

(Approved by AICTE, Affiliated to Anna University, 'A' Grade
Accredited by NAAC, NBA Accredited, ISO 9001: 2015 Certified)

CURRICULA AND SYLLABI
B.Tech. Agricultural Engineering
(Regulations 2024)



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CURRICULA AND SYLLABI
B.TECH. Agricultural Engineering
(Regulations 2024)

R. Kathir
HoD/BOS Chairman

CPA
Principal

ARUNAI ENGINEERING COLLEGE, THIRUVANNAMALAI
(An Autonomous Institution)

B.TECH. Agricultural Engineering

REGULATIONS 2024

CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Graduates of the programme B.TECH Agricultural Engineering will

- 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)

PO# Graduate Attribute

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

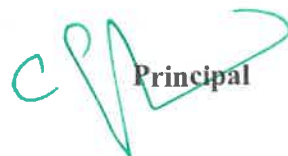
PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).


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PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Washington Accord Knowledge and Attitude Profile (WKs)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.


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PROGRAM SPECIFIC OUTCOMES (PSOs)

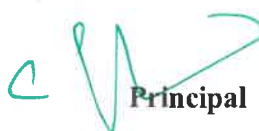
Graduates of the programme B. Tech. Agricultural Engineering will be able to

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.

PEOs / POs Mapping:

PEOs	POs											PSOs		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
I	3	3	-	-	-	-	-	-	1	-	-	3	3	3
II	-	-	3	3	3	-	-	-	-	1	-	3	3	3
III	2	2	2	-	-	-	-	1	-	1	-	3	3	3
IV	-	-	-	-	-	3	-	-	2	1	-	3	3	3
V	-	-	2	-	-	3	3	3	-	-	3	3	3	3


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Mapping of Course Outcomes and Programme Outcomes

YEAR I	SEMESTER I	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
			1.6	2.2	1.8	2.2	1.5	3	3	1.6	3	3	3	-	-	-
		Professional English-I	3	3	1	1	0	0	0	2	0	2	3	-	-	-
		Matrices and Calculus	3	3	1.6	1.2	1.8	1	-	-	-	-	1	-	-	-
		Engineering Physics	2.8	1.3	1.6	1	-	1.5	-	-	-	-	1.5	-	-	-
		Engineering Chemistry	2	3	3	3	2	-	-	-	-	2	2	3	3	-
		Problem Solving and Python Programming														
		தமிழர் மரபு/Heritage of Tamils														
		Problem Solving and Python Programming Laboratory	2	3	3	3	1	-	-	-	-	2	2	3	3	-
		Physics and Chemistry Laboratory	3	2.4	2.6	1	1	-	-	-	-	-	-	-	-	-
		English Laboratory	2.6	1.3	1.6	1	1	1.4	-	-	-	-	1.3	-	-	-
		Professional English-II	3	3	3	3	2.75	3	3	2.2	3	3	3	-	-	-
		Statistics and Numerical Methods	3	3	1	1	1	0	0	2	0	2	3	-	-	-
		Principles and Practices of Crop Production	3	2	1	1	2	2	1	2	2	1	3	3	2	2
		Basic Electrical, Electronics and Instrumentation Engineering	2	1	1	-	-	-	1	-	-	-	-	-	-	-
		Engineering Graphics	3	1	2	-	2	-	-	-	3	-	2	2	2	-
		தமிழகம் தொழில்நுட்பமும் /Tamilis and Technology														
		Engineering Practices Laboratory	3	2	-	-	1	1	-	-	-	-	2	2	1	1
		Basic Electrical, Electronics and Instrumentation Engineering Laboratory	1.6	1.4	0.8	1.6	-	-	1.2	1.6	-	-	-	-	-	-
		Communication Laboratory/Foreign Language	2.4	2.8	3	3	1.8	3	3	3	3	3	3	-	-	-

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YEAR III		Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
SEMESTER V		Farm Equipment and Machinery	2	3	3	2	3	-	2	-	1	-	2	3	3	1
		Professional Elective I														
		Professional Elective II														
		Professional Elective III														
		Professional Elective IV														
		Open Elective I														
		Mandatory Course -I ^{&}														
		Farm Machinery Laboratory	2	3	3	2	3	1	2	-	1	-	2	3	3	1
		ICT in Agricultural Engineering and Laboratory	1	1	2	2	2	2	1	-	1	1	2	3	3	3
		Summer Training (2 Weeks)**														
		Post Harvesting Technology	2	2	3	1	1	1	-	-	-	-	1	3	3	1
		Irrigation and Drainage Engineering	2	2	2	2	2	2	2	1	2	2	2	2	2	1
		Professional Elective V														
		Professional Elective VI														
		Open Elective – II*														
		Mandatory Course – II ^{&}														
		NCC Credit Course Level 3 [#]														
		CAD for Agricultural Machinery Laboratory	2	1	3	1	3	1	-	-	-	1	1	3	3	3
		Post- Harvesting Technology Laboratory	2	1	3	1	1	1	-	-	1	-	1	3	3	2
		Irrigation Field Laboratory	1	1	2	2	2	2	1	-	1	1	2	3	3	2
SEMESTER VI																

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YEAR II		Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
SEMESTER III																
		Fourier Series and Boundary Value Problems	3	3	1	1	-	-	-	-	2	-	3	-	-	-
		Principles of Soil Science and Engineering	3	2	2	1	1	1	-	-	-	-	1	2	1	1
		Unit Operations in Agricultural Processing	2	3	1	2	1	1	-	-	-	-	1	1	1	1
		Fluid Mechanics and Pumps	3	3	2	3	3	2	3	2	2	1	2	3	3	2
		Engineering Thermodynamics	3	3	2	1	-	1	-	1	-	1	2	1.8	0.8	1.2
		Surveying and Levelling	3	2	3	3	3	3	3	3	3	3	1	3	3	3
		Fluid Mechanics Laboratory	3	3	2	3	1	2	2	1	2	1	2	3	2	1
		Soil Science Laboratory	2	1	1	3	2	1	-	-	-	-	1	2	2	1
		Surveying and Levelling Laboratory	3	2	3	3	3	3	3	3	3	3	1	3	3	3
		Professional Development														
		Probability and Linear Programming Problems	3	2.8	2.6	2	1.6	-	-	-	-	-	1.6	-	-	-
		Tractor and Engine systems	2	3	3	2	3	-	2	-	-	2	2	3	3	2
		Strength of Materials for Agricultural Engineering	3	2	2	1	-	1	-	-	-	1	1	3	3	1
		Hydrology and Water Resources Engineering	2	2	1	2	1	2	1	2	2	1	2	2	2	3
		Machines of Theory	3	2	2	-	2	-	1	-	-	-	1	3	-	1
		Environmental Sciences and Sustainability	2.8	1.8	1	1	-	2.2	-	-	-	-	1.8	-	-	-
		NCC Credit Course Level 2 [#]														
		Tractor and Farm Engines Laboratory	3	2	2	1	2	1	-	-	-	1	2	3	3	3
		Strength of Materials Laboratory	3	2	2	1	-	1	-	-	-	-	2	3	3	1

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YEAR IV		Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
SEMESTER VII																
		Remote Sensing and Geographical Information	3	3	2	1	1	1	1	1	1	2	3	2	2	2
		Renewable Energy in Agricultural Engineering	3	3	2	1	1	1	1	1	1	2	3	2	2	2
		Human Value and Ethics														
		Open Elective - III***														
		Open Elective - III****														
		Management Elective														
		Remote Sensing and GIS Laboratory	1	1	2	2	2	2	1	-	1	1	2	2	2	2
		Renewable Energy in Agricultural Engineering Laboratory	1	1	2	2	2	2	1	-	1	1	2	2	2	2
SEMESTER VIII																
		Project Work/Internship	3	2	1	3	3	3	3	2	2	2	2	2	2	2
		Value Added Course														

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PROFESSIONAL ELECTIVE COURSES

S.No	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	IT In Agricultural Systems	2	3	3	2	3	2	3	1	3	3	3	2	2	2
2	Climate Change and Adaptation	2	2	2	2	3	2	3	1	2	2	2	2	2	2
3	Agricultural Business Management	2	3	3	2	3	2	1	1	2	2	2	2	2	2
4	Agricultural Economics and Farm Management	2	3	3	2	3	2	2	1	2	2	2	2	3	2
5	Agricultural Extension	1	0	1	2	2	0	0	2	2	1	1	2	1	1
6	Human Rights	1	1	1	1	1	3	3	2	2	3	3	1	1	1
7	Numerical Methods	3	3	3	3	3	2	1	1	1	1	3	-	-	-
8	Intellectual Property Rights	2	2	1	1	2	3	3	2	3	2	3	1	2	1
9	Agricultural Waste Management	2	3	3	2	3	3	3	2	2	2	2	3	3	3
10	Sustainable agriculture and Food security	2	2	1	2	3	1	3	3	3	1	3	2	2	2
11	Storage and Packaging Technology	2	1	1	3	2	1	1	1	1	2	2	1	1	1
12	Process Engineering of Fruits and Vegetables	1	1	2	1	2	1	1	1	1	2	2	2	2	2
13	Watershed Management	3	2	2	2	2	2	3	1	2	2	2	2	2	2
14	Precision Farming Equipment	3	2	2	1	3	3	2	2	1	3	3	2	2	2
15	Farm Power and Machinery Management	3	2	2	2	3	3	2	2	1	3	3	3	3	1
16	Micro Irrigation	2	2	3	2	2	2	2	2	3	2	2	3	3	3
17	Integrated Farming System	2	2	3	3	2	3	3	2	2	3	2	2	3	3
18	Waste and By Product Utilization	3	2	2	2	3	3	2	2	1	3	2	2	2	2
19	Automation In Agriculture	2	1	1	1	3	1	-	-	-	1	-	2	2	2
20	On Farm Water Management	2	2	2	2	3	2	3	2	2	2	3	1	1	1
21	Soil and Water Conservation Engineering	2	2	3	2	2	2	2	1	2	2	2	2	2	1

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TIRUVANNAMALAI
REGULATIONS 2024
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B.TECH. AGRICULTURAL ENGINEERING
CURRICULUM AND SYLLABI FOR I TO VIII SEMESTERS
SEMESTER I

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	IP24101	Induction Programme						0
THEORY								
2	HS24101	Professional English-I	HSMC	3	0	0	3	3
3	MA24101	Matrices and Calculus	BSC	3	1	0	4	4
4	PH24101	Engineering Physics	BSC	3	0	0	3	3
5	CY24101	Engineering Chemistry	BSC	3	0	0	3	3
6	GE24101	Problem Solving and Python Programming	ESC	3	0	0	3	3
7	GE24102	தமிழர் மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
8	GE24111	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
9	BS24111	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
10	GE24112	English Laboratory ^s	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			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	HS24201	Professional English – II	HSMC	2	0	0	2	2
2	MA24201	Statistics and Numerical Methods	BSC	3	1	0	4	4
3	AI24201	Principles and Practices of Crop Production	BSC	2	0	2	3	3
4	BE24204	Basic Electrical, Electronics and Instrumentation Engineering	ESC	3	0	0	3	3
5	GE24201	Engineering Graphics	ESC	2	0	4	6	4
6	GE24202	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	HSMC	1	0	0	1	1
7		NCC Credit Course Level 1 #		2	0	0	2	2#
PRACTICALS								
8	GE24211	Engineering Practices Laboratory	ESC	0	0	4	4	2
9	BE24211	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ESC	0	0	4	4	2
10	GE24212	Communication Laboratory / Foreign Language ^s	EEC	0	0	4	4	2
TOTAL				14	1	16	31	23

NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

\$ Skill Based Course

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SEMESTER III

S.NO	COURSE CODE	COURSE TITLE	CATEG ORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MA24303	Fourier Series and Boundary Value Problems	BSC	3	1	0	4	4
2	AI24301	Principles of Soil Science and Engineering	PCC	3	0	0	3	3
3	AI24302	Unit Operations in Agricultural Processing	PCC	2	0	2	4	3
4	AI24303	Fluid Mechanics and Pumps	PCC	3	0	0	3	3
5	ME24302	Engineering Thermodynamics	ESC	3	0	0	3	3
6	CE24351	Surveying and Levelling	PCC	3	0	0	3	3
PRACTICALS								
7	AI24311	Fluid Mechanics Laboratory	PCC	0	0	4	4	2
8	AI24312	Soil Science Laboratory	PCC	0	0	3	3	1.5
9	CE24361	Surveying and Levelling Laboratory	PCC	0	0	3	3	1.5
10	GE24903	Professional Development	EEC	0	0	2	2	1
TOTAL				17	1	14	30	25

SEMESTER IV

S.NO	COURSE CODE	COURSE TITLE	CATEG ORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MA24404	Probability and Linear Programming Problems	BSC	3	1	0	4	4
2	AI24401	Tractors and Engine Systems	PCC	3	0	0	3	3
3	AI24403	Strength of Materials for Agricultural Engineering	PCC	3	0	0	3	3
4	AI24404	Hydrology and Water Resources Engineering	PCC	3	0	0	3	3
5	ME24401	Theory of Machines	PCC	3	0	0	3	3
6	GE24451	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
7		NCC Credit Course Level 2 [#]		3	0	0	3	3 [#]
PRACTICALS								
8	AI24411	Tractor and Farm Engines Laboratory	PCC	0	0	2	3	2
9	AI24412	Strength of Materials Laboratory	PCC	0	0	4	4	2
TOTAL				17	1	6	24	22

[#]NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

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SEMESTER V

S.NO	COURSE CODE	COURSE TITLE	CATEG ORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	AI24501	Farm Equipment and Machinery	PCC	3	0	0	3	3
2		Professional Elective I	PEC	3	0	0	3	3
3		Professional Elective II	PEC	3	0	0	3	3
4		Professional Elective III	PEC	3	0	0	3	3
5		Professional Elective IV	PEC	3	0	0	3	3
6		Open Elective–I*	OEC	3	0	0	3	3
7		Mandatory Course-I&	MC	3	0	0	3	Non-credit course
PRACTICALS								
8	AI24511	Farm Machinery Laboratory	PCC	0	0	4	4	2
9	AI24512	ICT in Agricultural Engineering Laboratory	PCC	0	0	4	4	2
10	AI24513	Summer Training (2 week)**	EEC	0	0	0	0	1
TOTAL				18	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

SEMESTER VI

S.NO	COURSE CODE	COURSE TITLE	CATEG ORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	AI24601	Post-Harvest Technology	PCC	3	0	0	3	3
2	AI24602	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		Open Elective–I*	OEC	3	0	0	3	3
6		Mandatory Course-II&	MC	3	0	0	3	Non- credit course
7		NCC Credit Course Level 3 [#]		3	0	0	3	3 [#]
PRACTICALS								
1.	AI24611	CAD for Agriculture Machinery Laboratory	PCC	0	0	4	4	2
2.	AI24612	Post – Harvest Technology	PCC	0	0	2	4	2
3.	AI24613	Irrigation Field Laboratory	PCC	0	0	2	4	2
TOTAL				21	0	8	33	21

*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)

#NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA

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SEMESTER VII

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	AI24701	Remote Sensing and Geographical Information	PCC	3	0	0	3	3
2.	AI24702	Renewable Energy in Agricultural Engineering	PCC	3	0	0	3	3
3.	GE24791	Human Values and Ethics	HSMC	2	0	0	2	2
4.		Open Elective–III***	OEC	3	0	0	3	3
5.		Open Elective–IV***	OEC	3	0	0	3	3
6		Management Elective	HSMC	3	0	0	3	3
PRACTICALS								
8.	AI24711	Remote Sensing and GIS Laboratory	PCC	0	0	4	4	2
9.	AI24712	Renewable Energy in Agricultural Engineering Laboratory	PCC	0	0	2	2	1
TOTAL				17	0	6	20	20

*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VII

**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	CATEGORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	AI24811	Project Work/Internship	EEC	0	0	20	20	8
2.		VAC		0	0	0	0	2
TOTAL				0	0	20	20	10

*If students under go internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII

TOTAL CREDITS: 166


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SUMMARY

NAME OF THE PROGRAMME: B. TECH AGRICULTURAL ENGINEERING										
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	7	4	6	-	-	-	-	29
3.	ESC	5	11	3	-	-	-	-	-	19
4.	PCC	-	-	17	16	7	12	9	-	61
5.	PEC	-	-	-	-	12	6	-	-	18
6.	OEC	-	-	-	-	3	3	6	-	12
7.	EEC	1	2	1	-	1	-	-	10	15
8.	Mandatory Course (Non credit)					✓	✓			
TOTAL		22	23	25	22	23	21	20	10	166

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PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I IT and Agricultural Business management	Vertical II Farm Machinery and Energy	Vertical III Food Processing	Vertical IV Water Management and Protected cultivation
IT In Agricultural Systems	Human Rights	Storage And Packaging Technology	Micro Irrigation
Climate Change and Adaptation	Numerical Methods	Process Engineering of Fruits and Vegetables	Integrated Farming System
Agricultural Business Management	Intellectual Property Rights	Watershed Management	Waste And By Product Utilization
Agricultural Economics And Farm Management	Agricultural Waste Management	Precision Farming Equipment	Automation In Agriculture
Agricultural Extension	Sustainable agriculture and Food security	Farm Power and Machinery Management	On Farm Water Management
			Soil and Water Conservation Engineering

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PROFESSIONAL ELECTIVE COURSES**VERTICAL I (IT AND AGRICULTURAL BUSINESS MANAGEMENT)**

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AI24001	IT In Agricultural Systems	PE	3	3	0	3	3
2.	AI24002	Climate Change and Adaptation	PE	3	3	0	3	3
3.	AI24003	Agricultural Business Management	PE	3	3	0	3	3
4.	AI24004	Agricultural Economics and Farm Management	PE	3	3	0	3	3
5.	AI24005	Agricultural Extension	PE	3	3	0	3	3

VERTICAL II (FARM MACHINERY AND ENERGY)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AI24006	Human Rights	PE	3	3	0	3	3
2.	AI24007	Numerical Methods	PE	4	4	0	4	4
3.	AI24008	Intellectual Property Rights	PE	3	3	0	3	3
4.	AI24009	Agricultural Waste Management	PE	3	3	0	3	3
5.	AI24010	Sustainable agriculture and Food security	PE	3	3	0	3	3

VERTICAL III (FOOD PROCESSING)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AI24011	Storage And Packaging Technology	PE	3	3	0	3	3
2.	AI24012	Process Engineering of Fruits and Vegetables	PE	3	3	0	3	3
3.	AI24013	Watershed Management	PE	3	3	0	3	3
4.	AI24014	Precision Farming Equipment	PE	3	3	0	3	3
5.	AI24015	Farm Power and Machinery Management	PE	3	3	0	3	3

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VERTICAL IV (WATER MANAGEMENT AND PROTECTED CULTIVATION)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AI24016	Micro Irrigation	PE	3	3	0	3	3
2.	AI24017	Integrated Farming System	PE	3	3	0	3	3
3.	AI24018	Waste and By Product Utilization	PE	3	3	0	3	3
4.	AI24019	Automation In Agriculture	PE	3	3	0	3	3
5.	AI24020	On Farm Water Management	PE	3	3	0	3	3
6.	AI24021	Soil and Water Conservation Engineering	PE	3	0	0	3	3

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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

EMERGING TECHNOLOGIES

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OCS2401	Artificial Intelligence and Machine Learning fundamentals	OEC	2	0	2	4	3
2.	OCS2402	Data science fundamentals	OEC	2	0	2	4	3
3.	OCS2403	Augmented Reality/ Virtual Reality	OEC	2	0	2	4	3
4.	OCS2404	IOT and its applications	OEC	2	0	2	4	3
5.	OCS2405	Deep Learning Techniques	OEC	2	0	2	4	3
6.	OEC2401	Introduction to ASIC design	OEC	2	0	2	4	3

OPEN ELECTIVE – II

INDUSTRIAL

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OME2401	Applied design thinking	OEC	3	0	0	3	3
2.	OME2402	Introduction to industrial automation systems	OEC	3	0	0	3	3
3.	OME2403	Industrial Management	OEC	3	0	0	3	3
4.	OME2404	Quality Engineering	OEC	3	0	0	3	3
5.	OME2405	Sustainable Manufacturing	OEC	3	0	0	3	3
6.	OME2406	Industrial design and rapid prototyping techniques	OEC	3	0	0	3	3
7.	OEE2401	Industrial IOT and industry 4.0	OEC	3	0	0	3	3
8.	OEC2402	Robotics and Industrial Automation	OEC	3	0	0	3	3

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OPEN ELECTIVE – III& IV (Other Domains)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	OAG2401	Urban agriculture	OEC	3	0	0	3	3
2	OAG2402	Agriculture Entrepreneurship	OEC	3	0	0	3	3
3	OBT2401	Basics of Biomolecules	OEC	3	0	0	3	3
4	OBT2402	Basics of Microbial Technology	OEC	3	0	0	3	3
5	OBT2403	Biotechnology for Waste Management	OEC	3	0	0	3	3
6	OBT2404	Food Processing Technology	OEC	3	0	0	3	3
7	OEC2403	VLSI Design	OEC	3	0	0	3	3
8	OEC2404	Remote Sensing Concepts	OEC	3	0	0	3	3
9	OEC2405	Drone technologies	OEC	3	0	0	3	3
10	OEE2402	Basics of Electric Vehicle Technology	OEC	3	0	0	3	3
11	OEE2403	Introduction To Control Systems	OEC	3	0	0	3	3
12	OEE2404	Integrated energy planning for sustainable development	OEC	3	0	0	3	3
13	OHS2401	Nano technology	OEC	3	0	0	3	3
14	OHS2402	Operations research	OEC	3	0	0	3	3
15	OME2407	Additive Manufacturing	OEC	3	0	0	3	3

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MANDATORY COURSES I*

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS			TOTAL CONTACT PERIODS
				L	T	P	
1	MX24101	Introduction to women and gender studies	MC	3	0	0	3
2	MX24102	Elements of literature	MC	3	0	0	3
3	MX24103	Disaster risk reduction and management	MC	3	0	0	3
4	MX24104	History of science and technology in India	MC	3	0	0	3
5	MX24105	State, nation building and politics in India	MC	3	0	0	3
6	MX24106	Political and economic thought for a humane society	MC	3	0	0	3
7	MX24107	Understanding Society & Culture through Literature	MC	3	0	0	3
8	MX24108	Work Ethics & Social Responsibility	MC	3	0	0	3
9	MX24109	Technology & Society	MC	3	0	0	3
10	MX24110	Social Innovation & Entrepreneurship	MC	3	0	0	3
11	MX24111	Education & Social Change	MC	3	0	0	3

*Mandatory Courses are offered as Non-Credit Courses

MANDATORY COURSES II*

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS			TOTAL CONTACT PERIODS
				L	T	P	
1	MX24201	Industrial Safety	MC	3	0	0	3
2	MX24202	Wellbeing with Traditional Practices - Yoga, Ayurveda and siddha	MC	3	0	0	3
3	MX24203	Application of Psychology in Everyday Life	MC	3	0	0	3
4	MX24204	Stress Management & Well Being	MC	3	0	0	3
5	MX24205	Health & Well Being in Education	MC	3	0	0	3
6	MX24206	Physical fitness & Mental Resilience	MC	3	0	0	3
7	MX24207	Food, Nutrition and Health	MC	3	0	0	3
8	MX24208	Life style diseases	MC	3	0	0	3

*Mandatory Courses are offered as Non-Credit Courses

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MANAGEMENT ELECTIVES

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	GE24M01	Principles of Management	HSMC	3	0	0	3	3
2	GE24M02	Total Quality Management	HSMC	3	0	0	3	3
3	GE24M03	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
4	GE24M04	Human Resource Management	HSMC	3	0	0	3	3
5	GE24M05	Knowledge Management	HSMC	3	0	0	3	3
6	GE24M06	Industrial Management	HSMC	3	0	0	3	3
7	GE24M07	Foundations of Entrepreneurship	HSMC	3	0	0	3	3

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Subject Code	Subject Name	Category	L	T	P	C
IP24101	Induction Programme		0	0	0	0

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

“One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character.

“Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

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A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References:

Guide to Induction program from AICTE

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Subject Code	Subject Name	Category	L	T	P	C
HS24101	PROFESSIONAL ENGLISH- I	HSMC	3	0	0	3
Course Objectives:						
- To improve the communicative competence of learners - To learn to use basic grammatic structures in suitable contexts - To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text - To help learners use language effectively in professional contexts - To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.						

UNIT – I	INTRODUCTION TO EFFECTIVE COMMUNICATION	1
What is effective communication? (Explain using activities) Why is communication critical for excellence during study, research and work? What are the seven C's of effective communication? What are key language skills? What is effective listening? What does it involve? What is effective speaking? What does it mean to be an excellent reader? What should you be able to do? What is effective writing? How does one develop language and communication skills? What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?		
INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION		8
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).		
UNIT – II	NARRATION AND SUMMATION	9
Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.		
UNIT – III	DESCRIPTION OF A PROCESS / PRODUCT	9
Reading – Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).		
UNIT – IV	CLASSIFICATION AND RECOMMENDATIONS	9
Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc.). Writing – Note-making / Note-taking (*Study skills to be taught, not tested); Writing recommendations; Transferring information from nonverbal (chart, graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.		
UNIT – V	EXPRESSION	9
Reading – Reading editorials; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative). Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.		
		Total Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	To use appropriate words in a professional context

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CO2	To gain understanding of basic grammatical structures and use them in right context.
CO3	To read and infer the denotative and connotative meanings of technical texts
CO4	To read and interpret information presented in tables, charts, and other graphic forms
CO5	To write definitions, descriptions, narrations, and essays on various topics

Textbooks:

1.	English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2.	English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Jeevani, Department of English, Anna University.

Reference books/other materials/web resources:

1.	Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi
2.	A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3.	English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education, ISBN : 0070264244.
4.	Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House. 5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.
5.	Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	3	3	3	1	3	-	-	-	-
CO2	1	1	1	1	1	3	3	3	1	3	-	-	-	-
CO3	2	3	2	3	2	3	3	3	2	3	3	-	-	-
CO4	2	3	2	3	2	3	3	3	2	3	3	-	-	-
CO5	2	3	3	3	-	3	3	3	2	3	-	-	-	-
Average:	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	-	-	-

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Subject Code	Subject Name	Category	L	T	P	C
MA24101	MATRICES AND CALCULUS	BSC	3	1	0	4
Course Objectives:						
- To develop the use of matrix algebra techniques that is needed by engineers for practical applications. - To familiarize the students with differential calculus. - To familiarize the student with functions of several variables. This is needed in many branches of engineering. - To make the students understand various techniques of integration. - To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.						

UNIT – I	MATRICES	9+3
Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.		
UNIT – II	DIFFERENTIAL CALCULUS	9+3
Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.		
UNIT – III	FUNCTIONS OF SEVERAL VARIABLES	9+3
Partial differentiation – Homogeneous functions and Euler’s theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor’s series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange’s method of undetermined multipliers.		
UNIT – IV	INTEGRAL CALCULUS	9+3
Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.		
UNIT – V	MULTIPLE INTEGRALS	9+3
Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications: Moments and centres of mass, moment of inertia.		
		Total Contact Hours : 60

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Use the matrix algebra methods for solving practical problems.
CO2	Apply differential calculus tools in solving various application problems.
CO3	Able to use differential calculus ideas on several variable functions.
CO4	Apply different methods of integration in solving practical problems.
CO5	Apply multiple integral ideas in solving areas, volumes and other practical problems.

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Textbooks:

1. Kreyszig, E., "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal, B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

Reference books/other materials/web resources:

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, "Engineering Mathematics " Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus", 14th Edition, Pearson India, 2018.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	2	-	-	-
CO2	3	3	1	1	0	0	0	0	2	0	2	-	-	-
CO3	3	3	1	1	0	0	0	0	2	0	2	-	-	-
CO4	3	3	1	1	0	0	0	0	2	0	2	-	-	-
CO5	3	3	1	1	0	0	0	0	2	0	2	-	-	-
Average:	3	3	1	1	0	0	0	0	2	0	2	-	-	-

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Subject Code	Subject Name	Category	L	T	P	C
PH24101	ENGINEERING PHYSICS	BSC	3	0	0	3
Course Objectives:						
- To make the students effectively to achieve an understanding of mechanics. - To enable the students to gain knowledge of electromagnetic waves and its applications. - To introduce the basics of oscillations, optics and lasers. - Equipping the students to be successfully understand the importance of quantum physics. - To motivate the students towards the applications of quantum mechanics.						

UNIT I	MECHANICS	9
Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia – theorems of MI –moment of inertia of continuous bodies – M.I of a diatomic molecule – torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule – gyroscope – torsional pendulum – double pendulum – Introduction to nonlinear oscillations.		
UNIT II	ELECTROMAGNETIC WAVES	9
The Maxwell's equations – wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field – properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter – polarization – Producing electromagnetic waves – Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure – Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium- vacuum interface for normal incidence.		
UNIT III	OSCILLATIONS, OPTICS AND LASERS	9
Simple harmonic motion – resonance –analogy between electrical and mechanical oscillating systems – waves on a string – standing waves – traveling waves – Energy transfer of a wave – sound waves – Doppler effect. Reflection and refraction of light waves – total internal reflection – interference – Michelson interferometer –Theory of air wedge and experiment. Theory of laser – characteristics- Spontaneous and stimulated emission – Einstein's coefficients – population inversion – Nd-YAG laser, CO2 laser, semiconductor laser –Basic applications of lasers in industry.		
UNIT IV	BASIC QUANTUM MECHANICS	9
Photons and light waves – Electrons and matter waves –Compton effect – The Schrodinger equation (Time dependent and time independent forms) – meaning of wave function – Normalization –Free particle – particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.		
UNIT V	APPLIED QUANTUM MECHANICS	9
The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope – Resonant diode – Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.		
		Total Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Understand the importance of mechanics.
CO2	Express their knowledge in electromagnetic waves.
CO3	Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
CO4	Understand the importance of quantum physics.
CO5	Comprehend and apply quantum mechanical principles towards the formation of energy bands.

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Textbooks:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw- Hill (Indian Edition), 2017.

Reference books/other materials/web resources:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer- Verlag, 2012.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	1	-	-	-	-	-	-	-	-
CO2	3	3	2	1	2	1	-	-	-	-	-	-	-	-
CO3	3	3	2	2	2	1	-	-	-	-	-	-	-	-
CO4	3	3	1	1	2	1	-	-	-	-	-	-	-	-
CO5	3	3	1	1	2	1	-	-	-	-	-	-	-	-
Average:	3	3	1.6	1.2	1.8	1	-	-	-	-	-	-	-	-

R. K. Kishor
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Subject Code	Subject Name	Category	L	T	P	C
CY24101	ENGINEERING CHEMISTRY	BSC	3	0	0	3
Course Objectives:						
To inculcate sound understanding of water quality parameters and water treatment techniques.						
To impart knowledge on the basic principles and preparatory methods of nanomaterials.						
To introduce the basic concepts and applications of phase rule and composites.						
To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.						
To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.						

UNIT I	WATER AND ITS TREATMENT	9
Water: Sources and impurities, Water quality parameters: Definition and significance of-colour, odour, turbidity, Ph, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.		
UNIT II	NANOCHEMISTRY	9
Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.		
UNIT III	PHASE RULE AND COMPOSITES	9
Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process. Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.		
UNIT IV	FUELS AND COMBUSTION	9
Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil- cetane number; Power alcohol and biodiesel. Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO₂ emission and carbon foot print.		
UNIT V	ENERGY SOURCES AND STORAGE DEVICES	9
Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; Electric vehicles-		

R. Kathir
HoD/BOS Chairman

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working principles; Fuel cells: H₂-O₂ fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

Total Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
CO2	To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
CO3	To apply the knowledge of phase rule and composites for material selection requirements.
CO4	To recommend suitable fuels for engineering processes and applications.
CO5	To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

Textbooks:

1.	P. C. Jain and Monica Jain, "Engineering Chemistry", 17 th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2.	Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3.	S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12 th Edition, 2018.

Reference books/other materials/web resources:

1.	B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2.	O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2 nd Edition, 2017.
3.	Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4.	Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5.	O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	1	1	-	-	-	-	-	-	-
CO2	2	-	-	1	-	2	2	-	-	-	-	-	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	1	-	-	1	2	-	-	-	-	-	-	-
CO5	3	1	2	1	-	2	2	-	-	-	-	-	-	-
Average:	2.8	1.3	1.6	1	-	1.5	1.8	-		-	-	-	-	-

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Subject Code	Subject Name	Category	L	T	P	C
GE24101	PROBLEM SOLVING AND PYTHON PROGRAMMING	ESC	3	0	0	3

Course Objectives:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I	COMPUTATIONAL THINKING AND PROBLEM SOLVING	9
Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.		
UNIT II	DATA TYPES, EXPRESSIONS, STATEMENTS	9
Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.		
UNIT III	CONTROL FLOW, FUNCTIONS, STRINGS	9
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.		
UNIT IV	LISTS, TUPLES, DICTIONARIES	9
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.		
UNIT V	FILES, MODULES, PACKAGES	9
Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).		
		Total Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Develop algorithmic solutions to simple computational problems.
CO2	Develop and execute simple Python programs.
CO3	Write simple Python programs using conditionals and looping for solving problems.
CO4	Decompose a Python program into functions.
CO5	Represent compound data using Python lists, tuples, dictionaries etc.
CO6	Read and write data from/to files in Python programs.

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Textbooks:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, 2017.

Reference books/other materials/web resources:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. <https://www.python.org/>
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	-	-	2	3	3	-
CO2	3	3	3	3	2	-	-	-	-	-	2	3	-	-
CO3	3	3	3	3	2	-	-	-	-	-	2	3	-	-
CO4	2	2	-	2	2	-	-	-	-	-	1	3	-	-
CO5	1	2	-	-	1	-	-	-	-	-	1	2	-	-
CO6	2	2	-	-	2	-	-	-	-	-	1	2	-	-
Average:	2	3	3	3	2	-	-	-	-	-	2	3	3	-

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Subject Code	Subject Name	Category	L	T	P	C
GE24102	தமிழர் மரபு	HSMC	1	0	0	1

அலகு 1	மொழி மற்றும் இலக்கியம்	3
இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் திருக்குறளில் மேலாண்மைக் கருத்துக்கள் தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு		
அலகு II	மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக்கலை	3
நடுகல் முதல் நவீன சிற்பங்கள் வரை ஐம்பொன்சிலைகள்- பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப்பொருட்கள், பொம்மைகள் தேர்செய்யும் கலை சுடுமண்சிற்பங்கள் நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.		
அலகு III	நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள்	3
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம். தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.		
அலகு IV	தமிழர்களின் திணைக் கோட்பாடுகள்	3
தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் தமிழர்கள் போற்றிய அறக் கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்க கால நகரங்களும் துறைமுகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி		
அலகு V	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு	3
இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு புத்தகங்களின் அச்சு வரலாறு. கல்வெட்டுகள், கையெழுத்துப்படிகள்-தமிழ்ப் புத்தகங்களின் அச்சுவரலாறு		
		Total Contact Hours :15

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Text-Cum-Reference Books	
1.	தமிழக வரலாறு மக்களும் பண்பாடும் கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3.	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருளை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.

