights, horn, odometer, amperemeter, accelerator, brake, differential lock, PTO lever, hydraulic lever, draft and position control lever.

REFERENCES:

1. Jain, S.C. and C.R.Rai. Farm tractor maintenance and repair. Standard publishers and distributors, New Delhi, 1999.
2. Jagdishwar Sahay. 2019. Elements of Agricultural Engineering. Standard Publishers Distributors, Delhi.
3. Michael, A.M. and Ohja, T.P. 2018. Principles of Agricultural Engineering Volume I. Jain Brothers, Jodhpur.

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Understand the working of tractors, power tillers and their functions.
CO2: Identify and rectify problems in the functioning of tractors and power tillers.
CO3: Summarize the ergonomics of tractors and power tillers.

COs-PO's & PSO's MAPPING

PO/PSO		CO1	CO2	CO3	Overall Correlation of Cos with POs
PO1	Knowledge of Engineering Sciences	2	3	3	3
PO2	Problem analysis	2	1	2	2
PO3	Design/development of solutions	2	2	2	2
PO4	Investigation	1	1	1	1
PO5	Modern Tool Usage	3	3	3	3
PO6	Individual and Team work	1	1	1	1
PO7	Communication	-	-	-	-
PO8	Engineer and Society	-	-	-	-
PO9	Ethics	-	-	-	-
PO10	Environment and Sustainability	1	1	1	1
PO11	Project Management and Finance	2	2	2	2
PO12	Life Long Learning	1	1	1	1
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	3	3	3	3
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	3	3	3	3
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	3	3	3	3

24UAG422 STRENGTH OF MATERIALS LABORATORY FOR AGRICULTURAL ENGINEERING

L T P C
0 0 4 2

COURSE OBJECTIVES:

- Able to know the testing of different materials under the action of various forces and determination of their characteristics experimentally.

LISTOF 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 helical spring
9. Deflection test on carriage spring

TOTAL: 60 PERIODS

REFERENCES:

1. Strength of Materials Laboratory Manual, Anna University, Chennai - 600025.
2. IS1786-2008 (Fourth Revision, Reaffirmed 2013), 'High strength deformed bars and wires for concrete reinforcement—Specification', 2008.

COURSE OUTCOMES:

CO1: Find the stress distribution and strains in regular and composite structures subjected to axial loads.
CO2: Assess the shear force, bending moment and bending stresses in beams
CO3: Apply torsion equation in design of circular shafts and helical springs

COs-PO's & PSO's MAPPING

PO/PSO		CO1	CO2	CO3	Overall correlation of Cos with POs
PO1	Knowledge of Engineering Sciences	2	3	3	3
PO2	Problem analysis	2	1	2	2
PO3	Design/development of solutions	2	2	2	2
PO4	Investigation	1	1	1	1
PO5	Modern Tool Usage	-	-	-	-
PO6	Individual and Team work	1	1	1	1
PO7	Communication	-	-	-	-
PO8	Engineer and Society	-	-	-	-
PO9	Ethics	-	-	-	-
PO10	Environment and Sustainability	-	-	-	-
PO11	Project Management and Finance	2	2	2	2
PO12	Life Long Learning	1	1	1	1
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	3	3	3	3
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	3	3	3	3
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	1	1	1	1

24UAG423 **FLUID MECHANICS LABORATORY** **L T P C**

0 0 4 2

COURSE OBJECTIVES:

- Able to verify the principles studied in theory by performing the experiments in the laboratory

LISTOF EXPERIMENTS

1.Flow Measurement

- Calibration of Rotameter
- Flow through Venturimeter
- Flow through a circular Orifice
- Determination of mean velocity by Pitot tube
- Flow through a Triangular Notch
- Flow through a Rectangular Notch

2. Losses in Pipes

- Determination of friction coefficient in pipes
- Determination of losses due to bends, fittings and elbows

3. Pumps

- Characteristics of Centrifugal pump
- Characteristics of Submersible pump
- Characteristics of Reciprocating pump

TOTAL: 60 PERIODS

REFERENCES:

1. Hydraulic Laboratory Manual, Centre for Water Resources, Anna University, 2015.
2. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics. Standard Book House. New Delhi, 2017.
3. Subramanya K, Fluid Mechanics and Hydraulic Machines, Tata McGraw Hill Edu. Pvt. Ltd.2011

COURSE OUTCOMES:

On completion of the course, the student is expected to

CO1: Apply Bernoulli equation for calibration of flow measuring devices.
CO2: Measure friction factor in pipes and compare with Moody diagram
CO3: Determine the performance characteristics of roto dynamic pumps.
CO4: Determine the performance characteristics of positive displacement pumps.

