NANDHA ENGINEERING COLLEGE

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE, New Delhi)
Erode-638 052, Tamil Nadu, India, Phone: 04294 – 225585

Curriculum and Syllabi

for

B. Tech – Agricultural Engineering [R22]

[CHOICE BASED CREDIT SYSTEM]

(This Curriculum and Syllabi are applicable to Students admitted from the academic year (2022-23) onwards)

August 2022

INSTITUTE VISION AND MISSION

VISION	• To be an institute of excellence providing quality Engineering, Technology and Management education to meet the ever-changing needs of the society.
MISSION	• To provide quality education to produce ethical and competent professionals with social Responsibility • To excel in the thrust areas of Engineering, Technology and Entrepreneurship by solving real- world problems. • To create a learner centric environment and improve continually to meet the changing global needs.

B.Tech – Agricultural Engineering

VISION	• To foster academic excellence by imparting knowledge in Agricultural Engineering to meet the ever-growing needs of the society.
MISSION	• To provide quality education to produce agricultural engineers with social responsibility. • To excel in the thrust areas of agricultural engineering to identify and solve the real-world problems. • To create a learner-centric environment by upgrading knowledge and skills to cater the needs and challenges of the society.
PROGRAMME EDUCATIONAL OBJECTIVES (PEO)	The graduates of Agricultural Engineering will be • **PEO1: Core Competency:** Successful professional with core competency and inter-disciplinary skills to satisfy the Industrial needs. • **PEO2: Research, Innovation and Life-long Learning:** Capable of identifying technological requirements for the society and providing innovative solutions to real time problems. • **PEO3: Ethics, Human values and Entrepreneurship**: Able to demonstrate ethical practices and managerial skills through continuous learning
PROGRAMME SPECIFIC OUTCOMES (PSO)	The students of Agricultural Engineering will be able to • **PSO1:** Design, analyze and apply the knowledge gained on agricultural machinery, tools, implements and production technologies to increase crop production, improve land use, soil nutrient and conserve resources like water, fertilizer and energy. • **PSO2:** Apply the comprehensive knowledge of engineering properties of agricultural products for upgrading the unit operation and developing innovative process, value-added products, and advanced engineering technologies to meet the challenges in agriculture.

PROGRAM OUTCOMES:

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

a-l	GRADUATE ATTRIBUTES	PO No.	PROGRAMME OUTCOMES
a	Engineering Knowledge	PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
b	Problem Analysis	PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
c	Design and Development of Solutions	PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
d	Investigation of Complex Problems	PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
e	Modern Tool Usage	PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
f	The Engineer and Society	PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
g	Environment and Sustainability	PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
h	Ethics	PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
i	Individual and Team Work	PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
j	Communication	PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
k	Project Management and Finance	PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
l	Lifelong Learning	PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the Programme Educational Objectives and the Programme Outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	3	2	3	2	1	1	2	1	1	3	1
2	3	3	3	3	3	1	1	1	1	1	1	2
3	3	3	3	3	3	2	2	3	1	2	2	2

Contribution   **1: Reasonable**   **2: Significant**   **3: Strong**

B. Tech - AGRICULTURAL ENGINEERING

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
			SEMESTER: I						
1	22MAN01	Induction Programme	MC	-	0	0	0	0	0
THEORY									
2	22EYA01	Professional Communication - I	HSMC	-	4	2	0	2	3
3	22MYB01	Calculus and Linear Algebra*	BSC	-	4	3	1	0	4
4	22PYB02	Advanced Materials and Nano Technology	BSC	-	3	3	0	0	3
5	22AGC01	Basics of Engineering Mechanics	ESC	-	3	2	1	0	3
6	22MEC01	Engineering Graphics	ESC	-	4	2	0	2	3
7	22GYA01	தமிழர் மரபு / Heritage of Tamils*	HSMC	-	1	1	0	0	1
PRACTICAL									
8	22PYP01	Physics Laboratory*	BSC	-	2	0	0	2	1
9	22GEP01	Engineering Practices Laboratory	ESC	-	4	0	0	4	2
Mandatory Non-Credit Courses									
10	22MAN02	Soft/Analytical Skills - I	MC	-	3	1	0	2	0
11	22MAN03	Yoga – I*	MC	-	1	0	0	1	0
				TOTAL	29	14	2	13	20

*Ratified by Eleventh Academic Council

			SEMESTER: II						
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	22EYA02	Professional Communication - II	HSMC	22EYA01	4	2	0	2	3
2	22MYB02	Partial Differential Equations and Transform Techniques*	BSC	-	4	3	1	0	4
3	22CYB05	Chemistry for Agricultural Engineers	BSC	-	3	3	0	0	3
4	22CSC01	Problem Solving and C Programming	ESC	-	3	3	0	0	3
5	22AGC02	Principles and Practices of Crop Production	PCC	-	3	3	0	0	3
6	22EEC04	Electrical Engineering*	PCC		3	3	0	0	3
7	22GYA02	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology*	HSMC		1	1	0	0	1
PRACTICAL									
8	22CSP01	Problem Solving and C Programming Laboratory	ESC	-	4	0	0	4	2
9	22AGP01	Crop Production and Husbandry Laboratory	PCC	-	4	0	0	4	2
10	22CYP01	Chemistry Laboratory*	BSC	-	4	0	0	2	1
Mandatory Non-Credit Courses									
11	22MAN04	Soft/Analytical Skills – II	MC	22MAN02	3	1	0	2	0
12	22MAN05	Yoga – II*	MC	-	1	0	0	1	0
13	22MAN06	Environmental Science	MC	-	2	2	0	0	0
				TOTAL	38	21	1	15	25

*Ratified by Eleventh Academic Council

			SEMESTER: III						
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	22MYB03	Statistics and Numerical Methods	BSC	-	4	3	1	0	4
2	22AGC03	Fundamentals of Soil Science	PCC	-	4	2	0	2	3
3	22AGC04	Strength of Materials for Agricultural Engineers	PCC	-	3	3	0	0	3
4	22AGC05	Basic workshop Technology	ESC	-	3	3	0	0	3
5	22AGC06	Thermodynamics for Agricultural Engineers	PCC	-	3	2	1	0	3
6	22AGC07	Farm Tractor Systems	PCC	-	3	3	0	0	3
PRACTICAL									
7	22AGP02	Workshop Technology Laboratory	ESC	-	4	0	0	4	2
8	22AGP03	Drawing of Farm Structures Laboratory	PCC	-	4	0	0	4	2
9	22AGP04	Farm Tractor and Engines Laboratory	PCC	-	4	0	0	4	2
Mandatory Non-Credit Courses									
10	22MAN07	Soft / Analytical Skills - III	MC	-	5	3	0	2	0
11	22MAN09	Indian Constitution	MC	-	1	1	0	0	0
				TOTAL	38	20	2	16	25

				SEMESTER: IV					
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	22AGC08	Fluid Mechanics and Hydraulics	PCC	-	4	2	0	2	3
2	22AGC09	Heat and Mass Transfer for Agricultural Engineers	PCC	-	3	2	1	0	3
3	22AGC10	Crop Process Engineering	PCC	-	3	3	0	0	3
4	22AGC11	Irrigation and Drainage Engineering	PCC	-	3	3	0	0	3
5	22AGC12	Hydrology and Water Resources Engineering	PCC	-	3	3	0	0	3
6	22AGC13	Surveying and Levelling for Agricultural Engineers	PCC	-	4	2	0	2	3
PRACTICAL									
7	22AGP05	Crop Process Engineering Laboratory	PCC	-	4	0	0	4	2
8	22AGP06	Irrigation and Drainage Engineering Laboratory	PCC	-	4	0	0	4	2
Mandatory Non-Credit Courses									
9	22MAN08	Soft/Analytical Skills - IV	MC	-	5	3	0	2	0
10	22GED01	Personality and Character Development	MC	-	0	0	0	1	0
				TOTAL	33	18	1	15	22

SEMESTER: V									
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	22AGC14	Soil and Water Conservation Engineering	PCC	-	3	3	0	0	3
2	22AGC15	Unit Operations in Agricultural Processing	PCC	-	3	3	0	0	3
3	22AGC16	Farm Implements and Equipment (Theory + Lab)	PCC	-	5	3	0	2	4
4	E1	Elective(PEC)	PEC	-	3	3	0	0	3
5	E2	Elective(PEC)	PEC	-	3	3	0	0	3
6	E3	Elective(PEC/OEC)	PEC/OEC	-	3	3	0	0	3
PRACTICAL									
7	22AGP07	CAD for Agricultural Engineers	PCC	-	4	0	0	4	2
8	22AGP08	Unit Operations in Agricultural Processing Laboratory	PCC	-	4	0	0	4	2
Mandatory Non-Credit Courses									
10	22MAN10	Soft/Analytical Skills - V	MC	-	3	1	0	2	0
11	22MAN11	Certification Course - 1	MC	-	1	0	0	1	0
				TOTAL	30	18	0	13	23

		SEMESTER: VI							
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	22AGC17	Renewable energy Sources	PCC	-	3	3	0	0	3
2	22AGC18	Food and Dairy Engineering	PCC	-	3	3	0	0	3
3	EM1	Elective - Management (ABM)	HSMC	-	3	3	0	0	3
4	E4	Elective(PEC)	PEC	-	3	3	0	0	3
5	E5	Elective(PEC/OEC)	PEC/OEC	-	3	3	0	0	3
6	E6	Elective(OEC)	OEC	-	3	3	0	0	3
PRACTICAL									
7	22AGP09	Food and Dairy Engineering Laboratory	PCC	-	4	0	0	4	2
8	22AGP10	Rural Agricultural Work Experiment	EEC	-	4	0	0	2	1
Mandatory Non-Credit Courses									
9	22MAN12	Soft/Analytical Skills - VI	MC	-	3	1	0	2	0
10	22MAN13	Certification Course - II	MC	-	1	0	0	1	0
				TOTAL	30	19	0	9	21

SEMESTER: VII									
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	22GEA01	Human Values and Ethics	HSMC	-	2	2	0	0	2
2	E7	Elective(PEC)	PEC	-	3	3	0	0	3
3	E8	Elective(PEC)	PEC	-	3	3	0	0	3
4	E9	Elective(PEC)	PEC	-	3	3	0	0	3
5	E10	Elective(OEC)	OEC	-	3	3	0	0	3
PRACTICAL									
6	22AGP11	Internship/ Inplant training (4 weeks)	EEC	-	0	0	0	0	2
				TOTAL	14	14	0	0	16

SEMESTER: VIII									
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
PRACTICAL									
1	22AGD01	Project Work	EEC	-	20	0	0	20	10
				TOTAL	20	0	0	20	10

(A)   HS,BS, ES,EE and Mandatory Courses

(a) Humanities and Social Sciences including Management courses (HSMC)

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
1.	22EYA01	Professional Communication - I	HSMC	-	4	2	0	2	3
2.	22GYA01	தமிழர் மரபு / Heritage of Tamils	HSMC	-	1	1	0	0	1
3.	22EYA02	Professional Communication - II	HSMC	22EYA01	4	2	0	2	3
4.	22GYA02	தமிழரும் தொழில்நுட்பமும்/Tamils and Technology	HSMC		1	1	0	0	1
5.	EM1	Elective - Management (ABM)	HSMC	-	3	3	0	0	3

(b) Basic Science Courses (BSC)