Subject Code	Subject Name	Category	L	T	P	C
GE24102	HERITAGE OF TAMILS	HSMC	1	0	0	1

UNIT I	LANGUAGE AND LITERATURE	3
Language Families in India - Dravidian Languages - Tamil as a Classical Language - Classical Literature in Tamil - Secular Nature of Sangam Literature - Distributive Justice in Sangam Literature- Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.		
UNIT II	HERITAGE - ROCK ART PAINTINGS TO MODERN ART - SCULPTURE	3
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yath and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.		
UNIT III	FOLK AND MARTIAL ARTS	3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.		
UNIT IV	THINAI CONCEPT OF TAMILS	3
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature- Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of		

P. Kothu
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Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.		
UNIT V	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	3
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.		
		Total Contact Hours : 15

Text-Cum-Reference Books	
1.	தமிழக வரலாறு – மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3.	கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருதை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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Subject Code	Subject Name	Category	L	T	P	C
GE24111	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	ESC	0	0	4	2
Course Objectives:						
- To understand the problem solving approaches. - To learn the basic programming constructs in Python. - To practice various computing strategies for Python-based solutions to real world problems. - To use Python data structures - lists, tuples, dictionaries. - To do input/output with files in Python.						
EXPERIMENTS:						
- Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.) - Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points). - Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern) - Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples) - Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries) - Implementing programs using Functions. (Factorial, largest number in a list, area of shape) - Implementing programs using Strings. (reverse, palindrome, character count, replacing characters) - Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy) - Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word) - Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation) - Exploring Pygame tool. - Developing a game activity using Pygame like bouncing ball, car race etc.						
			Total Contact Hours : 60			

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Develop algorithmic solutions to simple computational problems
CO2	Develop and execute simple Python programs.
CO3	Implement programs in Python using conditionals and loops for solving problems.
CO4	Deploy functions to decompose a Python program.
CO5	Process compound data using Python data structures.
CO6	Utilize Python packages in developing software applications.

R. Kothir
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C. S. S.
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Textbooks:

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

Reference books/other materials/web resources:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. <https://www.python.org/>
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	3	3	3	-
CO2	3	3	3	3	3	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	2	-	-	-	-	-	2	3	-	-
CO4	3	2	-	2	2	-	-	-	-	-	1	3	-	-
CO5	1	2	-	-	1	-	-	-	-	-	1	2	-	-
CO6	2	-	-	-	2	-	-	-	-	-	1	2	-	-
Average	2	3	3	3	2	-	-	-	-	-	2	3	3	-

R. Kothala
HoD/BOS Chairman

C. S. S. S.
Principal

Subject Code	Subject Name	Category	L	T	P	C
BS24111	PHYSICS AND CHEMISTRY LABORATORY	BSC	0	0	4	2

PHYSICS LABORATORY

Course Objectives:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.

EXPERIMENTS:

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wave length of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

Total Contact Hours : 30

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Understand the functioning of various physics laboratory equipment.
CO2	Use graphical models to analyze laboratory data.
CO3	Use mathematical models as a medium for quantitative reasoning and describing physical reality.
CO4	Access, process and analyze scientific information.
CO5	Solve problems individually and collaboratively.

R. Kathir
HoD/BOS Chairman

CPA
Principal

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	3	1	1	-	-	-	-	-	-	-	-	-
CO2	3	3	2	1	1	-	-	-	-	-	-	-	-	-
CO3	3	2	3	1	1	-	-	-	-	-	-	-	-	-
CO4	3	3	2	1	1	-	-	-	-	-	-	-	-	-
CO5	3	2	3	1	1	-	-	-	-	-	-	-	-	-
Average:	3	2.4	2.6	1	1	-	-	-	-	-	-	-	-	-

CHEMISTRY LABORATORY

Course Objectives:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

EXPERIMENTS:

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in water sample.
- Split the first experiment into two
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using flame photometer.
13. Preparation of nanoparticles ($\text{TiO}_2/\text{ZnO}/\text{CuO}$) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

Total Contact Hours : 30

R. K. Kothari
HoD/BOS Chairman

C. P. A.
Principal

Course Outcomes:	Upon completion of the course students should be able to:
CO1	To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
CO2	To determine the amount of metal ions through volumetric and spectroscopic techniques
CO3	To analyse and determine the composition of alloys.
CO4	To learn simple method of synthesis of nanoparticles
CO5	To quantitatively analyse the impurities in solution by electroanalytical techniques”

Textbooks:

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	-	1	-	-	2	2	-	-	-	-	-	-	-
CO2	3	1	2	-	-	1	2	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	1	-	-	-	-	-	-	-
CO4	2	1	2	-	-	2	2	-	-	-	-	-	-	-
CO5	2	1	2	-	1	2	2	-	-	-	-	-	-	-
Average:	2.6	1.3	1.6	1	1	1.4	1.8	-	-	-	-	-	-	-

R. Kathir
HoD/BOS Chairman

C. V. S.
Principal

Subject Code	Subject Name	Category	L	T	P	C
GE24112	ENGLISH LABORATORY	EEC	0	0	2	1
Course Objectives:						
- To improve the communicative competence of learners - To help learners use language effectively in academic /work contexts - To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc. - To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts. - To use language efficiently in expressing their opinions via various media.						

UNIT I	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	6
Listening for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form. Speaking - making telephone calls-Self Introduction; Introducing a friend; - politeness strategies-making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions (filling out a bank application for example).		
UNIT II	NARRATION AND SUMMATION	6
Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations* - describing experiences and feelings- engaging in small talk- describing requirements and abilities.		
UNIT III	DESCRIPTION OF A PROCESS PRODUCT	6
Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking — Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities(large & small)-talking about precautions.		
UNIT IV	CLASSIFICATION AND RECOMMENDATIONS	6
Listening – Listening to TED Talks; Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation-		
UNIT V	EXPRESSION	6
Listening — Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking –making predictions- talking about a given topic-giving opinions- understanding a website-describing processes		
		Total Contact Hours : 30

Course Outcomes:	Upon completion of the course students should be able to:
CO1	To listen to and comprehend general as well as complex academic information
CO2	To listen to and understand different points of view in a discussion
CO3	To speak fluently and accurately in formal and informal communicative contexts
CO4	To describe products and processes and explain their uses and purposes clearly and accurately
CO5	To express their opinions effectively in both formal and informal discussions

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PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	3	3	3	3	3	3	-	-	-
CO2	3	3	3	3	1	3	3	3	3	3	3	-	-	-
CO3	3	3	3	3	1	3	3	3	3	3	3	-	-	-
CO4	3	3	3	3	1	3	3	3	3	3	3	-	-	-
CO5	3	3	3	3	1	3	3	3	3	3	3	-	-	-
Average:	3	3	3	3	1	3	3	3	3	3	3	-	-	-

R. Kothur
HoD/BOS Chairman

C. P. N.
Principal

Subject Code	Subject Name	Category	L	T	P	C
HS24201	PROFESSIONAL ENGLISH – II	HSMC	2	0	0	2
Course Objectives:						
- To engage learners in meaningful language activities to improve their reading and writing skills - To learn various reading strategies and apply in comprehending documents in professional context. - To help learners understand the purpose, audience, contexts of different types of writing - To develop analytical thinking skills for problem solving in communicative contexts - To demonstrate an understanding of job applications and interviews for internship and placements						

UNIT I	MAKING COMPARISONS	6
Reading - Reading advertisements, user manuals, brochures; Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases		
UNIT II	EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING	6
Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint, Writing - Writing responses to complaints. Grammar - Active Passive Voice transformations, Infinitive and Gerunds		
UNIT III	PROBLEM SOLVING	6
Reading - Case Studies, excerpts from literary texts, news reports etc. Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay. Grammar – Error correction; If conditional sentences		
UNIT IV	REPORTING OF EVENTS AND RESEARCH	6
Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions		
UNIT V	THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY	6
Reading — Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar –Numerical adjectives, Relative Clauses.		
		Total Contact Hours : 30

Textbooks

1.	English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
2.	English for Science & Technology Cambridge University Press 2021.
3.	Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Jeevani, Department of English, Anna University.

Course Outcomes:	Upon completion of the course students should be able to:
CO1	To compare and contrast products and ideas in technical texts.
CO2	To identify and report cause and effects in events, industrial processes through technical texts
CO3	To analyse problems in order to arrive at feasible solutions and communicate them in the written format.
CO4	To present their ideas and opinions in a planned and logical manner
CO5	To draft effective resumes in the context of job search.

R. K. K. K.
HoD/BOS Chairman

C. P. A.
Principal

Reference books/other materials/web resources:

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	2	3	3	-	-	-
CO2	3	3	3	3	3	3	3	3	2	3	3	-	-	-
CO3	3	3	3	3	3	3	3	3	2	3	3	-	-	-
CO4	3	3	3	3	2	3	3	3	2	3	3	-	-	-
CO5	-	-	-	-	-	-	-	-	3	3	3	-	-	-
Average:	3	3	3	3	2.75	3	3	3	2.2	3	3	-	-	-


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Subject Code	Subject Name	Category	L	T	P	C
MA24201	STATISTICS AND NUMERICAL METHODS	BSC	3	1	0	4
Course Objectives:						
- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology. - To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems. - To introduce the basic concepts of solving algebraic and transcendental equations. - To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines. - To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.						

UNIT I	TESTING OF HYPOTHESIS	9+3
Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) — Tests for single variance and equality of variances — Chi square test for goodness of fit — Independence of attributes.		
UNIT II	DESIGN OF EXPERIMENTS	9+3
One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.		
UNIT III	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	9+3
Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.		
UNIT IV	INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION	9+3
Lagrange's and Newton's divided difference interpolations — Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.		
UNIT V	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	9+3
Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.		
		Total Contact Hours : 60

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.

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C. S. A. S.
Principal

CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

Textbooks:

1.	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10 th Edition, New Delhi, 2015.
2.	Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8 th Edition, 2015.

Reference books/other materials/web resources:

1.	Burden, R.L and Faires, J.D, "Numerical Analysis", 9 th Edition, Cengage Learning, 2016.
2.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8 th Edition, 2014.
3.	Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7 th Edition, 2007.
4.	Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12 th Edition, 2020.
5.	Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4 th Edition, 2012.
6.	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9 th Edition, Pearson Education, Asia, 2010.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	-	-	-
CO2	3	3	1	1	1	0	0	0	2	0	2	-	-	-
CO3	3	3	1	1	1	0	0	0	2	0	2	-	-	-
CO4	3	3	1	1	1	0	0	0	2	0	2	-	-	-
CO5	3	3	1	1	1	0	0	0	2	0	2	-	-	-
Average:	3	3	1	1	1	0	0	0	2	0	2	-	-	-

R. Kaphan
HoD/BOS Chairman

CPA
Principal

Subject Code	Subject Name	Category	L	T	P	C
AI24201	PRINCIPLES AND PRACTICES OF CROP PRODUCTION	PCC	2	0	2	3
Course Objectives:						
• To introduce the students to principles of agricultural and horticultural crop production						
• Understand the crop selection and establishment procedures.						
• Learn about the different management practices during crop establishment and growth.						
• To introduce the production practices of agricultural and horticultural crops.						
• To delineate the role of agricultural engineers in relation to various crop production practices..						

UNIT – I	AGRICULTURE AND CROP PRODUCTION	9
Introduction to agriculture and its crop production sub-sectors - field crop production and horticulture; Factors affecting crop growth and production: genetic (internal) and environmental (external) factors; Crop management through environmental modification and adaptation of crops to the existing environment through crop cultural practices		
UNIT – II	CROP SELECTION AND ESTABLISHMENT	9
Regional and seasonal selection of crops; Systems of crop production; Competition among crop plants; Spacing and arrangement of crop plants; Field preparation for crops including systems of tillage; Establishment of an adequate crop stand and ground cover, including selection and treatment of seed, and nursery growing.		
UNIT – III	CROP MANAGEMENT	9
Crop water Management; Crop nutrition management - need for supplementation to soil supplied nutrients, sources, generalized recommendations, methods and timing of application of supplemental nutrients including fertigation scheduling; Crop protection including management of weeds, pests and pathogens; Integrated methods of managing water, nutrients and plant protection; Types and methods of harvest.		
UNIT – IV	PRODUCTION PRACTICES OF AGRICULTURAL CROPS	9
Generalized management and cultivation practices for important groups of field crops in Tamil Nadu: cereal crops, grain legumes, oil seed crops, sugarcane, and fiber crops, and special purpose crops such as those grown for green manure and fodder.		
UNIT – V	PRODUCTION PRACTICES OF HORTICULTURAL CROPS	9
Important groups of horticultural crops in Tamil Nadu such as vegetable crops, fruit crops, flower crops; Cultivation practices of representatives of each group; Special features of production of horticultural crops - green house cultivation.		
Total Contact Hours : (L: 30 + P:30) = 60 PERIODS		

Practical

Identification of field and horticultural crops. Seeds - estimation of seed rate, germination of seeds. Nursery, demonstration on different types in field. Fertilizers-type, estimation of recommended dose. Weeds, identification of major weed type, demonstration on simple weeding implements. Weedicide uses and caution. Pest identification and control, demonstration of IPM methods. Harvesting methods for various field and horticultural crops and implements used. Observing in demonstration field, cultivation of wet land, dry land and garden land crops and documenting of growth stage and recording of biometric observations.