COs-PO's & PSO's MAPPING

PO/PSO		Course Outcome				Overall Correlation of Cos to POs
		CO1	CO2	CO3	CO4	
PO1	Knowledge of Engineering Sciences	2	3	3	3	3
PO2	Problem analysis	2	2	3	3	3
PO3	Design/development of solutions	1	1	2	2	2
PO4	Investigation	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	1	1
PO6	Individual and Team work	2	2	3	3	2
PO7	Communication	1	1	1	1	1
PO8	Engineer and Society	2	2	2	2	2
PO9	Ethics	1	1	1	1	1

PO10	Environment and Sustainability	2	2	2	2	2
PO11	Project Management and Finance	1	1	1	1	1
PO12	Life Long Learning	2	2	2	2	2
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	2	3	3	3	3
PSO2	To enhance the ability of students to formulate solutions to real-world problems pertaining to sustained Agricultural productivity using modern technologies.	1	1	2	2	2
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	1	1	1	1	1

24UAG424 INTEGRATED CAD DESIGN FOR AGRICULTURAL ENGINEERING L T P C

0 0 4 2

COURSE OBJECTIVE

- To provide comprehensive training in 2D sketching, 3D part modeling, mechanical assemblies, and engineering drawing generation using professional CAD software, with a focus on solving agricultural design challenges.

SOFTWARE TOOLS: Solid Works / Autodesk Inventor / CATIA / Fusion 360

MODULE 1: 2D SKETCH DESIGN

Learning Objectives:

- Understand the sketching environment and its role in 3D modeling.
- Apply geometric and dimensional constraints effectively.

Topics Covered:

- Sketching interface and tools
- Planes and coordinate systems
- Drawing lines, arcs, circles, splines, and polygons
- Applying dimensions and constraints
- Sketch relations (horizontal, vertical, tangent, etc.)
- Editing and managing sketches

Practical Exercises:

- Sketching the outline of agricultural tools (plows, tillers)
- Creating profile sketches for machine parts (blades, shafts)

MODULE 2: PART MODELING

Learning Objectives:

- Convert 2D sketches into 3D models using features.
- Design complex agricultural components with modeling operations.

Topics Covered:

- Extrude, Revolve, Sweep, Loft features
- Cut operations and shelling

- Fillets, chamfers, holes, ribs, and draft
- Feature tree management and editing
- Configurations and design table basics
- Materials and mass property analysis

Practical Exercises:

- Modeling components like tractor brackets, seed dispensers, rotavator blades
- Parametric design of custom tools (hoe, cutter)

MODULE 3: ASSEMBLY DESIGN

Learning Objectives:

- Build mechanical assemblies from part files.
- Understand mechanical mating and motion simulation.

Topics Covered:

- Assembly interface and part insertion
- Standard and advanced mates (coincident, concentric, gear, etc.)
- Exploded views and assembly configurations
- Interference detection and collision check
- Sub-assemblies and top-down design

Practical Exercises:

- Assembling a seed planter or irrigation system
- Simulation of moving linkages (e.g., in a manual sprayer)

MODULE 4: GENERATIVE DRAWING VIEWS

Learning Objectives:

- Create 2D drawings from 3D models for manufacturing documentation
- Apply standard drawing practices and annotations

Topics Covered:

- Drawing templates and sheet setup
- Standard views: front, top, side, isometric
- Section views, detail views, auxiliary views
- Dimensioning and tolerance
- Bill of Materials (BoM) and balloons
- Title blocks and revision tables

Practical Exercises:

- Generating detailed manufacturing drawings of parts and assemblies
- Preparing full project documentation for a farm implement

TOTAL: 60 PERIODS

CURSE OUTCOME:

CO1: Ability to create parametric, fully defined 2D sketches for 3D modeling.
CO2: Create and manage parametric 3D models for agricultural machinery parts.
CO3: Create working mechanical assemblies with proper constraints and relationships
CO4: Generate professional-grade 2D documentation for production and review.