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
1.	22MYB01	Calculus and Linear Algebra	BSC	-	4	3	1	0	4
2.	22PYB02	Advanced Materials and Nano Technology	BSC	-	3	3	0	0	3
3.	22PYP01	Physics Laboratory	BSC	-	2	0	0	2	1
4.	22MYB02	Partial Differential Equations and Transform Techniques	BSC	-	4	3	1	0	4
5.	22CYB05	Chemistry for Agricultural Engineers	BSC	-	3	3	0	0	3
6.	22CYP01	Chemistry Laboratory	BSC	-	4	0	0	2	1
7.	22MYB03	Statistics and Numerical Methods	BSC	-	4	3	1	0	4

(c) Engineering Science Courses (ESC)

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
1.	22AGC01	Basics of Engineering Mechanics	ESC	-	3	2	1	0	3

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
2.	22MEC01	Engineering Graphics	ESC	-	4	2	0	2	3
3.	22GEP01	Engineering Practices Laboratory	ESC	-	4	0	0	4	2
4.	22CSC01	Problem Solving and C Programming	ESC	-	3	3	0	0	3
5.	22CSP01	Problem Solving and C Programming Laboratory	ESC	-	4	0	0	4	2
6.	22AGC05	Basic workshop Technology	ESC	-	3	3	0	0	3
7.	22AGP02	Workshop Technology Laboratory	ESC	-	4	0	0	4	2

(d) Employability Enhancement Courses (EEC)

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
1.	22AGP10	Rural Agricultural Work Experiment	EEC	-	4	0	0	2	1
2.	22AGP11	Internship/ Inplant training (4 weeks)	EEC	-	0	0	0	0	2
3.	22AGD01	Project Work	EEC	-	20	0	0	20	10

		(e) Professional Core Courses (PCC)							
S.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	22AGC02	Principles and Practices of Crop Production	PCC	-	3	3	0	0	3
2.	22EEC04	Electrical Engineering	PCC		3	3	0	0	3
3.	22AGP01	Crop Production and Husbandry Laboratory	PCC	-	4	0	0	4	2
4.	22AGC03	Fundamentals of Soil Science	PCC	-	4	2	0	2	3
5.	22AGC04	Strength of Materials for Agricultural Engineers	PCC	-	3	3	0	0	3
6.	22AGC06	Thermodynamics for Agricultural Engineers	PCC	-	3	2	1	0	3
7.	22AGC07	Farm Tractor Systems	PCC	-	3	3	0	0	3
8.	22AGP03	Drawing of Farm Structures Laboratory	PCC	-	4	0	0	4	2
9.	22AGP04	Farm Tractor and Engines Laboratory	PCC	-	4	0	0	4	2
10.	22AGC08	Fluid Mechanics and Hydraulics	PCC	-	4	2	0	2	3
11.	22AGC09	Heat and Mass Transfer for Agricultural Engineers	PCC	-	3	2	1	0	3
12.	22AGC10	Crop Process Engineering	PCC	-	3	3	0	0	3
13.	22AGC11	Irrigation and Drainage Engineering	PCC	-	3	3	0	0	3
14.	22AGC12	Hydrology and Water Resources Engineering	PCC	-	3	3	0	0	3
15.	22AGC13	Surveying and Levelling for Agricultural Engineers	PCC	-	4	2	0	2	3
16.	22AGP05	Crop Process Engineering Laboratory	PCC	-	4	0	0	4	2
17.	22AGP06	Irrigation and Drainage Engineering Laboratory	PCC	-	4	0	0	4	2
18.	22AGC14	Soil and Water Conservation Engineering	PCC	-	3	3	0	0	3
19.	22AGC15	Unit Operations in Agricultural Processing	PCC	-	3	3	0	0	3

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
20.	22AGC16	Farm Implements and Equipment (Theory + Lab)	PCC	-	5	3	0	2	4
21.	22AGP07	CAD for Agricultural Engineers	PCC	-	4	0	0	4	2
22.	22AGP08	Unit Operations in Agricultural Processing Laboratory	PCC	-	4	0	0	4	2
23.	22AGC17	Renewable energy Sources	PCC	-	3	3	0	0	3
24.	22AGC18	Food and Dairy Engineering	PCC	-	3	3	0	0	3
25.	22AGP09	Food and Dairy Engineering Laboratory	PCC	-	4	0	0	4	2

(f)Mandatory Non Credit Courses (MC)

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
1.	22MAN02	Soft/Analytical Skills - I	MC	-	3	1	0	2	0
2.	22MAN03	Yoga - I	MC	-	1	0	0	1	0
3.	22MAN04	Soft/Analytical Skills – II	MC	22MAN02	3	1	0	2	0
4.	22MAN05	Yoga - II	MC	-	1	0	0	1	0
5.	22MAN06	Environmental Science	MC	-	2	2	0	0	0
6.	22MAN07	Soft / Analytical Skills - III	MC	-	5	3	0	2	0
7.	22MAN09	Indian Constitution	MC	-	1	1	0	0	0
8.	22MAN08	Soft/Analytical Skills - IV	MC	-	5	3	0	2	0
9.	22GED01	Personality and Character Development	MC	-	0	0	0	1	0
10.	22MAN10	Soft/Analytical Skills - V	MC	-	3	1	0	2	0
11.	22MAN11	Certification Course - I	MC	-	1	0	0	1	0
12.	22MAN12	Soft/Analytical Skills - VI	MC	-	3	1	0	2	0
13.	22MAN13	Certification Course - II	MC	-	1	0	0	1	0

*Ratified by Eleventh Academic Council

CREDIT DISTRIBUTION SUMMARY

Semester/ Category	HSMC	BSC	PCC	ESC	EEC	PEC	OEC	Total
I	4	8		8				20
II	4	8	8	5				25
III		4	16	5				25
IV			22					22
V			14			6	3	23
VI	3		8		1	3	6	21
VII	2				2	9	3	16
VIII					10			10
Total	13	20	68	18	13	18	12	162
%	**8.02**	**12.34**	**41.97**	**11.11**	**8.02**	**11.11**	**7.40**	
AICTE Credits Recommended	16	23	59	29	15	12	9	163
	10%	**14%**	**36%**	**18%**	**9%**	**7%**	**6%**	**94%**

22EYA01 - PROFESSIONAL COMMUNICATION - I
(*Common to All Branches*)

		L	T	P	C
		2	0	2	3

PREREQUISITE: NIL

	Course Objectives		Course Outcomes : The students will be able to
1.0	To build essential English skills to address the challenges of communication in today's work environment.	**1.1**	Apply knowledge of communication and language processes occur in various work environment.
2.0	To comprehend the various dimensions of communication by employing LSRW skills.	**2.1**	Involve in diverse discourse forms utilizing LSRW skills.
3.0	To deploy students in contextual initiatives by assisting them in developing communication abilities.	**3.1**	Participate actively in communication activities that enhance their creative skill.
4.0	To facilitate students in comprehending the intent, target audience and environments of various forms of communication.	**4.1**	Associate with the target audience and contexts using varied types of communication.
5.0	To enhance coherence, cohesion, and proficiency in both verbal and nonverbal communication in the workplace environment.	**5.1**	Convey the idea distinctly both in verbal and non verbal communication in work culture.

UNIT I –INTRODUCTORY SKILLS	(6+6)

Grammar – Parts of Speech – Verb (Auxiliaries – Primary & Modal, Main Verb) -**Listening** – Listening to Short Conversations or Monologues - Listening to Experiences – Listening to Descriptions- **Speaking** – Introducing Oneself – Exchanging Personal information - Talking about food and culture - **Reading**– Reading for Interrogation – Reading Newspaper, Advertisements and Interpreting - **Writing** - Seeking Permission for Industrial Visit & In-plant Training

UNIT II – LANGUAGE ACUMEN	(6+6)

Grammar – Word Formation – Tenses (Present Tense) – Synonyms & Antonyms - **Listening** – Listening to Announcements – Listening to Interviews - Listening and Note-taking - **Speaking** – Talking about Holidays & Vacations – Narrating Unforgettable Anecdotes - **Reading** – Skimming – Scanning (Short Texts and Longer Passages) – Critical Reading - **Writing** – Instruction – Process Description

UNIT III – COMMUNICATION ROOTERS	(6+6)

Grammar– Cause and Effect – Tenses (Past Tense) – Discourse Markers - **Listening** – Listening to Telephonic Conversations – Listening to Podcasts - **Speaking** – Talking about neoteric Technologies – Eliciting information to fill a form - **Reading** –Book Reading (Motivational) - Practicing Speed Reading (reading newspaper reports & biographies) - **Writing** – Checklist – Circular, Agenda & Minutes of the Meeting

UNIT IV – DISCOURSE FORTE	(6+6)

Grammar – Tenses (Future Tense) –Yes/No & WH type questions – Negatives - **Listening** – Listening to TED/ Ink talks -**Speaking** – Participating in Short Conversations - **Reading** – Reading Comprehension (Multiple Choice / Short / Open Ended Questions) - **Writing** - E-Mail Writing

UNIT V – LINGUISTIC COMPETENCIES	(6+6)

Grammar – Articles – Homophones & Homonyms – Single line Definition – Phrasal Verb - **Listening** – Intensive listening to fill in the gapped text - **Speaking** –Expressing opinions through Situations & Role play **Reading** – Cloze Texts - **Writing** – Paragraph Writing

LIST OF SKILLS ASSESSED IN THE LABORATORY
1. Grammar
2. Listening Skills
3. Speaking Skills
4. Reading Skills
5. Writing Skills

TOTAL (L:30 , P:30) = 60 PERIODS

TEXT BOOK:

1. Shoba, K. N., Deepa Mary Francis, "English for Engineers and Technologists", Orient Black Swan Pvt. Ltd., Volume 1, 3rd Edition, Telangana, 2022.

REFERENCES:

1. Koneru, Aruna, "English Language Skills", Tata McGraw Hill Education (India) Private Limited, Chennai, 2006.
2. Hewings, M., "Advanced English Grammar", Cambridge University Press, Chennai, 2000.
3. Jack, C. Richards, Jonathan Hull and Susan Proctor, "Interchange", Cambridge University Press, New Delhi, 2015 (Reprint 2021).

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	-	-	-	3	3	-	2	-	1
2	-	-	-	-	-	-	-	-	3	3	-	2	-	1
3	-	-	-	-	-	-	-	-	3	3	-	2	-	1
4	-	-	-	-	-	-	-	-	3	3	-	2	-	1
5	-	-	-	-	-	-	-	-	3	3	-	2	-	1
CO (W.A)	-	-	-	-	-	-	-	-	**3**	**3**	-	**2**	-	**1**

22MYB01-CALCULUS AND LINEAR ALGEBRA
(Common to All Branches)

		L	T	P	C
		3	1	0	4

PREREQUISITE: NIL

	Course Objectives		Course Outcomes : The students will be able to
1.0	To develop the use of matrix algebra techniques needed by engineers for practical applications.	1.1	Apply the concept of orthogonal reduction to diagonalise a given matrix.
2.0	To use the techniques, skills and engineering tools necessary for engineering practice, with geometric concepts.	2.1	Identify the geometric aspects of plane, straight line and sphere.
3.0	To improve the ability of the students in solving geometrical applications of differential calculus problems.	3.1	Evaluate the radius of curvature, circle of curvature and centre of curvature for a given curve.
4.0	To learn the important role of mathematical concepts in engineering applications with the functions of several variables.	4.1	Calculate the maxima and minima for a given function with several variables by finding the stationary points.
5.0	To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.	5.1	Evaluate the area and volume by double and triple integrals.