R. Kathir
HoD/BOS Chairman

[Signature]
Principal

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Students completing this course would have acquired knowledge on the basic principles of crop production.
CO2	Students will be able to select suitable crops and decide upon its establishment procedures
CO3	Students will get knowledge on the different crop management practices.
CO4	The students will have the required knowledge in the area of production of agricultural and horticultural crops.
CO5	Students will be able to delineate their role in relation to various crop production practices.

Textbooks:

1. Rajendra Prasad, Text Book of Field Crop Production. Directorate of Information and Publication, Krishi Anusandhan Bhavan, Pusa, New Delhi, 2015.
2. Reddy T. Sankara G.H. Yellamanda Reddi, Principles of Agronomy, Kalyani Publishers, New Delhi, 2005.
3. Handbook of Agriculture. ICAR Publications, New Delhi, 2011.

Reference books/other materials/web resources:

1. Bose T. K. and L.P.Yadav. Commercial Flowers, Naya Prakash, Calcutta.1989.
2. Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore. 2005
3. Kumar, N., Abdul Khader, M. Rangaswami, P. and Irulappan, I. Introduction to spices, plantation crops, medicinal and aromatic plants. Rajalakshmi Publications, Nagercoil. 1993.
4. Kumar, N., "Introduction to Horticulture", Rajalakshmi Publications. Nagercoil, 7th edition, 2015.
5. Shanmugavel, K.G. Production Technology of Vegetable Crops. Oxford India Publications, New Delhi. 1989.

PO & PSO / CO	CO-PO Mapping												CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	2	1	-	-	2	3	-
CO2	3	-	-	-	-	-	-	-	-	2	-	-	2	-	-
CO3	3	2	1	-	3	3	-	-	-	2	-	2	3	2	2
CO4	-	-	-	1	2	2	-	1	-	3	1	3	3	1	2
CO5	-	-	-	1	2	2	1	1	-	3	1	3	3	1	2
Average	3	2	1	1	2	2	1	1	2	2	1	3	3	2	2

P. K. K. K.
HoD/BOS Chairman

C. R. K.
Principal

Subject Code	Subject Name	Category	L	T	P	C
BE24204	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING	ESC	3	0	0	3

Course Objectives:

- To introduce the basics of electric circuits and analysis
- To impart knowledge in domestic wiring
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To introduce the functional elements and working of sensors and transducers.

UNIT I	ELECTRICAL CIRCUITS	9
DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws — Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state) Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only), Three phase supply — star and delta connection — power in three-phase systems		
UNIT II	MAGNETIC CIRCUITS AND ELECTRICAL INSTALLATIONS	9
Magnetic circuits-definitions-MMF, flux, reluctance, magnetic field intensity, flux density, fringing, self and mutual inductances-simple problems. Domestic wiring, types of wires and cables, earthing, protective devices- switch fuse unit- Miniature circuit breaker-moulded case circuit breaker- earth leakage circuit breaker, safety precautions and First Aid		
UNIT III	ELECTRICAL MACHINES	9
Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.		
UNIT IV	ANALOG ELECTRONICS	9
Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon & Germanium — PN Junction Diodes, Zener Diode —Characteristics Applications — Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET, IGBT — Types, I-V Characteristics and Applications, Rectifier and Inverters, harmonics		
UNIT V	SENSORS AND TRANSDUCERS	9
Sensors, solenoids, pneumatic controls with electrical actuator, mechatronics, types of valves and its applications, electro-pneumatic systems, proximity sensors, limit switches, piezoelectric, hall effect, photo sensors, Strain gauge, LVDT, differential pressure transducer, optical and digital transducers, Smart sensors, Thermal Imagers.		
		Total Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Compute the electric circuit parameters for simple problems
CO2	Explain the concepts of domestic wiring and protective devices
CO3	Explain the working principle and applications of electrical
CO4	Analyze the characteristics of analog electronic devices
CO5	Explain the types and operating principles of sensors and transducers

P. Kathi
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Textbooks:

1.	D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education (India) Private Limited, Second Edition, 2020
2.	A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.
3.	S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019
	James A Svoboda, Richard C. Dorf, Dorf's Introduction to Electric Circuits, Wiley, 2018

Reference books/other materials/web resources:

1.	John Bird, "Electrical Circuit theory and technology", Routledge; 2017.
2.	Thomas L. Floyd, 'Electronic Devices', 10 th Edition, Pearson Education, 2018.
3.	Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7 th edition,
4.	Muhammad H.Rashid, "Spice for Circuits and electronics", 4 th Edition., Cengage India, 2019.
5.	H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	1	-	-	-	-	1	-	-	-	-	-	-
CO2	2	1	1	-	-	-	-	1	-	-	-	-	-	-
CO3	2	1	1	-	-	-	-	1	-	-	-	-	-	-
CO4	2	1	1	-	-	-	-	1	-	-	-	-	-	-
CO5	2	1	1	-	-	-	-	1	-	-	-	-	-	-
Average:	2	1	1	-	-	-	-	1	-	-	-	-	-	-

R. Kothari
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C.P.A.
Principal

Subject Code	Subject Name	Category	L	T	P	C
GE24201	ENGINEERING GRAPHICS	ESC	2	0	4	4
Course Objectives:						
• Drawing engineering curves.						
• Drawing freehand sketch of simple objects.						
• Drawing orthographic projection of solids and section of solids.						
• Drawing development of solids						
• Drawing isometric and perspective projections of simple solids.						

CONCEPTS AND CONVENTIONS (Not for Examination)		
Importance of graphics in engineering applications — Use of drafting instruments — BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.		
UNIT I	PLANE CURVES	6+12
Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.		
UNIT II	PROJECTION OF POINTS, LINES AND PLANE SURFACE	6+12
Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.		
UNIT III	PROJECTION OF SOLIDS AND FREEHAND SKETCHING	6+12
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects. Practicing three dimensional modeling of simple objects by CAD Software(Not for examination)		
UNIT IV	PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES	6+12
Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones. Practicing three dimensional modeling of simple objects by CAD Software(Not for examination)		
UNIT V	ISOMETRIC AND PERSPECTIVE PROJECTIONS	6+12
Principles of isometric projection — isometric scale —Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software(Not for examination)		
Total Contact Hours :(L=30+P=60) 90 PERIODS		

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Use BIS conventions and specifications for engineering drawing.
CO2	Construct the conic curves, involutes and cycloid.
CO3	Solve practical problems involving projection of lines.

P. Kathir
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CO4	Draw the orthographic, isometric and perspective projections of simple solids.
CO5	Draw the development of simple solids.

Textbooks:

1.	Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charota Publishing House, 53 rd Edition, 2019.
2.	Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3.	Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

Reference books/other materials/web resources:

1.	Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2 nd Edition, 2019.
2.	Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27 th Edition, 2017.
3.	Luzzader, Warren.J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4.	Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015..
5.	Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2 nd Edition, 2009.
	Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

Publication of Bureau of Indian Standards:

1.	IS 10711 — 2001: Technical products Documentation — Size and lay out of drawing sheets.
2.	IS 9609 (Parts 0 & 1) — 2001: Technical products Documentation — Lettering.
3.	IS 10714 (Part 20) — 2001 & SP 46 — 2003: Lines for technical drawings.
4.	IS 11669 — 1986 & SP 46 — 2003: Dimensioning of Technical Drawings.
5.	IS 15021 (Parts 1 to 4) — 2001: Technical drawings — Projection Methods

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	1	-	-	-	-	1	-	-	-	-	-	-
CO2	2	1	1	-	-	-	-	1	-	-	-	-	-	-
CO3	2	1	1	-	-	-	-	1	-	-	-	-	-	-
CO4	2	1	1	-	-	-	-	1	-	-	-	-	-	-
CO5	2	1	1	-	-	-	-	1	-	-	-	-	-	-
Average:	2	1	1	-	-	-	-	1	-	-	-	-	-	-

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Subject Code	Subject Name	Category	L	T	P	C
GE24202	தமிழரும் தொழில் நுட்பமும்	HSMC	1	0	0	1

அலகு I	நெசவு மற்றும் பானைத் தொழில்நுட்பம்	3
சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள்		
அலகு II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்	3
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.		
அலகு III	உற்பத்தித் தொழில் நுட்பம்	3
கப்பல் கட்டும் கலை உலோகவியல் இரும்புத் தொழிற்சாலை இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.		
அலகு IV	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்	3
அணை, ஏரி, குளங்கள், மதகு சோழர்காலக் குழுவித் தூம்பின் முக்கியத்துவம் கால்நடை பராமரிப்பு கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.		
அலகு V		3
அறிவியல் தமிழின் வளர்ச்சி -கணித் தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் தமிழ்மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்		
		Total Contact Hours :15

Text-Cum-Reference Books	
1.	தமிழக வரலாறு மக்களும் பண்பாடும் கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3.	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருளை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)

R. Kathir
HoD/BOS Chairman

C. J. V.
Principal

6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Subject Code	Subject Name	Category	L	T	P	C
GE24202	TAMILS AND TECHNOLOGY	HSMC	1	0	0	1

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

R. Raghav
HoD/BOS Chairman

C. V. V.
Principal

Text-Cum-Reference Books

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

R. Kathir
HoD/BOS Chairman

C. S. S.
Principal

Subject Code	Subject Name	Category	L	T	P	C
	(ARMY WING) NCC Credit Course Level – I	NCC	2	0	0	2

NCC GENERAL	6
NCC 1 Aims, Objectives & Organization of NCC	1
NCC 2 Incentives	2
NCC 3 Duties of NCC Cadet	1
NCC 4 NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS	4
NI 1 National Integration: Importance & Necessity	1
NI 2 Factors Affecting National Integration	1
NI 3 Unity in Diversity & Role of NCC in Nation Building	1
NI 4 Threats to National Security	1
PERSONALITY DEVELOPMENT	7
PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2 Communication Skills	3
PD 3 Group Discussion: Stress & Emotions	2
LEADERSHIP	5
L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2 Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT	8
SS 1 Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4 Protection of Children and Women Safety	1
SS 5 Road / Rail Travel Safety	1
SS 6 New Initiatives	2
SS 7 Cyber and Mobile Security Awareness	1
Total Contact Hours : 30	

R. Kothh
HoD/BOS Chairman

C. W.
Principal

Subject Code	Subject Name	Category	L	T	P	C
	(NAVAL WING) NCC Credit Course Level - I	NCC	2	0	0	2

NCC GENERAL		6
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS		4
NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
PERSONALITY DEVELOPMENT		7
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2
LEADERSHIP		5
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour 'Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		8
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1
		Total Contact Hours : 30


HoD/BOS Chairman


Principal

Subject Code	Subject Name	Category	L	T	P	C
	(AIR FORCE WING) NCC Credit Course Level – I	NCC	2	0	0	2

NCC GENERAL		6
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS		4
NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1
PERSONALITY DEVELOPMENT		7
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2
LEADERSHIP		5
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour 'Code	3
L 2	Case Studies: Shivaji, Jhansi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		8
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

P. Kothari
HoD/BOS Chairman

C.P.D.
Principal

Subject Code	Subject Name	Category	L	T	P	C
GE24211	ENGINEERING PRACTICES LABORATORY	ESC	0	0	4	2
Course Objectives:						
Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.						
Wiring various electrical joints in common household electrical wire work.						
Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipment's; Making a tray out of metal sheet using sheet metal work.						
Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.						

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

- Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
- Preparing plumbing line sketches.
- Laying pipe connection to the suction side of a pump
- Laying pipe connection to the delivery side of a pump.
- Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

- Sawing,
- Planning and
- Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

- Studying joints in door panels and wooden furniture
- Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

- Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
- Staircase wiring
- Fluorescent Lamp wiring with introduction to CFL and LED types.
- Energy meter wiring and related calculations/ calibration
- Study of Iron Box wiring and assembly
- Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)
- Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

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PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

- a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
- b) Practicing gas welding.

BASIC MACHINING WORK:

- a) (simple)Turning.
- b) (simple)Drilling.
- c) (simple)Tapping.

ASSEMBLY WORK:

- a) Assembling a centrifugal pump.
- b) Assembling a household mixer.
- c) Assembling an airconditioner.

SHEET METAL WORK:

- a) Making of a square tray

FOUNDRY WORK:

- a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:

- a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

- a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

- a) Study an elements of smart phone.
- b) Assembly and dismantle of LED TV.
- c) Assembly and dismantle of computer/ laptop

Total Contact Hours : 90

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
CO2	Wire various electrical joints in common household electrical wire work.
CO2	Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
CO3	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

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Principal

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	-	1	1	1	-	-	-	-	2	1	1
CO2	3	2	-	-	1	1	1	-	-	-	-	2	-	-
CO3	3	2	-	-	1	1	1	-	-	-	-	2	-	-
Average:	3	2	-	-	1	1	1	-	-	-	-	2	-	-

R. Kothakota
HoD/BOS Chairman

CPD
Principal

Subject Code	Subject Name	Category	L	T	P	C
BE24211	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY	ESC	0	0	4	2

Course Objectives:

- To train the students in conducting load tests electrical machines
- To gain practical experience in experimentally obtaining the characteristics of electronic devices and rectifiers
- To train the students to measure three phase power and displacement

List of Experiments

1. Verification of ohms and Kirchhoff's Laws.
2. Three Phase Power Measurement
3. Load test on DC Shunt Motor.
4. Load test on Self Excited DC Generator
5. Load test on Single phase Transformer
6. Load Test on Induction Motor
7. Characteristics of PN and Zener Diodes
8. Characteristics of BJT, SCR and MOSFET
9. Design and analysis of Half wave and Full Wave rectifiers
10. Measurement of displacement of LVDT

Total Contact Hours:60

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Use experimental methods to verify the Ohm's law and Kirchhoff's Law and to measure three phase power
CO2	Analyze experimentally the load characteristics of electrical machines
CO3	Analyze the characteristics of basic electronic devices
CO4	Use LVDT to measure displacement

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	1	2	-	-	-	1.5	2	-	-	-	-	-
CO2	2	3	1	2	-	-	-	1.5	2	-	-	-	-	-
CO3	2	3	1	2	-	-	-	1.5	2	-	-	-	-	-
CO4	2	3	1	2	-	-	-	1.5	2	-	-	-	-	-
Average:	1.6	1.4	0.8	1.6	-	-	-	1.2	1.6	-	-	-	-	-

R. Kothari
HoD/BOS Chairman

e.g.
Principal

Subject Code	Subject Name	Category	L	T	P	C
GE24212	COMMUNICATION LABORATORY	EEC	0	0	4	2
Course Objectives:						
- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context. - To analyse concepts and problems and make effective presentations explaining them clearly and precisely. - To be able to communicate effectively through formal and informal writing. - To be able to use appropriate language structures to write emails, reports and essays - To give instructions and recommendations that are clear and relevant to the context						

UNIT I	12
Speaking-Role Play Exercises Based on Workplace Contexts, - talking about competition- discussing progress toward goals-talking about experiences- talking about events in life- discussing past events-Writing: writing emails (formal & semi-formal).	
UNIT II	12
Speaking: discussing news stories-talking about frequency-talking about travel problems- discussing travel procedures- talking about travel problems- making arrangements-describing arrangements-discussing plans and decisions- discussing purposes and reasons- understanding common technology terms-Writing: - writing different types of emails.	
UNIT III	12
Speaking: discussing predictions-describing the climate-discussing forecasts and scenarios- talking about purchasing-discussing advantages and disadvantages- making comparisons- discussing likes and dislikes- discussing feelings about experiences-discussing imaginary scenarios Writing: short essays and reports-formal/semi-formal letters.	
UNIT IV	12
Speaking: discussing the natural environment-describing systems-describing position and movement-explaining rules-(example- discussing rental arrangements)- understanding technical instructions-Writing: writing instructions-writing a short article.	
UNIT V	12
Speaking: describing things relatively-describing clothing-discussing safety issues(making recommendations) talking about electrical devices-describing controlling actions- Writing: job application(Cover letter + Curriculum vitae)-writing recommendations.	
Total Contact Hours : 60	

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Speak effectively in group discussions held in a formal/semi formal contexts.
CO2	Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions
CO3	Write emails, letters and effective job applications.

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CO4	Write critical reports to convey data and information with clarity and precision
CO5	Give appropriate instructions and recommendations for safe execution of tasks

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	3	3	1	3	3	3	3	3	3	-	-	-
CO2	2	3	3	3	1	3	3	3	3	3	3	-	-	-
CO3	2	2	3	3	1	3	3	3	3	3	3	-	-	-
CO4	3	3	3	3	3	3	3	3	3	3	3	-	-	-
CO5	3	3	3	3	3	3	3	3	3	3	3	-	-	-
Average:	2.4	2.8	3	3	1.8	3	3	3	3	3	3	-	-	-

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HoD/BOS Chairman

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Subject Code:	Subject Name	Category	L	T	P	C
MA24303	FOURIER SERIES AND BOUNDARY VALUE PROBLEMS	BSC	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 introduce the effective mathematical tools for the solutions of partial differential equations in various situations.
- To acquaint the student with Fourier series techniques in solving wave equations used in various situations.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Non- Parametric tests problems used in various situations.

UNIT – I	FOURIER SERIES	9+3
Dirichlet's conditions – General Fourier series – Odd and Even functions – Half range sine series–Half range cosine series–Parseval's identity –Harmonic Analysis.		
UNIT – II	PARTIAL DIFFERENTIAL EQUATIONS	9+3
Formation of PDE - Eliminating arbitrary constants- Eliminating arbitrary functions – First order nonlinear PDE: $f(p, q) = 0$, $f(z, p, q) = 0$, $f(x, p) = g(y, q)$, Clairaut's equation - Lagrange's linear equation – Homogeneous linear PDE of Higher order with constant coefficients.		
UNIT – III	WAVE EQUATION	9+3
Classification of second order Quasi linear partial differential equation - Solution of one dimensional wave equation with one non-zero boundary conditions – one dimensional wave equation by explicit method		
UNIT – IV	HEAT EQUATION	9+3
.One dimensional heat equation – Steady of state solution of two dimensional heat equation (Insulated edge excluded).		
UNIT – V	NON-PARAMETRIC TESTS	9+3
Sign test for paired data. Rank sum test. Kolmogorov-Smirnov test –Mann – Whitney U test and Kruskal Wallis test. One sample run test.		
		Total Contact Hours : 60

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
CO2	Solve differential equations using Partial differential equations which plays a vital role in engineering applications.
CO3	Appreciate the physical significance of Fourier series techniques in solving one dimensional wave equations.
CO4	Appreciate the physical significance of Fourier series techniques in solving one dimensional heat flow problems
CO5	Appreciate the physical significance of Non-Parametric tests techniques in solving problems in Engineering field.

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HoD/BOS Chairman

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Principal

Textbooks:

1. Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2018
2. Kreyszig E, "Advanced Engineering Mathematics", 10th Edition, John Wiley, New Delhi, India, 2016

Reference books/other materials/web resources:

1. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 10th Edition, Laxmi Publications Pvt.Ltd, 2015.
2. Narayanan. S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.
3. Ramana.B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt.Ltd, New Delhi, 2018.
4. Conover, W.J. (1971). Practical Non-Parametric Statistics. David, H.A. (1970). Order Statistics. Fraser, D.A.S. (1957). Nonparametric Methods in Statistics.

PO& PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	1	1	-	-	-	-	2	-	3	-	-	-
CO2	3	3	1	1	-	-	-	-	2	-	3	-	-	-
CO3	3	3	1	1	-	-	-	-	2	-	3	-	-	-
CO4	3	3	1	1	-	-	-	-	2	-	3	-	-	-
CO5	3	3	1	1	-	-	-	-	2	-	3	-	-	-
Average:	3	3	1	1	-	-	-	-	2	-	3	-	-	-

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Subject Code	Subject Name	Category	L	T	P	C
AI24301	PRINCIPLES OF SOIL SCIENCE AND ENGINEERING	PCC	3	0	0	3
Course Objectives:						
To expose the students to the fundamental knowledge on Soil physical parameters, Permeability—Compaction, Bearing Capacity and types and methods of soil survey and 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 subclasses-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.		
UNIT – V	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 Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able 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.

Textbooks:	
1.	Nyle C. Brady, "The Nature and Properties of Soil", Macmillan Publishing Company, 10 th Edition, New York, 2008.
2.	Punmia, B. C., "Soil Mechanics and Foundation", Laxmi Publishers, New Delhi, 2007.

Reference books/other materials/web resources:	
1.	Edward J. Plaster, "Soil Science", Cengage Learning India Ltd, New Delhi, 2009.

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2.	Arora,K.R.“Soil Mechanics and Foundation Engineering”,Standard Publishers and Distributors, New Delhi, 2007.
3.	Murthy,V.N.S.“Soil Mechanics and Foundation Engineering”,UBS Publishers and Distributors, New Delhi, 2007.
4.	Sehgal, S.B., “Text Book of Soil Mechanics”, CBS Publishers and Distributors New Delhi, 2007.

PO& PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	1	2	-	-	-	-	2	1	1
CO2	3	1	2	1	1	1	-	-	-	-	-	2	1	1
CO3	3	2	2	1	1	1	-	-	-	-	-	1	1	1
CO4	3	1	2	1	1	1	2	-	-	-	-	2	1	1
CO5	3	2	2	1	1	1	1	-	-	-	-	2	1	1
Average:	3	2	2	1	1	1	1	-	-	-	-	2	1	1

R. Kothia
HoD/BOS Chairman

CVA
Principal

Subject Code	Subject Name	Category	L	T	P	C
AI24302	UNIT OPERATIONS IN AGRICULTURAL PROCESSING	PCC	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 Contact Hours : 30

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HoD/BOS Chairman

C.P.
Principal

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 Contact Hours : 30

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Examine the evaporation process and types of evaporators for food industry
CO2	Analyze 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.

Textbooks:

1. Earle, R.L., "Unit operations in Food Processing", Pergamon Press, Oxford, U.K., 1985.
2. McCabe, W.L., and Smith, J.C., "Unit Operations of Chemical Engineering", Mc-Graw-Hill Inc., Kosaido Printing Ltd., Tokyo, 1990.
3. Geankoplis, C.J. "Transport Processes and Separation Process Principles", 4th Edition, Prentice Hall, 2003.

Reference books/other materials/web resources:

1. Coulson, J.M and J.F. Richardson. Chemical Engineering. Volume I to V. The Pergamon Press. New York, 1999.
2. Albert Ibarz and Gustavo V. Barbosa-Cánovas. Unit Operations in Food Engineering. CRC Press LLC, Florida, 2003..