UNIT I – MATRICES	(9+3)

Characteristic Equation - Eigen values and Eigen vectors of a matrix - Cayley Hamilton Theorem (excluding proof) and its applications - Quadratic Form-Reduction of a Quadratic form to canonical form by orthogonal transformation.

UNIT II – ANALYTICAL GEOMETRY OF THREE DIMENSIONS	(9+3)

Equation of plane – Angle between two planes – Equation of straight lines - Coplanar lines –Equation of sphere – Orthogonal spheres.

UNIT III - GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS	(9+3)

Curvature – Curvature in Cartesian co-ordinates-Centre and Radius of curvature-Circle of curvature-Evolutes and Involutes.

UNIT IV - FUNCTIONS OF SEVERAL VARIABLES	(9+3)

Partial derivatives - Euler's theorem on homogeneous function-Jacobian-Maxima and Minima of functions of two variables-Constrained Maxima and Minima by Lagrange's multiplier method.

UNIT V - MULTIPLE INTEGRALS	(9+3)

Double integration in Cartesian Co-ordinates-Change of order of integration-Area as double integral- Triple integration in Cartesian Co-ordinates-Volume as triple integrals.

TOTAL (L:45+T:15) :60 PERIODS

LIST OF PROGRAMS USING MATLAB (Assignment/Online Test**):**
1. Introduction to MATLAB
2. Matrix operations – Addition, Multiplication, Transpose and Inverse
3. Characteristic equation of a Matrix
4. Eigen values and Eigen vectors of Higher order Matrices.
5. Curve Tracing
6. Determining Maxima and Minima of a function of one variable.
7. Determining Maxima and Minima of a function of two variables.
8. Evaluating double integrals
9. Evaluating triple integrals
10. Finding area between two curves.

TEXT BOOKS:
1. Grewal, B. S., "Higher Engineering Mathematics", Khanna publications, 42nd Edition, 2012.
2. Erwin Kreyszig, "Advanced Engineering mathematics", John Wiley & sons, 9th Edition, 2013.
3. Veerarajan, T., "Engineering Mathematics of semester I & II", Tata McGraw Hill, 3rd Edition, 2016.

REFERENCES:
1. Bali, N. P., Manish Goyal, "A Text book of Engineering Mathematics -Sem-II", Laxmi Publications, 6th Edition, 2014.
2. Kandasamy, P., Thilagavathy, K., Gunavathy, K., "Engineering Mathematics for first year", Scand & Co Ltd, 9th Revised Edition, 2013.
3. Glyn James, "Advanced Engineering Mathematics", Wiley India, 7th Edition, 2007.

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	-	1	-	-	-	1	-	2	2	2	1
2	3	2	2	-	1	1	-	-	1	-	-	2	2	-
3	3	2	2	-	1	-	-	-	-	-	-	2	2	-
4	3	2	2	1	1	-	-	-	1	-	-	2	2	-
5	3	2	2	1	1	-	-	-	1	-	1	2	2	1
CO (W.A)	3	2	2	1	1	1	-	-	1	-	2	2	2	1

Mapping of COs with POs / PSOs

*Ratified by Eleventh Academic Council

22PYB02 - ADVANCED MATERIALS AND NANO TECHNOLOGY
(Common to AGRI, CHEM and CIVIL Branches)

		L	T	P	C
		3	0	0	3

PREREQUISITE: NIL

	Course Objectives		Course Outcomes: The students will be able to
1.0	To gain adequate information about the properties of matter.	**1.1**	Understand the fundamental concepts of properties of matter
2.0	To obtain the knowledge regarding the basics of thermal physics.	**2.1**	Acquire knowledge about the basics of thermal physics.
3.0	To gain knowledge about the synthesis and properties of nanostructures.	**3.1**	Explore the knowledge of synthesising methods and properties of nanostructures.
4.0	To expose the concepts of Photonics and fiber optics.	**4.1**	Get adequate information about Photonics and fiber optics in the field of electrical and communication.
5.0	To update the recent development in Advanced new engineering materials	**5.1**	Acquire knowledge about recent developments in Advanced new engineering materials

UNIT I – PROPERTIES OF MATTER	(9)

Elasticity – Hooke's law Stress-strain diagram and its uses – factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple – torsion pendulum: theory and experiment - bending of beams – bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment – I-shaped girders - stress due to bending in beams.

UNIT II – THERMAL PHYSICS	(9)

Mode of heat transfer-thermal conductivity-Newton's law of cooling –thermal conduction through compound media (bodies in series and parallel) – thermal conductivity of a good conductor – Forbe's method-thermal conductivity of bad conductor –Lee's disc – Hazards – Cyclone and flood hazards – Fire hazards and fire protection, fire – proofing of materials, fire safety regulations and firefighting equipment. Prevention and safety measures.

UNIT III - SYNTHESIS AND PROPERTIES OF NANOSTRUCTURES	(9)

Introduction to Nanoscience – Types of nanostructure and properties of Nanomaterials – Synthesis and preparation of Nanomaterials – Nanosensors – Biosensors – Nanoscience and Environment.

UNIT IV – PHOTONICS AND FIBER OPTICS	(9)

Photonics: Population of energy levels – Einstein's A and B coefficients derivation –Resonant cavity – Types of lasers – solid state laser (Neodymium) – gas laser (CO_2) Applications of lasers in science – Engineering – Medicine.

Fibre optics: Principle, numerical aperture and acceptance angle - Types of optical fibres (Material, refractive index and mode) -Losses in optical fibre - Fibre optic communication Fibre optic sensors (pressure and displacement).

UNIT V- ADVANCED NEW ENGINEERING MATERIALS	(9)

Ceramics - types and applications - composites: classification, role of matrix and reinforcement, processing of fiber reinforced plastics - metallic glasses: types, glass forming ability of alloys, melt spinning process, applications - shape memory alloys: phases, shape memory effect, pseudoelastic effect, NiTi alloy, application - Bio material - applications.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Dattuprasad, Ramanlal Joshi, "Engineering Physics", Tata McGraw hill education, 2019.
2. Rajendran, V., "Engineering Physics", Tata McGraw-Hill, New Delhi, 2017.
3. Marikani, "Materials Science", PHI Learning Private Limited, Eastern Economy Edition, 2018.

REFERENCES:

1. Subrahmanyam, N., Brijlal, "A Text Book of Optics", S. Chand & Co. Ltd, New Delhi, 2017.
2. Kongbamchandramanisingh, "Basic Physics", PHI, 2018.
3. Avathanalu, M. N., Kshirsagar, P. G., "A text book of Engineering Physics", S. Chand & Company Ltd, 2017.

	Mapping of COs with POs / PSOs													
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	3	-	-	-	-	-	1	1	-	2	-	-
2	3	2	3	-	-	-	-	-	1	1	-	1	-	1
3	3	2	3	-	-	-	-	-	1	1	-	1	-	-
4	2	2	2	-	-	-	-	-	-	-	-	1	-	-
5	2	1	2	-	-	-	-	-	1	1	-	2	-	-
CO (W.A)	**2.6**	**2**	**2.6**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**-**	**1**

22AGC01 - BASICS OF ENGINEERING MECHANICS

		L	T	P	C
		2	1	0	3

PREREQUISITE: NIL

	Course Objectives		Course Outcomes : The students will be able to
1.0	To acquire knowledge on the behaviour of a particle under the action of forces	**1.1**	Evaluate the engineering problems on stable particles using conditions for equilibrium
2.0	To analyze the behaviour of the rigid body under the action of forces	**2.1**	Calculate the reaction forces of various supports and resultant forces on rigid bodies
3.0	To gain knowledge related to friction and their types	**3.1**	Solve the problems involving dry friction under equilibrium conditions
4.0	To study the geometric properties of the different plane surfaces.	**4.1**	Determine the centroid, Centre of gravity and moment of inertia of various plane and composite areas
5.0	To acquire knowledge on the behavior of moving body under the action of forces causing the motion.	**5.1**	Analyze the problems involving dynamics of particles

UNIT I – STATICS OF PARTICLE	**(6+3)**

Units and dimensions - fundamental principles - laws of mechanics, lame's theorem, parallelogram and triangular law of forces, principle of transmissibility – System of forces- coplanar and concurrent forces - resultant force - statics of particles in two dimension - free body diagram - equilibrium of particles in two dimensions -problems

UNIT II – STATICS OF RIGID BODY	**(6+3)**

Rigid body-Statics of rigid body in two dimensions-- moment of a force about a point and about an axis-Varignon's theorem -Resultant of parallel and nonconcurrent forces-moments and couple- equilibrium of rigid bodies in two dimensions- requirements of stable equilibrium- types of supports and their reactions

UNIT III - FRICTION	**(6+3)**

Frictional force - Laws of Coulomb friction -Limiting friction- co-efficient of friction and angle of friction - Impending motion-angle of repose- cone of friction - simple contact friction - ladder friction - belt friction - transmission of power through belts - problems involving the equilibrium of a rigid bodies with frictional forces

UNIT IV - PROPERTIES OF SECTIONS	**(6+3)**

Centroid and Centre of Gravity- first and second moment of area -centroid of plan and composite plane areas- moment of Inertia of plane and composite plane areas – Radius of gyration-parallel axis theorem - perpendicular axis theorem - polar moment of inertia – Problems

UNIT V - DYNAMICS OF PARTICLES	**(6+3)**

Kinematics-Displacements, velocity and acceleration, their relationship - linear motion with uniform and variable acceleration - curvilinear motion and projectile motion - Kinetics of particles- Newton's law, D'Alembert's Principle - work energy equation - impulse momentum equation-problems

	TOTAL (L:30 +T:15): 45 PERIODS

TEXT BOOKS:

1. Vela Murali, "Engineering Mechanics", Oxford University Press, 2010.
2. Ferdinand, P., Beer and Russell Johnson, E., "Vector Mechanics for Engineers: Statics and Dynamics", Tata McGraw Hill International Edition, 9th Edition, 2010.

REFERENCES:

1. Irving H. Shames, "Engineering Mechanics: Statics and Dynamics", Prentice Hall of India Private limited, 2003.
2. Russell C. Hibbeler, "Engineering Mechanics: Statics and Dynamics", 12th Edition Prentice Hall, 2009.
3. Anthony M. Bedford and Wallace Fowler, "Engineering Mechanics: Statics and Dynamics", 5th Edition, Prentice Hall, 2007.
4. Palanichamy, M. S and Nagan, S., "Engineering Mechanics - Statics and Dynamics", Tata McGraw-Hill, 3rd Edition, New Delhi, 2005.
5. Meriam, J. L. and Kraige, L. G., "Engineering Mechanics: Statics and Dynamics", Wiley Publishers, 6th Edition, 2006.
6. Rajasekaran, S. and Sankarasubramanian, G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., 3rd Edition, New Delhi, 2005.