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HoD/BOS Chairman

C.P.
Principal

PO& PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	1	2	1	1	1	-	-	-	-	1	1	1
CO2	2	3	1	2	1	1	-	-	-	-	-	1	1	1
CO3	2	3	1	1	1	1	1	-	-	-	-	1	1	1
CO4	2	3	1	1	1	1	1	-	-	-	-	1	1	1
CO5	2	3	1	2	1	1	1	-	-	-	-	1	1	1
Average:	2	3	1	2	1	1	1	-	-	-	-	1	1	1

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HoD/BOS Chairman

C.P.
Principal

Subject Code	Subject Name	Category	L	T	P	C
AI24303	FLUID MECHANICS AND PUMPS	PCC	3	0	0	3
Course Objectives:						
- To introduce the students about the properties of the fluids, behaviour 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. - The students will be exposed to the basic concepts of open channel flows with significance to steady uniform flows along with flow measurements in open channels - To expose the students to 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 – Perfect gas - Viscosity – Vapour pressure – Compressibility and elasticity - 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 stream line - Bernoulli's equation - Linear momentum equation – Applications.		
UNIT – III	FLOW THROUGH PIPES AND MODEL STUDIES	9
Reynolds experiment - Laminar flow through circular pipe - Darcy-Weisbach equation - Moody diagram - Major and minor losses in pipe flow – Total energy line – Hydraulic grade line – 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	OPEN CHANNEL FLOWS	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 - Centrifugal pump – Components – Working principle – Types of impellers - 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 Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Demonstrate the properties of fluid and its behaviour in static conditions along with pressure measurements.
CO2	Apply the conservation laws applicable to fluid flows and its application through fluid kinematics and dynamics.

P. K. Kothari
HoD/BOS Chairman

C. P. A.
Principal

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.

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.

Reference books/other materials/web resources:

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

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	2	1	1	1	2	1	3	2	1
CO2	3	3	2	1	1	2	2	2	1	2	1	3	3	2
CO3	3	3	2	3	3	2	2	3	2	2	1	3	3	2
CO4	3	3	3	3	3	2	3	3	2	2	1	3	3	3
CO5	3	3	3	3	3	2	3	3	2	2	1	3	3	3
Average:	3	3	3	3	3	2	2	3	2	2	1	3	3	2

R. Kathin
HoD/BOS Chairman

C. V. A.
Principal

Subject Code	Subject Name	Category	L	T	P	C
ME24302	ENGINEERING THERMODYNAMICS	ESC	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- First Law- Concept of temperature and Temperature Scales, Steady flow energy equation-problems.		
UNIT – II	HEATING AND EXPANSION OF GASES	9
Expressions for work done, Internal energy and heat transfer for Constant Pressure, Constant Volume, Isothermal, Adiabatic and Polytropic processes-Derivations and problems; Free expansion and Throttling process.		
UNIT – III	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.		
UNIT – IV	COMPOSITION OF PURE SUBSTANCES	9
Steam - formation and its thermodynamic properties - p-v, p-T, T-v, T-s, h-s diagrams. PVT surface. 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	GAS MIXTURES AND THERMODYNAMIC RELATIONS	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, Clausius-Clapeyron equation.		
		Total Contact Hours : 45

Course Outcomes:	Upon completion of the course students should 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.

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Subject Code	Subject Name	Category	L	T	P	C
CE24351	SURVEYING AND LEVELLING	PCC	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 concepts of Control Surveying. To introduce the basics of Astronomical Surveying						
UNIT I	FUNDAMENTALS OF CONVENTIONAL SURVEYING	9				
Definition – Classifications – Basic principles – Equipment and accessories for ranging and chaining – Methods of ranging – Well conditioned triangles – Chain traversing – Compass – Basic principles – Types – Bearing – System and conversions – Sources of errors and Local attraction – Magnetic declination – Dip – compass traversing – Plane table and its accessories – Merits and demerits – Radiation – Intersection – Resection – Plane table traversing.						
UNIT II	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 III	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.						
UNIT IV	CONTROL SURVEYING AND ADJUSTMENT	9				
Horizontal and vertical control —Methods—Triangulation—Traversing—Gale's table—Trilateration—Concepts of measurements and errors—Error propagation and Linearization—Adjustment methods – Least square methods – Angles, lengths and leveling network.						
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 anti spoofing receiver components and antenna —Planning and data acquisition – Data processing—Errors in GPS—Field procedure and applications.						
		Total Contact Hours : 45				

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Introduce the rudiments of various surveying and its principles.
CO2	Imparts knowledge in computation of levels of terrain and ground features
CO3	Imparts concepts of Theodolite Surveying for complex surveying operations
CO4	Understand the procedure for establishing horizontal and vertical control
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, Sixteenth Edition, 2016
2.	T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 2008.

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Textbooks:

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

Reference books/other materials/web resources:

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.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	1	-	-	-
CO2	3	3	2	1	-	-	-	-	-	-	1	-	-	-
CO3	3	3	2	1	-	-	-	-	1	-	1	3	-	3
CO4	3	3	2	1	-	1	-	-	2	-	1	3	2	-
CO5	3	3	2	1	-	1	-	-	2	-	1	3	2	3
Average:	3	3	2	1	-	1	-	-	1	-	1	1.8	0.8	1.2

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Subject Code	Subject Name	Category	L	T	P	C
A124311	FLUID MECHANICS LABORATORY	PCC	0	0	4	2
Course Objectives:						
Students should be able to verify the principles studied in theory by performing the experiments in the laboratory						

LIST OF 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 Contact Hours : 60

Course Outcomes:	Upon completion of the course students should be able 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 rotodynamic pumps.
CO4	Determine the performance characteristics of positive displacement pumps.
Reference books/other materials/web resources:	
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

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	1	3	1	2	1	2	1	2	1	2	1	1
CO2	3	2	1	3	1	2	1	2	1	2	1	3	1	1
CO3	3	3	2	3	1	3	1	2	1	2	1	3	2	1
CO4	3	3	2	3	1	3	1	2	1	2	1	3	2	1
Average:	3	3	2	3	1	2	1	2	1	2	1	3	2	1

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Reference books/other materials/web resources:

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, Prentice^ Hall of India 2010.
5. K.R.Arora, Surveying Voll& II, Standard Bookhouse, Twelfth Edition 2013.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	3	2	2	3	-	2	2	-	2	3	3	3
CO2	3	3	2	2	2	3	-	2	2	-	2	3	3	3
CO3	3	3	3	2	3	3	-	2	2	-	2	3	3	3
CO4	3	3	3	3	3	3	2	2	3	-	2	3	-	3
CO5	3	3	3	3	3	3	2	3	2	-	2	3	-	3
Average:	3	3	3	2	3	3	2	2	2	-	2	3	-	3

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Subject Code	Subject Name	Category	L	T	P	C
AI24312	SOIL SCIENCE LABORATORY	PCC	0	0	3	1.5
Course Objectives:						
Students should be able to verify various quality aspects of soil and water studied in theory by performing experiments in the laboratory.						

LIST OF 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 Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Explain soil physical properties and compare the properties based on soil and water system
CO2	Analyse the soil chemical properties to classify the arable and problem soils to develop different reclamation practices
Reference books/other materials/web resources:	
1.	Punmia, B.C, "Soil Mechanics and Foundation Engineering", Laxmi Publishers, New Delhi. 2007.
2.	Laboratory Manual, Centre for Water Resources, Anna University, Chennai. 2012..

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	1	3	2	1	1	-	-	-	-	2	2	1
CO2	2	1	1	3	2	1	1	-	-	-	-	2	2	1
Average:	2	1	1	3	2	1	1	-	-	-	-	2	2	1

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Subject Code	Subject Name	Category	L	T	P	C
CE24361	SURVEYING AND LEVELLING LABORATORY	PCC	0	0	3	1.5
Course Objectives:						
At the end of the course the student will possess knowledge about survey field techniques						

LIST OF EXPERIMENTS:

Chain Survey

- Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset
- Setting out works–Foundation marking using tapes single Room and Double Room

Compass Survey

- Compass Traversing–Measuring Bearings & arriving included angles

Levelling-Study of levels and levelling staff

- Fly levelling using Dumpy level & Tilting level
- Check levelling

Theodolite-Study of Theodolite

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

Tacheometry–Tangential system –Stadia system

- Determination of Tacheometric Constants
- Heights and distances by stadia Tacheometry
- Heights and distances by Tangential Tacheometry

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

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

Total Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	impart knowledge on the usage of basic surveying instruments like chain/tape, compass and levelling instruments
CO2	Able to use levelling instrument for 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
Reference books/other materials/web resources:	
1.	T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24 th Reprint, 2015.
2.	Dr.B.C.Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol.I&II, Lakshmi Publications Pvt Ltd, New Delhi, 17 th Edition, 2016.
3.	James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition,

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	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, 6 th Edition, 2004.
5.	David Clark and James Clendinning, Plane and Geodetic Surveying for Engineers, Volume II, Constable and Company Ltd, London, CBS, 6 th Edition, 2004.
6.	S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice Hall of India 2004
7.	K.R. Arora, Surveying Vol. I & II, Standard Book House, Eleventh Edition, 2013.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	3	3	3	3	3	3	3
CO2	3	2	3	-	3	3	3	3	3	3	3	3	3	3
CO3	3	1	2	-	3	2	-	-	3	-	-	3	3	3
CO4	3	3	2	3	2	3	3	2	3	3	3	3	3	3
CO5	3	3	3	2	2	3	3	2	3	3	3	3	3	3
Average:	3	2	3	3	3	3	3	3	3	3	3	3	3	3

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Subject Code	Subject Name	Category	L	T	P	C
GE24903	PROFESSIONAL DEVELOPMENT	EEC	0	0	2	1
Course Objectives:						
• To be proficient in important Microsoft Office tools: MS WORD, 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 presentability 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, presentability, aesthetics, using media elements and enhance the overall quality of presentations						

MS WORD:

10 Hours

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, endnotes footnote
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 analyse 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
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

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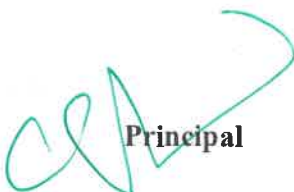
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Perform slideshow recording and Record narration and create presentable videos

Total Contact Hours : 30

Course Outcomes:	Upon completion of the course students should be able 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 PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.


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Subject Code:	Subject Name	Category	L	T	P	C
MA24404	PROBABILITY AND LINEAR PROGRAMMING PROBLEMS	HS	3	1	0	4
Course Objectives:						
- To introduce the basic concepts of probability and random variables. - To introduce the basic concepts of Special distribution. - To introduce the basic concepts of classifications of design of experiments. - To apply quantitative techniques in modelling. - To solving business related problems.						

UNIT – I	PROBABILITY AND RANDOM VARIABLES	9+3
Axioms of Probability - Conditional Probability-Baye's Theorem- One dimensional Discrete and Continuous random variables -Moments - Moment generating functions.		
UNIT – II	SPECIAL DISTRIBUTIONS	9+3
Discrete distributions : Binomial, Poisson, Geometric – Continuous distributions: Uniform, Exponential and Normal distribution.		
UNIT – III	STATISTICAL QUALITY CONTROL	9+3
Control charts for Measurements ($\bar{x}$ and R Charts))- Control charts for Attributes (p, c, and np charts)- Tolerance limits- Acceptance Sampling.		
UNIT – IV	LINEAR PROGRAMMING PROBLEMS	9+3
Linear Programming formulation, Solution by Graphical method - Simplex methods –Big-M method.		
UNIT – V	TRANSPORTATION AND ASSIGNMENT PROBLEMS	9+3
Transportation Models – Balanced and unbalanced Problems – Initial Basic feasible solution by N-W Corner Rule, Least cost and Vogel's approximation methods. Check for optimality. Solution by MODI. Assignment Problems– Balanced and Unbalanced Problems-Hungarian Method.		
		Total Contact Hours : 60

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Understand the basic concepts of Probability and Random variables and apply in Engineering applications.
CO2	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
CO3	Apply the basic concepts of classifications of design of experiments in the field of Agriculture and statistical quality control.
CO4	Understand the Linear programming in product mix decisions.
CO5	Apply the Transportation and assignment in logistics and job allocation scenarios

Textbooks:	
1.	Johnson. R.A., Miller. I. and Freund. J.E., " Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9 th Edition, 2016.
2.	John E. Freund, "Mathematical Statistics", Prentice Hall, 5 th Edition, 1992.
3.	Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4 th Edition, 2007
4.	Grewal. B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44 th Edition, 2018
5	N. D. Vohra, Business Statistics, Tata McGraw Hill, 2017.