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	2	3	-	-	2	-	-	-	2	2	1
2	3	2	-	2	3	-	1	-	-	-	-	-	2	2
3	2	3	2	-	-	2	-	-	-	-	-	-	-	3
4	3	3	2	2	3	-	-	2	-	-	-	-	3	3
5	3	3	1	2	3	-	-	-	-	-	-	1	2	3
CO (W.A)	2.8	2.6	1.8	2	3	2	1	2	-	-	-	1.5	2.3	2.4

Mapping of COs with POs / PSOs

22MEC01 - ENGINEERING GRAPHICS
(Common to AGRI, CHEM, CIVIL and EEE Branches)

		L	T	P	C
		2	0	2	3

PREREQUISITE: NIL

	Course Objectives		Course Outcomes : The students will be able to
1.0	To Construct various plane curves	1.1	Construct various plane curves
2.0	To Construct the concept of projection of points, lines and plane	2.1	Create the projection of points, lines and planes
3.0	To Develop the projection of solids	3.1	Develop projection of solids
4.0	To Solve problems in sectioning of solids and developing the surfaces	4.1	Solve problems in sections of solids and development of surfaces
5.0	To Apply the concepts of orthographic and isometric	5.1	Apply the concepts of isometric in engineering practice

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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 – scales

UNIT I - PLANE CURVES	**(6+6)**

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 - theory of projection - principle of multi-view orthographic projection - profile plane and side views - multiple views - representation of three dimensional objects - layout of views.

UNIT II - PROJECTION OF POINTS, LINES AND PLANES	**(6+6)**

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 - projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III - PROJECTION OF SOLIDS	**(6+6)**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to anyone of the principal plane and parallel to another by rotating object method.

UNIT IV - SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES	**(6+6)**

Sectioning of solids (prism, cube, pyramid, cylinder and cone) 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 cylinder and cone.

UNIT V - ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS	(6+6)

Principles of isometric projection - isometric scale - isometric projections of lines, plane figures, simple solids and truncated solids - prisms, pyramids, cylinders, cones – free hand sketching of orthographic views from isometric views of objects.

TOTAL (L:30+ P:30) : 60 PERIODS

TEXT BOOKS:

1. Venugopal, K. and Prabhu Raja, V., "Engineering Graphics", New Age International (P) Limited, 2022.
2. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015.

REFERENCES:

1. Bhatt N. D. and Panchal, V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
2. Gopalakrishna, K. R., "Computer Aided Engineering Drawing", Subhas Stores, Vol I and II combined, Bangalore, 2017.
3. Natarajan, K. V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
4. Luzzader, Warren. J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production", Prentice Hall of India Pvt. Ltd., Eastern Economy Edition, New Delhi, 2005.
5. Shah, M. B. and Rana, B. C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	-	-	1	-	-	-	2	-	3	-	1
2	3	2	1	-	-	1	-	-	-	2	-	3	-	1
3	3	2	1	-	-	1	-	-	-	2	-	3	-	1
4	3	2	1	-	-	1	-	-	-	2	-	3	-	1
5	3	3	1	-	-	1	-	-	-	2	-	3	-	1
CO (W.A)	**3**	**2.2**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**	**3**	**-**	**1**

			22PYP01 - PHYSICS LABORATORY				
			(Common to All Branches)				
				L	**T**	**P**	**C**
				0	0	2	1

PREREQUISITES: NIL

	Course Objectives		Course Outcomes : The students will be able to	
1.0	To provide the basic practical exposure to all the engineering and technological streams in the field of physics.	**1.1**	Apply the concept of stress, strain and elastic limit for a given sample to find their properties.
2.0	To infer the practical knowledge by applying the experimental methods to correlate with the Physics theory.	**2.1**	Gain the basic knowledge about handling the laser light and Identify the basic parameters of an optical fibre.
3.0	To enable the students to correlate the theoretical principles with application oriented studies.	**3.1**	Analyze the properties of matter with sound waves.
4.0	To introduce different experiments to test basic understanding of physics concepts applied in optics and electronics	**4.1**	Recall the knowledge of properties of light through spectrometer grating and fiber optic cable.
5.0	To analyze the behavior and characteristics of solar cells and LED	**5.1**	Acquire the knowledge in semiconducting devices such as solar cells and LED.

PHYSICS LABORATORY

1. Determination of Young's modulus by non-uniform bending method
2. Determination of (a) wavelength and (b) particle size using Laser.
3. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
4. Determination of wavelength of mercury spectrum – spectrometer grating
5. Determination of band gap of a semiconductor.
6. Determination of thickness of a thin wire – Air wedge method.
7. Determination of V-I characteristics of solar cell.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	3	3	-	-	-	-	-	-	1	-	2	1	-
2	3	3	2	-	-	-	-	-	-	-	-	1	1	-
3	3	3	2	-	-	-	-	-	1	-	-	1	-	-
4	3	2	3	-	-	-	-	-	-	-	-	2	-	-
5	3	2	2	-	-	-	-	-	-	1	-	1	-	-
CO (W. A)	3.0	2.0	2.4	-	-	-	-	-	1.0	1.0	0.0	1.0	1.0	-

22GEP01 - ENGINEERING PRACTICES LABORATORY
(Common to AGRI, BME, CHEM, CIVIL, ECE, EEE and MECH Branches)

		L	T	P	C
		0	0	4	2

PRE-REQUISITE: NIL

Course Objectives		Course Outcomes : The students will be able to	
1.0	To provide hands on training on various basic engineering practices in Civil Engineering	**1.1**	Make various joints/ connections in civil engineering practices like plumbing and carpentry.
2.0	To provide hands on training on various basic engineering practices in Mechanical Engineering	**2.1**	Make various shapes using manufacturing processes like welding, machining and sheet metal work.
3.0	To understand the basic working principle of electric components	**3.1**	Do residential house wiring and measure electric quantities-Voltage, Current and Power in R Circuit
4.0	To understand the basic working principle of electronic components	**4.1**	Perform the assembling and testing of the PCB based electronic circuits.
5.0	To develop the skill to make / operate/utilize the simple engineering components	**5.1**	Make / operate / utilize the simple engineering components.

GROUP-A (MECHANICAL AND CIVIL ENGINEERING)	
I - CIVIL ENGINEERING PRACTICE	**(15)**

Buildings:
   a. Study of plumbing and carpentry components of residential and industrial buildings, Safety aspects

Plumbing:
   a. Study of tools and operations
   b. Hands-on-exercise: External thread cutting and joining of pipes

Carpentry:
   a. Study of tools and operations
   b. Hands-on-exercise: "L" joint and "T" joint

II - MECHANICAL ENGINEERING PRACTICE	**(15)**

Welding:
   a. Study of arc welding, gas welding tools and equipments
   b. Arc welding- Butt joints, Lap joints and Tee joints
   c. Practicing gas welding

Basic Machining:
   a. Study of lathe and drilling machine
   b. Facing and turning
   c. Drilling and Tapping

Sheet Metal Work:
a. Study of tools and operations
b. Rectangular tray
c. Cone

GROUP - B (ELECTRICAL AND ELECTRONICS)	
I - ELECTRICAL ENGINEERING PRACTICE	**(15)**
a. Residential house wiring using Switches, fuse, indicator, lamp b. Fluorescent lamp wiring c. Stair Case Wiring d. Measurement of electrical quantities –Voltage, current, power in R Circuit e. Study of Electrical Apparatus-Iron box & water heater f. Study of Electrical Measuring instruments- Megger	
II - ELECTRONICS ENGINEERING PRACTICE	**(15)**
a. Study of Electronic components and various use of multi meter. b. Measurement of AC signal parameter (peak-peak, RMS period, frequency) using CRO. c. Study of logic gates AND, OR, XOR and NOT. d. Study of Clock Signal. e. Soldering practice -Components Devices and Circuits - Using general purpose PCB. f. Study of Half Wave Rectifier (HWR) and Full Wave Rectifier (FWR). g. Study of Telephone, FM Radio and Cell Phone.	
	TOTAL (P: 60) = 60 PERIODS

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	2	2	-	-	-	-	1	-	3	2	3	1
2	3	3	2	2	-	-	-	-	1	-	3	2	3	1
3	3	2	-	2	-	-	-	-	1	-	3	2	3	1
4	3	2	-	2	-	-	-	-	1	-	3	2	3	1
5	3	2	-	2	-	-	-	-	1	-	3	2	3	1
CO (W.A)	3	2.4	2	2	-	-	-	-	1	-	3	2	3	1

		L	T	P	C
22MAN01 INDUCTION PROGRAMME *(For Common To All Branches)*					
		-	-	-	-

PRE REQUISITE : NIL

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:
"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"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 dont's, 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

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:
1.Guide to Induction program from AICTE

22MAN02 - SOFT/ANALYTICAL SKILLS – I				
(Common to All Branches)				
	L	**T**	**P**	**C**
	1	0	2	0

PREREQUISITE: NIL

Course Objectives		Course Outcomes: The students will be able to	
1.0	To understand the basic concepts of grammar and apply them in a structured manner.	**1.1**	Intensify their awareness on correct usage of grammar in writing and speaking
2.0	To evaluate various real-life situations by resorting to an analysis of key issues and factors.	**2.1**	Solve the real-time problems for performing job functions easily.
3.0	To solve mathematical problems and thereby reducing the time taken for performing job functions.	**3.1**	Enhance their aptitude round clearing ability in interview process.

UNIT I – VERBAL ABILITY	(5+10)
Tenses - One word substitution- Articles – Preposition - Conjunction	
UNIT II – BASIC APTITUDE	**(5+10)**
Percentage – Ratio and Proportion – Blood Relations – Analogy	
UNIT III – LOGICAL REASONING	**(5+10)**
Probability – Profit and Loss - Syllogism - Statement Assumptions.	
TOTAL (L:15, P: 30) :45 PERIODS	

REFERENCES:
1. Aggarwal, R. S., "A Modern Approach to Verbal & Non-Verbal Reasoning", S. Chand and Company Limited, New Delhi, 2014.
2. Ashish Aggarwal, "Quick Arithmetic", S. Chand and Company Limited, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", 4th Edition, Cambridge University, 2012.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	-	-	-	3	3	-	2	1	-
2	-	3	2	2	-	-	-	-	2	-	-	3	1	-
3	-	3	2	2	-	-	-	-	2	-	-	3	1	-
CO (W.A)	-	3	2	2	-	-	-	-	2.3	3	-	2.7	1	-

Approved by Tenth Academic Council

<table>
<tr><td colspan="5">22MAN03 YOGA - I
(For Common To All Branches)</td></tr>
<tr><td></td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td></td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
</table>

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes Student will be able to
1.0	To make students in understanding the importance of yoga in shaping mental and physical wellness.	**1.1**	understand the importance of yoga for physical and mental goodness.
2.0	To provide awareness about the significance of leading a peaceful life by following yoga exercises and principles.	**2.1**	perform the yoga exercises for hand, leg, eye and sun salutation etc.
3.0	To develop mental wellbeing through meditation and breathing exercises.	**3.1**	learn and practice meditation techniques for keeping good mental health
4.0	To strengthen the body through physical exercises.	**4.1**	develop their body by performing yoga exercises.
5.0	To inculcate the knowledge about different types of Asanas and their benefits	**5.1**	demonstrate different types of yoga Asanas for improving their personal fitness.

UNIT I – INTRODUCTION TO YOGA	**(3)**

Meaning and Importance of Yoga - Elements of Yoga - Introduction - Asanas, Pranayama, Meditation and Yogic Kriyas - Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana and Shashankasana) - Relaxation Techniques for improving concentration - Yog-nidra.

UNIT II - YOGA AND LIFE STYLE	**(3)**

Asanas as Preventive measures – Hypertension:Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana – Obesity: Procedure, Beneits and contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana – Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana - Diabetes: Procedure, Benefits and contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana – Asthema: Procedure, Benfits and contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

UNIT III – MIND EXERCISES	**(3)**

Naadi sudhi – Thanduvada sudhi – Breathing meditation – Silent meditation – Relax meditation.

UNIT IV – PHYSICAL EXERCISES (PART– I)	**(3)**

Hand Exercises – Leg Exercises – Eye Exercises – Sun Salutation.

UNIT V – ASANAS (PART-I)	(3)

Asanas –Tadasana – Yegapadhasana – Chakrasana – Udkaddasana – Thirikosana – Thandasana – Paschimottanasana.

<div align="right">

TOTAL (P:15) : 15 PERIODS

</div>

TEXT BOOK/REFERENCE:

  1. Iyengar, B. K. S., "Light On Yoga".

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	2	2	3	2	2	-	3	-	-
2	-	-	-	-	-	2	2	3	2	2	-	3	-	-
3	-	-	-	-	-	2	2	3	2	2	-	3	-	-
4	-	-	-	-	-	2	2	3	2	2	-	3	-	-
5	-	-	-	-	-	2	2	3	2	2	-	3	-	-
CO (W.A)	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**3**	**2**	**2**	**-**	**3**	**-**	**-**

*Ratified by Eleventh Academic Council

		L	T	P	C
22EYA02 - PROFESSIONAL COMMUNICATION - II (*Common to All Branches*)		2	0	2	3

PREREQUISITE : 22EYA01

	Course Objectives		Course Outcomes : Student will be able to
1.0	To familiarize the students with the basic structures of English and to train them to use these elements correctly in speaking and writing	**1.1**	Frame sentences both in written and spoken forms with accuracy and fluency.
2.0	To acquire proficiency in LSRW skills on par with the expectations of the industry.	**2.1**	attain and enhance competence in the four modes of literacy: Listening, Speaking, Reading and Writing.
3.0	To enable students to adopt strategies for enhancing vocabulary, language and fluency and to deliver professional presentations.	**3.1**	gain essential competency to express one's thoughts orally and in writing in a meaningful way.
4.0	To communicate effectively in an academic setting using the language skills as tools.	**4.1**	use linguistic structures to read and understand well-structured texts encountered in academic or social contexts.
5.0	To acquire necessary language skills to follow and comprehend discourse such as lectures, conversations, interviews, and discussions.	**5.1**	perform various tasks, such as role plays, debates, group discussions apart from the use of correct spelling and punctuation

UNIT I – LANGUAGE RUDIMENTS	**(6+6)**
Grammar – Active and Passive Voice – Impersonal Passive Voice – Numerical Expressions - **Listening** – Listening for Specific Information and Match / Choose / Fill in the texts - **Speaking** – Describing a Person - Making Plans -**Reading** – Intensive Reading -**Writing** – Job Application with Resume	
UNIT II - RHETORIC ENHANCERS	**(6+6)**
Grammar – Reported Speech – Infinitive and Gerund - **Listening** – Listening to Iconic Speeches and making notes - Listening news / documentaries - **Speaking** –Talking over Phone – Narrating Incidents - **Reading** – Extensive Reading (Motivational Books) - **Writing** – Recommendation	
UNIT III – TECHNICAL CORRESPONDENCE	**(6+6)**
Grammar – If Conditionals – Blended Words - **Listening** – Listening to business conversation on audio and video of Short Films, News, Biographies - **Speaking** – Synchronous communication and Asynchronous communication - Opportunities and threats in using digital platform- **Reading** - Finding key information in a given text - **Writing** –Netiquettes- Inviting Dignitaries - Accepting & Declining Invitation	
UNIT IV - CORPORATE COMMUNICATION	**(6+6)**
Grammar – Concord – Compound Words - **Listening** – Listening to Roles and Responsibilities in Corporate - Listening to technical videos - **Speaking** – Introduction to Technical Presentation - Story Telling - **Reading** – Reading and Understanding Technical Articles - **Writing** – Report Writing (Accident, Survey and feasibility)	

UNIT V - LANGUAGE BOOSTERS	(6+6)

Grammar - Idiomatic Expressions – Relative Clauses – Confusable words - **Listening** – Listening to different kinds of Interviews - Listening to Group Discussion - **Speaking** – Group Discussion - **Reading** – Reading and Interpreting Visual Materials - **Writing** – Analytical Paragraph Writing

LIST OF SKILLS ASSESSED IN THE LABORATORY

1. Grammar.
2. Listening Skills.
3. Speaking Skills.
4. Reading Skills
5. Writing Skills

TOTAL (L:30 , P:30) = 60 PERIODS

TEXT BOOK:

1. Sudharshana, N. P. and Saveetha, C., "English for Technical Communication", Cambridge University Press, New Delhi, 2016 (Reprint 2017).

REFERENCES:

1. Rizvi, M. Ashraf, "Effective Technical Communication", McGraw Hill Education India Pvt. Ltd., Second Edition, 2017.
2. Rodney Huddleston, Geoffrey K. Pullum and Brett Reynolds, "A Student's Introduction to English Grammar", Cambridge University Press, Second Edition, New Delhi, 2022.

WEB REFERENCE:

1. http://youtu.be/URtdGiutVew

\	Mapping of COs with POs / PSOs													
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	-	-	-	3	3	-	2	-	1
2	-	-	-	-	-	-	-	-	3	3	-	2	-	1
3	-	-	-	-	-	-	-	-	3	3	-	2	-	1
4	-	-	-	-	-	-	-	-	3	3	-	2	-	1
5	-	-	-	-	-	-	-	-	3	3	-	2	-	1
CO (W.A)	-	-	-	-	-	-	-	-	**3**	**3**	-	**2**	-	**1**

22MYB02 –PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORM TECHNIQUES
(Common to AGRI,CIVIL.CHEM, MECH Branches)

		L	T	P	C
		3	I	0	4

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes The students will be able to
1.0	To understand the concept of Fourier series and enhance the problem solving skills.	1.1	Analysis the Fourier series problem
2.0	To acquire knowledge of Partial Differential Equations.	2.1	Know the formation of partial differential equations and types of solutions.
3.0	To solve different forms of wave and heat equations	3.1	Apply the partial differential equations to solve boundary value problems.
4.0	To gain the concepts of Fourier transform techniques used in wide variety of situations.	4.1	Solve the problems using Fourier transforms and convolution theorem technique.
5.0	To apply the concepts of Laplace transforms & its applications to various problems related to Engineering	5.1	Simplify calculations in system modeling

UNIT I – FOURIER SERIES	**(9+3)**
Dirichlet's condition – Fourier series: Half range sine series – Half range cosine series – Parseval's identity for half range series – Root mean square value of a function – Harmonic analysis.	

UNIT II –PARTIAL DIFFERENTIAL EQUATIONS	**(9+3)**
Formulation of partial differential equations by eliminating arbitrary constants and functions – Solution of standard types first order partial differential equations of the type f(p,q)=0,Clairaut's form – Lagrange's linear equations –Linear partial differential equation of second and higher order with constant coefficient of homogeneous types.	

UNIT III –APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	**(9+3)**
Classification of second order quasi linear partial differential equations – Solution of one dimensional wave equation (Zero and non-zero velocity) – One dimensional heat equation (Temperature reduced to zero and non zero boundary conditions) – Steady state solution of two dimensional heat equation(Finite and infinite plate).	

UNIT IV –FOURIER TRANSFORM	**(9+3)**
Fourier integral theorem(Statement only) – Fourier transform pair - Sine and Cosine transforms – Properties -Transforms of simple functions – Convolution theorem – Parseval's identity(Excluding proof).	

UNIT V –LAPLACE TRANSFORM	**(9+3)**
Condition for existence - Transforms of Elementary functions –Basic Properties- First & Second Shifting Theorems(Statement only) - Initial and Final value Theorems. Inverse Laplace transforms -Convolution theorem (Excluding proof)- Solution of linear second order ordinary differential equations with constant coefficients using Laplace transform.	

TOTAL (L:45+T:15) :60 PERIODS

TEXT BOOKS:

1. Veerajan, T. "Engineering Mathematics (for semester III), Tata Mc Graw Hill, 3rd ed., New Delhi.

2. Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Engineering Mathematics; Volume III",

   S. Chand& Co Ltd., 2008.

3. Grewal B. S., "Higher Engineering Mathematics", Khanna publishers, 42nd ed., New Delhi, 2012.

REFERENCES:

1. Goyal Manish and Bali. N. P., "A Text book of Engineering mathematics", Laxmi Publication (P) Ltd., 6th ed., New Delhi, 2012.

2. Kreyszig, Erwin, "Advanced Engineering Mathematics", Wiley Publications, 9th ed., New Delhi, 2006.

3. Singaravelu, A., "Transforms and Partial Differential Equations", Meenakshi Publications, Reprint Edition, Tamilnadu, 2013.

WEB REFERENCES:

1. https://youtu.be/HCHnXuQ2oME
2. https://www.youtube.com/watch?v=LYslBqjQTdI&list=PLF6061160B55B0203&index=1
3. https://www.youtube.com/watch?v=9DgiyiRNw1g
4. https://youtu.be/lkAvgVUvYvY
5. https://www.youtube.com/watch?v=8oE1shAX96U&list=PLnVYEpTNGNtVH5YLVJsA2WxWXk6 bAps-D&index=1

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	1	-	-	-	-	1	-	-	2	-	-
2	3	2	1	1	-	-	-	-	1	-	-	2	-	-
3	3	2	1	1	-	-	-	-	1	-	-	2	-	-
4	3	2	1	1	-	-	-	-	1	-	-	2	-	-
5	3	2	1	1	-	-	-	-	1	-	-	2	-	-
CO (W.A)	3	2	1	1	-	-	-	-	1	-	-	2	-	-

Mapping of COs with POs / PSOs

*Ratified by Eleventh Academic Council

22CYB05   CHEMISTRY FOR AGRICULTURAL ENGINEERS
(For AGRI Branch Only)

		L	T	P	C
		3	0	0	3

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes: The students will be able to
1.0	To make the students conversant with water treatment, boiler feed water techniques	1.1	Identify the various water treatment techniques for domestic and industrial purpose.
2.0	To endow with the nature of bonding and Engineering materials.	2.1	Pertain the basic principles of chemistry at the atomic and molecular level.
3.0	To elucidate the mechanism of corrosion and their control measures.	3.1	Explore the type of corrosion and depict the methods of corrosion control.
4.0	To impart knowledge to the students on the fundamentals of soil science and impart skills in weathering.	4.1	Adopt basic concepts of soil and weathering.
5.0	To impart knowledge on the basic principles and preparatory methods of naonmaterials.	5.1	Identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.

UNIT I – WATER TECHNOLOGY	(9)

Hardness – types – estimation by EDTA method. Water quality parameter – BOD and COD - Domestic water treatment – disinfection methods (chlorination, ozonation and UV treatment) – Boiler troubles (scale, sludge, priming, foaming and caustic embrittlement) – Internal conditioning (carbonate, phosphate and calgon) – External conditioning – demineralization process – desalination – reverse osmosis method.

UNIT II – CHEMICAL BONDING AND ENGINEERING MATERIALS	(9)

Chemical bond – Types of bonds - Covalent bond – Hydrogen fluoride, Methane (overview only) - Ionic bond – Sodium Chloride, Magnesium Oxide (overview only) - Coordinate bond – Hydrogen Peroxide, Ozone (overview only) - Hydrogen Bond – Types of hydrogen bond (overview only).
Engineering Materials : Synthesis of Abrasives – Properties of Refractories - Lubricants

UNIT III – SCIENCE OF CORRISION	(9)

Corrosion – types - chemical corrosion - pilling bedworth rule - electrochemical corrosion – mechanism - galvanic corrosion - differential aeration corrosion - factors influencing corrosion - corrosion control - sacrificial anode and impressed cathodic current methods - corrosion inhibitors.