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Reference books/other materials/web resources:

1.	Gupta. S.C. and Kapoor. V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12 th Edition, 2020
2.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8 th Edition, 2014.
3.	Walpole.R.E., Myers.R.H., Myers.S.L. and Ye.K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9 th Edition, 2010.
4.	Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.

PO& PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	-	-	-	-	-	1	-	-	-
CO2	3	3	2	2	1	-	-	-	-	-	1	-	-	-
CO3	3	2	3	2	2	-	-	-	-	-	2	-	-	-
CO4	3	3	3	2	2	-	-	-	-	-	2	-	-	-
CO5	3	3	3	2	2	-	-	-	-	-	2	-	-	-
Average:	3	2.8	2.6	2	1.6	-	-	-	-	-	1.6	-	-	-

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C. P. Singh
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Subject Code	Subject Name	Category	L	T	P	C
AI24401	TRACTORS AND ENGINE SYSTEMS	PCC	3	0	0	3
Course Objectives:						
To introduce the students to the different systems and working principles of tractor, power tiller, makes of tractors and power tillers.						

UNIT – I	TRACTORS	9
Classification of tractors - Tractor engines—construction of engine blocks, cylinder head and crankcase-features of cylinder, piston, connecting rod and crankshaft—firing order combustion chambers		
UNIT – II	ENGINE SYSTEMS	9
Valves-inletandoutletvalves—valvetimingdiagram.Aircleaner-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.		
UNIT – V	POWER TILLER , BULLDOZER AND TRACTOR TESTING	9
Power tiller- special features -clutch- gearbox-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 Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able 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

Textbooks:

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

Reference books/other materials/webresources:

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.,

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	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.	JagadeeshwarSahay,Elements of Agricultural Engineering, Standard Publishers Co., New Delhi, 2010

PO& PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	1	2	3	-	-	2	-	-	-	3	3	3
CO2	2	3	3	2	3	-	-	2	-	-	-	3	3	2
CO3	2	3	3	3	3	-	-	1	-	-	-	3	3	2
CO4	3	3	3	2	3	-	-	2	-	-	-	3	3	2
CO5	2	3	3	3	3	-	-	2	-	1	2	3	3	2
Average:	2	3	3	2	3	-	-	2	-	-	2	3	3	2

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Subject Code	Subject Name	Category	L	T	P	C
AI24403	STRENGTH OF MATERIALS FOR AGRICULTURAL ENGINEERING	PCC	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 hollow 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 Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Find the stress distribution and strains in regular and composite structures subjected to axial loads.
CO2	Evaluate 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	Evaluate the slope and deflection of beams and buckling loads of columns under different boundary conditions

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

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Reference books/other materials/web resources:

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., "MechanicsofMaterials",PearsonEducation,LowPriceEdition, 2007
4. Ferdinand P. Beer,Russell Johnson, Jr. and JohnJ.Dewole"Mechanics of Materials", Tata McGraw Hill Publishing „co. Ltd., New Delhi, 2005.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	1	1	-	1	-	-	-	-	1	3	3	1
CO2	3	2	2	1	-	1	-	-	-	-	-	3	3	1
CO3	3	2	2	1	-	1	-	-	-	-	1	3	3	1
CO4	3	1	2	1	-	1	-	-	-	-	1	3	3	1
CO5	3	2	2	1	-	1	-	-	-	-	1	3	3	1
Average:	3	2	2	1	-	1	-	-	-	-	1	3	3	1

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Subject Code	Subject Name	Category	L	T	P	C
AI24404	HYDROLOGY AND WATER RESOURCES ENGINEERING	PCC	3	0	0	3
Course Objectives:						
- To introduce to the students, the concepts of hydrological processes, hydrological extremes and groundwater. - To prepare the students to quantify, regulate and manage water resources.						

UNIT – I	PRECIPITATION AND ABSTRACTIONS	9
Hydrological cycle - Meteorological measurements—Types and forms of precipitation - Rain gauges - Spatial analysis of rainfall data using Thiessen polygon and Iso-hyetal methods - Interception—Evaporation: Measurement, Evaporation suppression methods—Infiltration: Horton's equation-Double ring infiltrometer- Infiltration indices.		
UNIT – II	RUNOFF	9
Catchment: Definition, Morphological characteristics - Factors affecting runoff - Run off estimation using Strange's table and empirical methods-SCS-CN method—Stage discharge relationship-Flow measurements-Hydrograph—Unit Hydrograph—IUH.		
UNIT – III	HYDROLOGICAL EXTREMES	9
Natural Disasters - Frequency analysis - Flood estimation - Flood management - Definitions of drought: Meteorological, Hydrological, Agricultural and Integrated - IMD method - NDVI analysis - Drought Prone Area Programme (DPAP).		
UNIT – IV	RESERVOIRS	9
Classification of reservoirs- Site selection-General principles of design-Spillways-Elevation-Area-Capacity curve-Storage estimation-Sedimentation-Life of reservoirs—Rule curve.		
UNIT – V	GROUND WATER AND MANAGEMENT	9
Origin - Classification and types - Properties of aquifers - Governing equations—Steady and unsteady flow- Artificial recharge-RWH in rural and urban areas.		
		Total Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able to:
CO1	Define the hydrological processes and their integrated behavior in catchments
CO2	Apply the knowledge of hydrological processes to address basin characteristics, runoff and hydrograph
CO3	Explain the concept of hydrological extremes and its management strategies
CO4	Describe the principles of storage reservoirs
CO5	Understand and apply the concepts of groundwater management

Textbooks:	
1.	SubramanyaK, "Engineering Hydrology"-Tata McGraw Hill,2010
2.	Jayarami Reddy P, "Hydrology", Tata McGrawHill,2008.
3.	"Sedimentation Engineering", 2006, ASCE manual and Report on Engineering Practice No. 54, Edited by Vito A. Vanoni. ASCE publishing.

Reference books/other materials/web resources:	
1.	David Keith Todd."Ground water Hydrology",John Wiley & Sons,Inc.2007

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2.	VenTe Chow, Maidment, D.R. and Mays, L.W."Applied Hydrology", McGraw Hill International Book Company, 1998.
3.	Raghunath.H.M., "Hydrology", WileyEasternLtd., 1998.
4.	Bhagu R. Chahar, Ground water Hydrology, McGraw Hill Education(India) Pvt Ltd, New Delhi, 2017.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	-	2	1	2	2	-	2	2	-	2	2	2
CO2	2	3	2	2	1	2	2	-	3	2	-	2	2	3
CO3	2	2	2	1	-	2	2	-	2	2	2	2	2	2
CO4	2	2	1	1	1	3	2	2	2	2	-	2	2	3
CO5	2	2	2	2	1	3	2	2	3	2	2	2	2	3
Average:	2	2	1	2	1	2	2	1	2	2	1	2	2	3

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Subject Code	Subject Name	Category	L	T	P	C
ME24401	THEORY OF MACHINES	PCC	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 toothed 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 force-motion relationship in components subjected to external forces and analyzing of standard mechanisms.

UNIT – I	KINEMATICS OF MECHANISMS	9
Mechanisms – Terminology and definitions – kinematics inversions of 4 bar 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 – involute gearing – Interchangeable gears – Gear tooth action interference and undercutting – nonstandard teeth – gear trains – parallel axis gears trains – epicyclic gear trains – automotive transmission gear trains.		
UNIT – III	FRICTION IN MACHINE ELEMENTS	9
Reynolds experiment - Laminar flow through circular pipe - Darcy-Weisbach equation - Moody diagram - Major and minor losses in pipe flow – Total energy line – Hydraulic grade line – 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	FORCE ANALYSIS	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	BALANCING AND VIBRATION	9
Types of pumps – Head of pump – Losses and efficiencies - Selection of pump capacity - Centrifugal pump – Components – Working principle – Types of impellers - 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 Contact Hours : 45

Course Outcomes:	Upon completion of the course students should be able 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.

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Textbooks:

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

Reference books/other materials/web resources:

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

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	-	2	-	-	1	-	-	-	3	-	1
CO2	3	2	2	-	2	-	-	1	-	-	-	3	-	1
CO3	3	2	2	-	2	-	-	1	-	-	-	3	-	1
CO4	3	2	2	-	2	-	-	1	-	-	-	3	-	1
CO5	3	2	2	-	2	-	-	1	-	-	-	3	-	1
Average:	3	2	2	-	2	-	-	1	-	-	-	3	-	1

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Subject Code	Subject Name	Category	L	T	P	C
GE24901	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY	BSC	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 BIODIVERSITY	6
Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: 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 unsustainability 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 Contact Hours : 30

Course Outcomes:	Upon completion of the course students should be able to:
CO1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation

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CO2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
CO3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
CO4	To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
CO5	To 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 McGraw-Hill, New Delhi, 2016
3.	Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, 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.

Reference books/other materials/web resources:	
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 Crisisto Cure', Oxford University Press, Third Edition, 2015.
5.	ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	2	3	-	-	-	-	-	-	-
CO2	3	2	-	-	-	3	3	-	-	-	-	-	-	-
CO3	3	-	1	-	-	2	2	-	-	-	-	-	-	-
CO4	3	2	1	1	-	2	2	-	-	-	-	-	-	-
CO5	3	2	1	-	-	2	2	-	-	-	-	-	-	-
Average:	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	-	-	-

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Subject Code	Subject Name	Category	L	T	P	C
AI24411	TRACTOR AND FARM ENGINES LABORATORY	PCC	0	0	2	1
Course Objectives:						
- To make the students conversant with the anatomy of farm tractor and farm engines - To make them understand the working principle of IC engines, clutch, gear box, differential and final drive						
EXPERIMENTS:						
- Identification and study of different components of diesel engine - Identification and study of different components of petrol engine - Method of working of diesel engine with the help of working models - Method of working of diesel engine with the help of working models - Dismantling and assembly of diesel engine - Dismantling and assembly of petrol engine - Study of clutch-components and method of working - Study of gearbox-components and method of working - Study of differential and final drive-components and method of working - Study of braking system and steering system-components and method of working - Study of hydraulic system and PTO system in a tractor - 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.						
						Total Contact Hours : 60

Course Outcomes:	Upon completion of the course students should be able 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.

Reference books/other materials/web resources:	
1.	JagdishwarSahay. 2019. Elements of Agricultural Engineering. Standard Publishers Distributors, Dpelhi
2.	Michael, A.M. and Ohja, T.P. 2018. Principles of Agricultural Engineering Volume I. Jain Brothers, Jodhpur.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	2	1	3	1	-	-	-	1	2	3	3	3
CO2	3	1	2	1	3	1	-	-	-	1	2	3	3	3
CO3	3	2	2	1	3	1	-	-	-	1	2	3	3	3
Average:	3	2	2	1	2	1	-	-	-	1	2	3	3	3

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Subject Code	Subject Name	Category	L	T	P	C
AI24412	STRENGTH OF MATERIALS LABORATORY	PCC	0	0	4	2
Course Objectives:						
To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally						
EXPERIMENTS:						
- Tension test on steel rod - Compression test on wood - Double shear test on metal - Torsion test on mild steel rod - Impact test on metal specimen (Izod and Charpy) - Hardness test on metals(Rock well and Brinell Hardness Tests) - Deflection test on metal beam - Compression test on helical spring - Deflection test on carriage spring						
						Total Contact Hours : 60

Course Outcomes:	Upon completion of the course students should be able to:
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

Reference books/other materials/web resources:	
1.	Strength of Materials Laboratory Manual, Anna University, Chennai -600025
2.	IS1786-2008(Fourth Revision, Reaffirmed2013), 'High strength deformed bars and wires for concrete reinforcement—Specification', 2008.

PO & PSO / CO	CO-PO Mapping											CO-PSO Mapping		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	2	1	-	1	-	-	-	-	2	3	3	1
CO2	3	1	2	1	-	1	-	-	-	-	2	3	3	1
CO3	3	2	2	1	-	1	-	-	-	-	2	3	3	1
Average:	3	2	2	1	-	1	-	-	-	-	2	3	3	1

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