UNIT IV – BASICS OF SOIL	(9)

Soil – Pedological and edaphological concepts – Eartth – Interior and Exterior of earth -Composition of earth's crust – Rocks and minerals – types – Weathering of rocks and minerals – physical weathering - chemical weathering – biological weathering -- Fundamental soil forming process – Humification – Eluviation – Illuviation – Horizonation and specific soil forming process – Calcification – Decalcification – Fertilizers and pesticides – Effects of using fertilizers and pesticides in modern agriculture.

UNIT – V – NANOCHEMISTRY	(9)
Introduction - Types of nanomaterials - Properties and uses of – nanoparticle - nanocluster- nanorod, nanowire and nanotube. - Synthesis of nanomaterials - sol-gel – solvothermal - laser ablation - chemical vapour deposition - electrochemical deposition and electro spinning - Applications of nanomaterials.	

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Ravikrishnan, A., "Engineering Chemistry I & Engineering Chemistry II , Sri Krishna Hitech Publishing chem., Co. Pvt. Ltd., 13th ed., Chennai , 2020.
2. Dilip kumar Das, "Introductory soil science", Kalyani publishers, 2018.

REFERENCES:

1. Jain, P.C. and Monica Jain, "Engineering Chemistry", Vol I &II, Dhanpat Rai Pub, Co., New Delhi 15th ed., 2018.
2. "Fundamentals of Soil Science", ISSS Publication, New Delhi, 2019.

WEB LINKS:

1. https://www.sciencedirect.com/book/9781856177054/water-technology
2. https://chem.libretexts.org/Bookshelves/Inorganic_Chemistry/Supplemental_Modules_and_Websites_(Inorganic_Chemistry)/Chemical_Compounds/Introduction_to_Chemical_Bonding
3. https://www.sciencedirect.com/topics/materials-science/corrosion
4. https://www.soils.org/about-soils/basics/
5. https://www.sciencedirect.com/topics/chemistry/nanochemistry

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	-	-
1	3	1	1	-	-	2	1	-	1	-	-	2	-	-
2	3	1	1	-	-	2	2	-		-	-	2	-	-
3	3	2	1	-	-	2	2	-	1	-	-	2	-	-
4	3	-	1	-	-	2	-	-	-	-	-	2	-	-
5	3	2	1	-	-	-	1	-	2	-	-	2	-	-
CO (W. A)	**3**	**2**	**1**	**-**	**-**	**2**	**2**	**-**	**1**	**-**	**-**	**2**	**-**	**-**

22CSC01 - PROBLEM SOLVING AND C PROGRAMMING
(Common to All Branches)

	L	T	P	C
	3	0	0	3

PREREQUISITE : NIL

	Course Objectives		Course Outcomes: The students will be able to
1.0	To understand problem solving, problem solving aspects, programming and to know about various program design tools.	1.1	Identify the appropriate problem solving techniques to drive the solution for the given problem.
2.0	To learn basic structure and Control Statements in C programming.	2.1	Implement the appropriate looping and control statements in C for developing applications.
3.0	To learn the manipulation of arrays and strings	3.1	Develop programs on arrays of different dimensions of arrays and strings concepts.
4.0	To understand the concept of modular programming using user defined functions.	4.1	Implement programs using user defined functions.
5.0	To acquaint with the use and benefits of Memory Allocation and file handling.	5.1	Use dynamic memory allocation functions for assigning memory space during execution.

UNIT I -PROBLEM SOLVING AND C PROGRAMMING BASICS	(9)

General Problem Solving: Algorithms, Flowcharts and Pseudo-codes, implementation of algorithms
Basics of C Programming : Introduction to C - Structure of C program - Programming Rules –Compilation – Errors - C Declarations: Tokens - keywords - identifiers - constants - data types - variable declaration and initialization - type conversion - constant and volatile variables - operators and expressions.

UNIT II - DECISION CONTROL STATEMENTS	(9)

Managing Input and Output operations, Decision Control Statements: Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops break and continue statements.

UNIT III - ARRAYS AND STRINGS	(9)

Introduction to Array - Definition - Array initialization - Characteristics - One Dimensional Array - Array operations -Two dimensional arrays -Strings and String handling functions.

UNIT IV - FUNCTIONS	(9)

Functions: Basics - definition - Elements of User defined Functions - return statement, Function types, Parameter Passing Techniques, Function returning more values - Passing Array to Functions - Recursion - Storage classes.

UNIT V - POINTERS AND FILE MANAGEMENT	(9)

Pointer concepts - Pointers & Arrays, Structure concepts - Defining, Declaring, Accessing Member Variables, Structure within Structure - Union - File Management in C- Dynamic Memory Allocation

	TOTAL (L:45) :45 PERIODS

TEXT BOOKS:

1. Ashok N. Kamthane, "Programming in C", Pearson Education, 2nd Edition, 2013.
2. Sumitabha Das, "Computer Fundamentals and C Programming", McGraw Hill, 1st Edition, 2018.

REFERENCES:

1. Dromey, R. G., "How to Solve it by Computer", Pearson Education India; 1ˢᵗ Edition, ISBN10: 8131705625, ISBN-13: 978-8131705629
2. Maureen Spankle, "Problem Solving and Programming Concepts", Pearson, 9ᵗʰ Edition, India, ISBN-10: 9780132492645, ISBN-13: 978- 0132492645
3. Yashavant Kanetkar, "Let us C", BPB Publications, 16ᵗʰ Edition, 2018.
4. Reema Thareja, "Programming in C ", 2nd Edition, Oxford University Press, New Delhi, 2018.
5. Balagurusamy, E., "Programming in ANSI C", Mc Graw Hill Education, 7ᵗʰ Edition, 2017.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	-	-	-	-	-	-	-	-	3	3	3
2	3	2	3	-	-	-	-	-	-	-	-	3	3	3
3	3	2	3	-	-	-	-	-	-	-	3	3	3	3
4	3	2	3	-	-	-	-	-	3	-	3	3	3	3
5	3	2	3	-	-	-	-	-	-	-	3	3	3	3
CO (W.A)	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**	**3**	**3**	**3**

22AGC02 - PRINCIPLES AND PRACTICES OF CROP PRODUCTION

		L	T	P	C
		3	0	0	3

PREREQUISITE: NIL

	Course Objectives		Course Outcomes : The students will be able to
1.0	To introduce agriculture and agronomy	1.1	Illustrate ancient Agriculture and acquire basic skills on agronomy.
2.0	To acquire knowledge on crop selection and establishment	2.1	select suitable crops and decide upon its establishment procedures
3.0	To acquire knowledge on various crop management practices	3.1	Suggest management practices on weeds, Pest & Disease, nutrients crop.
4.0	To understand various concepts of cropping systems	4.1	Identify the various cropping and farming systems.
5.0	Acquire knowledge on production practices for agricultural and horticultural crops	5.1	Implement effective production practices for agricultural and horticultural crops.

UNIT I – HISTORY OF AGRICUTLURE AND AGRONOMY	(9)

Agriculture – Definition – Importance and scope – Branches of agriculture – Evolution of man and agriculture – History of agricultural development in the world and India – ITK – National and International Agricultural Research Institutes in India and Tamil Nadu.
Agronomy – Definition – Importance, meaning and scope – Agro–climatic zones of India and Tamil Nādu – crops and classification – season – Units and measurements.

UNIT II – FIELD PREPARATION AND CROP ESTABLISHMENT	(9)

Tillage – Definition – Types – Objectives – Modern concepts of tillage - Main field preparation – seeds – seed rate – sowing methods – crop establishment methods – plating geometry and factors affecting crop production – climatic – edaphic – biotic – physiographic and socio-economic factors – after cultivation – Thinning – Gap filing – Earthing up – detrashing – nipping – Pruning and Mulching.

UNIT III – CROP MANAGEMENT TECHNIQUES	(9)

Weeds – Definition – types – weed control methods – physical cultural – mechanical – chemical – biological controls. Irrigation – methods. Pest and disease and their management. Manures and fertilizers- organic – inorganic – Time and methods of application – Integrated management practices- (IWM, INM, IPM)

UNIT IV – CROPPING SYSTEMS	(9)

Cropping systems – Definition – Principles – Concepts – classification cropping systems of India and Tamil Nadu – cropping patterns – suitable Agriculture – integrated farming systems – organic agriculture – Dry farming.

UNIT V – PACKAGE OF PRACTICES FOR AGRI. AND HORTI. CROPS	(9)
Cultivation practices for cereals (Rice, maize) – millets (Cumbu, Ragi, sorghum) – minor millets, pulses (Black gram, green gram, Red gram) – Oil seeds (Groundnut and sesame) – Fiber (Cotton) – Sugar crop (sugarcane). Cultivation practices for Horticulture crops – Vegetables. Fruits and flowers.	

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:
1. Yellamanda Reddy, T., Sankara Reddy, G. H., "Principles of Agronomy", Kalyani Publishers, New Delhi, 2016.
2. Chidda SIngh, Prem Singh and Rajtir Sing, "Modern techniques of raising field crops". Oxford & AMP; IBH Publishing Co. Pvt. Ltd., 2nd Edition, New Delhi, 2018.

REFERENCES:
1. Hand book of Agriculture, ICAR publications, New Delhi, 2016.
2. Rajendra Prasad, "Text book of field crop production", Directorate of Information and Publication, Krishi Anusandhan bavan, Pusa, New Delhi. 2015.
3. "Crop production guide", Directorate of Agriculture and Tamil Nadu Agricultural University, Coimbatore, 2020.
4. Palaniyappan, S. P. and Sivaraman, K. "Cropping systems in the tropics principles and management", New Age International Publishers, Revised 2nd Edition, New Delhi, 2006.
5. Kumar. N., "Introduction to Horticulture", Rajalakshmi publications, 7th Edition, Nagercoil, 2015.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	-	-	-	3	3	2	-	-	-	1	1	2
2	3	3	3	3	2	-	1	-	-	-	-	1	2	3
3	3	3	3	2	2	-	1	-	2	-	-	1	3	2
4	2	-	2	-	-	3	2	1	-	-	2	2	2	-
5	3	-	-	-	3	2	2	-	3	-	-	3	3	1
CO (W.A)	2.8	2.7	2.7	2.5	2.3	2.7	1.8	1.5	2.5	-	2	1.6	2.2	2

22EEC04- ELECTRICAL ENGINEERING
(For AGRI Branch only)

		L	T	P	C
		3	0	0	3

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes : The students will be able to
1.0	To impart knowledge on the concepts of measuring instruments	1.1	Explain the measurement of electrical parameters and various meters used.
2.0	To analyze the layout of wiring.	2.1	Develop the wiring layout for electric fence
3.0	To evaluate different Protection schemes.	3.1	Analyze the need of various protection schemes
4.0	To understand the concept of characteristics of induction motor	4.1	Analyze the characteristics of induction motor in machineries
5.0	To understand principles of sensors.	5.1	Exemplify the construction and operating characteristics of sensors used in agriculture applications

UNIT I - MEASURING INSTRUMENTS	(9)

Instruments: Introduction, Classification – Indicating Instruments: Operating Principles, Moving Iron, Moving Coil – Induction type Energy meter - Measurement of Earth resistance: Fall of potential method and Earth tester.

UNIT II - ELECTRICAL WIRING AND FENCING	(9)

Electric Wiring: Types of wires, Wiring materials, Casing and Capping wiring, Cleat wiring, Batten Wiring and Conduit Wiring - Electric Fencing: working principle, Earth Return System, Fence Return System, Bi-Polar Fencing System, Energisers.

UNIT III – PROTECTION	

Introduction to Fuses - Circuit Breaker: Operation - Types: MCB, MCCB, ELCB - Earthing: Types – Pipe and Plate Earthing, System and Equipments Earthing.	(9)

UNIT IV - ELECTRICAL MACHINES AND DRIVES	

Single Phase Induction Motor: Constructional details, Starting methods - Applications - Electric drives: Introduction, Classifications, General electric drive system (Block diagram Approach only)	(9)

UNIT V SENSORS AND TRANSDUCERS	

Sensors: Introduction, Position sensor, Velocity sensor, Proximity sensor, Hall effect sensor Thermistor and Thermocouple - Transducer: Principle of operation, Resistive potentiometer, LVDT, Piezo electric, capacitive.	(9)

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Kothari, D. P. and Nagarath, I. J., "Basic Electrical Engineering", McGraw Hill Education(India) Private Limited, 4th Edition, Third Reprint, 2019.
2. Muthusubramaian, R., Salivahanan, S. and Muraleedharan, K.A., "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill publishers, 2nd ed., New Delhi, 2012.

REFERENCES:

1. Bhattacharya, S. K., "Basic Electrical and Electronics Engineering", Pearson India, Second Edition, New Delhi, 2017.
2. Sawhney, A. K., "A Course in Electrical and Electronic Measurement and Instrumentation", Dhanpat Rai & Sons, 29th Edition, New Delhi, 2021.

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	1	1	1	-	-	1	-	-	-	-	1	1	1
2	3	1	1	1	-	-	1	-	-	-	-	1	1	1
3	3	1	1	1	-	-	1	-	-	-	-	1	1	1
4	3	1	1	1	-	-	1	-	-	-	-	1	1	1
5	3	1	1	1	-	-	1	-	-	-	-	1	1	1
CO (W.A)	3	1	1	1	-	-	1	-	-	-	-	1	1	2

Mapping of COs with POs / PSOs

*Ratified by Eleventh Academic Council

22CSP01 - PROBLEM SOLVING AND C PROGRAMMING LABORATORY
(Common to All Branches)

	L	T	P	C
	0	0	4	2

PREREQUISITE : NIL

	Course Objectives		Course Outcomes : The students will be able to
1.0	To study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language.	1.1	Identify the appropriate programming construct to develop programs for all types of problems.
2.0	To study, analyze and implement the concepts of arrays and strings in C programming.	2.1	Implement programs on arrays of different dimensions and string concepts.
3.0	To learn the importance user defined functions and pointers.	3.1	Develop programs using user defined functions and pointers.
4.0	To gain knowledge in user defined data types and file handling functions in C programming	4.1	Design programs using user defined data types and various file handling functions.
5.0	To acquire skill in dynamic memory allocation	5.1	Use dynamic memory allocation functions for assigning memory space during execution.

C-Programming:

1. Draw the flowchart for the following using Raptor tool.
   a) Simple interest calculation
   b) Greatest among three numbers
   c) Find the sum of digits of a number
2. Programs for demonstrating the use of different types of operators like arithmetic, logical, relational and ternary operators (Sequential and Selection structures)
3. Programs for demonstrating repetitive control statements like 'for', 'while' and 'do-while' (Iterative structures)
4. Programs for demonstrating one-dimensional and two-dimensional numeric array
5. Programs to demonstrate modular programming concepts using functions
6. Programs to implement various character and string operations with and without built-in library functions.
7. Programs to demonstrate the use of pointers
8. Programs to illustrate the use of user-defined data types
9. Programs to implement various file management.
10. Program Using Dynamic memory allocation functions

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:
- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software:
- RAPTOR Tool
- Compiler – C

TOTAL (P:60) : 60 PERIODS

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	-	-	-	-	-	-	-	-	3	3	3
2	3	2	2	-	-	-	-	-	-	-	-	3	3	3
3	3	2	2	-	-	-	-	-	-	-	3	3	3	3
4	3	2	2	-	-	-	-	-	3	-	3	3	3	3
5	3	2	3	-	-	-	-	-	-	-	3	3	3	3
CO (W.A)	3	2	2.2	-	-	-	-	-	3	-	3	3	3	3

22AGP01 - CROP PRODUCTION AND HUSBANDRY LABORATORY

		L	T	P	C
		0	0	4	2

PREREQUISITE: NIL

	Course Objectives		Course Outcomes: The students will be able to
1.0	To identify various inputs and tools	**1.1**	Identify various inputs and tools for crop production.
2.0	To acquire knowledge on field preparation, seed selection and seed treatment.	**2.1**	Effectively prepare fields, select suitable seeds, and implement appropriate seed treatment practices.
3.0	To analyze input requirements	**3.1**	Evaluate appropriate input requirements and inter cultural operations in crop production
4.0	To learn various crop management practices	**4.1**	Identify various crop management strategies.
5.0	To understand the various climatic parameters and instruments	**5.1**	Identify the various meteorological instruments and harvest techniques.

LIST OF EXPERIMENTS

1. Identification of seeds, seed rates, manures, fertilizers, green and green leaf manures.
2. Identification of tools and implements.
3. Acquiring skill in handling primary and secondary tillage implements.
4. Practicing different methods of lad configuration.
5. Practicing different methods of seed treatments and sowing methods.
6. Practicing various inter-cultural operations.
7. Working out manures and fertilizers requirements of crop and practicing methods of application.
8. Identification of Weeds, weeding practices and handling of weeding tools and implements.
9. Practicing various Harvest – Post harvest techniques in field crop.
10. Study on Meteorological Instruments and visit to AWS.

TOTAL(P:60) = 60 PERIODS

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	3	-	-	-	2	-	-	-	2	1
2	-	-	-	-	3	-	2	-	2	-	-	2	2	-
3	-	2	-	-	-	-	-	1	3	-	-	2	3	-
4	-	2	3	-	2	-	2	-	-	-	-	3	2	2
5	3	1	-	-	3	-	1	-	-	-	-	-	3	2
CO (W.A)	3	1.7	3	-	2.8	-	1.7	1	2.3	-	-	2.3	2.4	1.7

			22CYP01 CHEMISTRY LABORATORY				

22CYP01 CHEMISTRY LABORATORY
(Common to AGRI, BME, CHEM, CIVIL, ECE, EEE and MECH Branches)

					L	T	P	C
					0	0	2	1

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes : The students will be able to
1.0	To explain the origin of hardness, alkalinity, and chloride and dissolved oxygen in water.	1.1	acquire practical skills in the determination of water quality parameters through volumetric analysis
2.0	To determine the copper in brass in the given solution.	2.1	The students will be able to evaluate the amount of copper in the given analyze by titration method.
3.0	Enable the students to acquire knowledge of conductometric titrations and their calculations.	3.1	Gain the knowledge about conductance of ions.
4.0	To perform a potentiometric titration and pH of an acidic solution of known Normality.	4.1	Analyze and gain experimental skill about activity of hydrogen ions and measures the voltage.
5.0	To know about pH of the solution and how to measure pH using pH meter.	5.1	Utilize the fundamental laboratory techniques for analyses such as pH of acidic, basic and neutral solution.

LIST OF EXPERIMENTS
1. Determination of total, temporary and permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of chloride content of water sample by Argentometric method.
4. Determination of DO content of water sample by Winkler's method.
5. Estimation of copper in brass by EDTA.
6. Conductometric titration of strong acid vs strong base.
7. Estimation of iron content of the given solution using potentiometer.
8. Determination of strength of given hydrochloric acid using pH meter.

Total (30 P) = 30 periods

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	-	-
1	2	1	-	1	1	1	-	-	-	-	1	1	-	-
2	2	1	-	1	-	1	2	-	-	-	1	1	-	-
3	2	-	-	1	-	1	2	-	-	-	1	1	-	-
4	2	-	-	1	2	1	2	-	-	-	1	1	-	-
5	2	2	-	1	-	1	2	-	-	-	-	1	-	-
CO (W.A)	2	1	-	1	2	1	2	-	-	-	1	1	-	-

*Ratified by Eleventh Academic Council

Approved by Tenth Academic Council

22MAN04- SOFT / ANALYTICAL SKILLS - II				

		L	T	P	C
Prerequisite : *NIL*		1	0	2	0

	Course Objectives		Course Outcomes: The students will be able to
1.0	To acquire satisfactory competency in use of Verbal Reasoning	1.1	Enhance their vocabulary which in turn will be helpful in developing their speaking skills.
2.0	To develop skill to meet the competitive examinations for better job opportunity.	2.1	Solve the problems easily by using Short-cut method with time management.
3.0	To enrich their knowledge and to develop their logical reasoning thinking ability.	3.1	Analyze the problems logically and approach the problems in a different manner.

UNIT I – VERBAL COMPETENCY	(5+10)
Voice - Modal Verbs – Synonyms & Antonyms - Confusable Words	
UNIT II – NUMERICAL REPRESENTATION	**(5+10)**
Average – Data Interpretation – Simple Interest and Compound Interest – Venn Diagram.	
UNIT III - RESOLUTION TENDENCY	**(5+10)**
Time and Work – Pipes and Cistern – Number Series and Odd man Out – Cube Problems.	
TOTAL(L :15,P:30) : 45 PERIODS	

REFERENCES:

1. Ashish Aggarwal, "Quick Arithmetic", S. Chand and Company Limited, New Delhi, 2014.
2. Aggarwal, R. S., "A Modern Approach to Verbal & Non-Verbal Reasoning", S. Chand and Company Limited, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", Fourth Edition, Cambridge University, 2012.

Mapping of COs with POs / PSOs														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	-	-	-	3	3	-	2	-	1
2	-	3	2	2	-	-	1	-	2	-	-	3	2	-
3	-	3	2	2	-	-	1	-	2	-	-	3	2	
CO (W. A)	-	3	2	2	-	-	1	-	2.3	3	-	2.7	2	1

				L	T	P	C
	22MAN05 YOGA – II *(For Common To All Branches)*						
				0	0	1	0

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes : Students will be able to
1.0	To strengthen the body through physical exercises.	**1.1**	Perform physical exercises like spine exercises, massage and acupressure.
2.0	To understand the importance of value system and ethics.	**2.1**	Learn the human values, ethics, time management and the importance of introspection.
3.0	To know the life philosophy of yogis and maharishis.	**3.1**	Analyze various life philosophies of yogi's and rishi's.
4.0	To understand the nature laws, cause and effect theory.	**4.1**	Understand life lessons and nature laws.
5.0	To inculcate knowledge about different types of Asanas and their benefits.	**5.1**	Demonstrate different types of yoga Asanas and improve their personal fitness.

UNIT I – PHYSICAL EXCERCISES (PART-II)	**(3)**
Breathing Exercises – Kapalapathi – Maharasanam (Spine Exerices) – Massage and Acupressure.	

UNIT II – HUMAN VALUE	**(3)**
Divine power – Life force (Bio magnetism) – Importance of Introspection – Time management – Punctuality – self confidence – mind control.	

UNIT III – PHILOSOPHY OF LIFE	**(3)**
Basic needs for life – Hunger and thirst – climatic/weather changes – Body wastes – pressure of excretory organs – safety measures – protection from natural disaster – protection from enmity – protection from accidents – ethics – morality – duty – charity – Wisdom of perfection stages – faith – understanding – realization.	

UNIT IV – NATURE'S LAW OF CAUSE AND EFFECT	**(3)**
Food transformation into seven minerals – Natural actions – pattern – precision – regularity – Required skills – planned work – awareness – introspection.	

UNIT V – ASANAS (PART-II)	**(3)**
Ustrasana – Vakrasana –Komugasana – Padmasana – Vajrasana – Sukhasana – Yogamudra – mahamudra.	

TOTAL (P:15) : 15 PERIODS

TEXT BOOK/REFERENCE:

1. Iyengar, B. K. S., "Light On Yoga".

Mapping of COs with POs / PSOs														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	1	2	3	3	2	1	3	-	-
2	-	-	-	-	-	1	2	3	3	2	1	3	-	-
3	-	-	-	-	-	1	2	3	3	2	1	3	-	-
4	-	-	-	-	-	1	2	3	3	2	1	3	-	-
5	-	-	-	-	-	1	2	3	3	2	1	3	-	-
CO (W. A)	-	-	-	-	-	1	2	3	3	2	1	3	-	-

*Ratified by Eleventh Academic Council

22MAN06 ENVIRONMENTAL SCIENCE
(Common to AGRI^{2nd}and MECH^{4th} Branches)

	L	T	P	C
	2	0	0	0

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes: Students will be able to
1.0	To recognize the basic concepts of environment, ecosystems and biodiversity.	1.1	Infer the importance of environment and functions ecosystems and biodiversity
2.0	To impart knowledge on the causes, effects and control measures of environmental pollution.	2.1	Identify the causes, effects of environmental pollution and contribute the preventive measures to the society.
3.0	To make the students conversant with the global and Indian scenario of renewable resources, causes of their degradation and measures to preserve them.	3.1	Identify and understand the renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
4.0	To familiarize the concept of sustainable development goals, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.	4.1	Recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
5.0	To impart knowledge on the e-waste and its recycling methods of cell phone, battery, laptop and PCB.	5.1	Reframe the recycling of battery, cell phone, laptop and PCB

UNIT I - ENVIRONMENT AND BIODIVERSITY	(6)

Environment - scope and importance - Eco-system: Structure and function of an ecosystem- types of biodiversity - genetic - species and ecosystem diversity – values of biodiversity - hot-spots of biodiversity — conservation of biodiversity: In-situ and ex-situ.

UNIT II - ENVIRONMENTAL POLLUTION	(6)

Pollution – Causes - Effects and Preventive measures of Water, Air and noise pollution - Solid waste management: methods of disposal of solid waste - Environmental protection act: Air act – Water act.

UNIT III - RENEWABLE SOURCES OF ENERGY	(6)

Energy management and conservation - New Energy Sources: Different types of new energy sources – Solar energy – wind energy - Applications of Hydrogen energy, Ocean energy resources, Tidal energy conversion.

UNIT IV – SUSTAINABILITY AND MANAGEMENT	(6)

Development – Factors affecting development – advantages – disadvantages – GDP - Sustainability- needs – concept - concept of carbon credit – carbon footprint – Environmental management.

UNIT V – BATTERIES AND RECYCLING OF E-WASTE	(6)

Battery lifecycle - Mobile battery life cycle – Laptop battery life cycle – battery maintenance – benefits of recycling battery – E-waste – sources of e-waste - recycling of computing devices - mobile phones - PCB .

TOTAL (L:30) : 30 PERIODS

TEXT BOOKS:

1. Ravikrishan, A., "Envrionmental Science and Engineering", Sri Krishna Hitech Publishing Co. Pvt. Ltd., 15thEdition, Chennai, 2023.
2. Anubha Kaushik and Kaushik's, C. P., "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.

REFERENCES:

1. Rajagopalan, R., "Environmental Studies-From Crisis to Cure", Oxford University Press, Third Edition, 2015.
2. Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", Orient Blackswan Pvt. Ltd. 2013.

WEB LINKS:

1. http://www.jnkvv.org/PDF/08042020215128Amit1.pdf
2. https://www.conserve-energy-future.com/types-of-renewable-sources-of-energy.php
3. https://ugreen.io/sustainability-engineering-addressing-environmental-social-and-economic-issues/
4. https://www.researchgate.net/publication/326090368_E-_Waste_and_Its_Management
5. https://www.ewaste1.com/how-to-reduce-e-waste/

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	2	-	-	3	3	2	1	-	-	2	-	-
2	2	2	2	-	-	3	3	2	1	-	-	2	-	-
3	2	2	2	-	-	3	3	2	1	-	-	2	-	-
4	2	2	2	-	-	3	3	2	1	-	-	2	-	-
5	2	2	2	-	-	3	3	2	1	-	-	2	-	-
CO (W.A)	**2**	**2**	**2**	**-**	**-**	**3**	**3**	**2**	**1**	**-**	**-**	**2**	**-**	**-**

22MYB03 – STATISTICS AND NUMERICAL METHODS
(Common to Mech,Civil,Agri,Chemical Branches)

		L	T	P	C
		3	1	0	4

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes : Students will be able to
1.0	To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.	1.1	Select a hypothesis testing method for the given numerical set of data to analyze the significance.
2.0	To understand the knowledge of design of experiments	2.1	Apply analysis of Variance for the data set of selected number factors for analyzing the significance.
3.0	To introduce the basic concepts of solving algebraic and transcendental equations.	3.1	Solve an algebraic or transcendental equation using an appropriate numerical method.
4.0	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.	4.1	Relate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for Engineering problems.
5.0	To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.	5.1	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with Engineering applications.

UNIT I - TESTING OF HYPOTHESIS	(9+3)

Sampling Distributions-Tests for single mean, difference of means (Large and Small samples)
Using z, t -distribution, F – distribution- Chi-square - Test for independence of attributes and Goodness of fit.

UNIT II - DESIGN OF EXPERIMENTS	(9+3)

Analysis of variance- Completely randomized design - Randomized block design - Latin square design.

UNIT III - SOLUTION OF EQUATIONS AND EIGEN VALUE 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 – Iterative methods of Gauss Jacobi and Gauss Seidel Methods- Eigen values of a matrix by Power method.

UNIT IV - INTERPOLATION AND APPROXIMATION	(9+3)

Lagrange's and Newton's divided difference interpolations - Newton's forward and backward difference interpolation - Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules - Romberg's Methods.

UNIT V - NUMERICAL DIFFERENTIATION AND INTEGRATION	(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 (L:45+T:15) : 60 PERIODS

TEXT BOOKS:

1. Grewal, B. S. and Grewal, J. S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R. A., Miller, I. and Freund J., "Miller and Freund's Probability and Statistics for
3. Engineers", Pearson Education, 8th Edition, Asia, 2015.
4. Gupta, S. C. and Kapoor, V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, 12th Edition, New Delhi, 2020.

REFERENCES:

1. Burden, R. L. and Faires, J. D., "Numerical Analysis", Cengage Learning, 9th Edition, 2016.
2. Devore, J. L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, 8th Edition, New Delhi, 2014.
3. Gerald, C. F. and Wheatley, P. O. "Applied Numerical Analysis" Pearson Education, 7th Edition, Asia, New Delhi, 2007.

WEB REFERENCES:

1. https://youtu.be/zmyh7nCjmsg
2. https://youtu.be/NmgbFJ4UwPs
3. https://youtu.be/RgKy7URFx1c
4. https://archive.nptel.ac.in/courses/111/107/111107105/

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	1	1	1	-	-	-	1	1	-	2	-	-
2	3	3	1	1	1	-	-	-	1	1	-	2	-	-
3	3	2	1	1	1	-	-	-	1	1	-	2	-	-
4	3	3	1	1	1	-	-	-	1	1	-	2	-	-
5	3	2	1	1	1	-	-	-	1	1	-	2	-	-
CO (W. A)	**3**	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**1**	**1**	**-**	**2**	**-**	**-**

	L	T	P	C
22AGC03 - FUNDAMENTALS OF SOIL SCIENCE	2	0	2	3

PREREQUISITE: NIL

Course Objectives		Course Outcomes : Students will be able to	
1.0	To know about mechanics of different soils.	1.1	suggest manures and fertilizers for crop Production
2.0	To gain knowledge on colloidal properties of soils.	2.1	suggest suitable crops for different soil
3.0	Acquire knowledge on soil metabolism.	3.1	Analyse soil health.
4.0	To know about the nutrient content, deficiency of soil.	4.1	suggest nutrients, fertilizers for effective production
5.0	To know about various composting process & its composition.	5.1	Apply different composts for crop production.

UNIT I – PHYSICAL PROPERTIES	**(8)**

Soil physical properties and their significance – Soil texture and textural classes – soil structure and classification – soil consistence. Bulk density, particle density and porosity – soil color- significance – causes and measurement. Soil temperature – Soil air – soil water – Measurements – Soil water potentials – Soil moisture constants – Movements of soil water – saturated and unsaturated flow – infiltration, hydraulic conductivity, percolation, permeability and drainage.

UNIT II –CHEMICAL PROPERTIES	**(7)**

Soil colloids – properties, types and significance – layer silicate clays – their genesis and sources of charges – Ion exchange – CEC, AEC and Base saturation – Factors influencing Ion exchange – significance. Soil reaction, Buffering capacity and EC

UNIT III – ORGANIC MATTER AND HUMUS	**(5)**

Soil organic matter – Composition – decomposition and mineralization, C: N ratio, carbon cycle – Fractions of Soil organic matter – Humus formation. Soil organisms – Beneficial and Harmful effects – Soil enzymes.

UNIT IV – CLASSIFICATION OF FERTILIZERS AND ITS REQUIREMENT	**(5)**

Fertilizers – Definition and classification – Primary, Secondary and micronutrients. Calculating fertilizer requirements – simple fertilizer – Complex fertilizers – mixed fertilizers – water soluble fertilizers, liquid fertilizers.

UNIT V – COMPOSTING TECHNOLOGY	**(5)**

Composting techniques – Aerobic and anaerobic – Enriched FYM and Vermi-compost. Composting of organic waste – Sugarcane trash and coir waste

TOTAL (L: 30, P: 30) = 60 PERIODS

TEXT BOOKS:
1. Brady, N. C. and Raymond, C. Weil, "The Nature and properties of Soils", Pearson Education, Inc. publishing as prentice Hall, 14th Edition, 2013.
2. Dilip Kumar Das, "Introductory Soil Science", Kalyani Publishers, New Delhi, 2004.
3. Schgal, J., "Pedology concepts and application", Kalyani Publishers, New Delhi, 2005.
4. "Fundamentals of Soil Science", ISS Publication, New Delhi, 2009.

REFERENCES:
1. Fanning, D. S. and Fanning, C. B., "Soil: Morphology, Genesis and classification", John Wiley and sons, Newyork, 1989.
2. Garrison Sposito, "The Chemistry of soils", Amazon Publishers, India, 2008.
3. Ghildyal, B. P. and Tripathi, R. P., "Soil physics", New Age International Publications, 2001.

LIST OF EXPERIMENTS

1. Soil sample collection
2. Visit to soils of different terrains and study of Soil profiles.
3. Determination of bulk density, particle density and porosity – cylinder, wax coating and core methods.
4. Soil textural analysis – feel method, International pipette method.
5. Determination of soil color and temperature.
6. Determination of soil moisture
7. Determination of Infiltration rate
8. Determination of Hydraulic conductivity.
9. Determination of soil pH and EC
10. Estimation of Soil organic carbon.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	1	1	-	1	1	-	-	-	2	2	-
2	-	-	-	1	1	-	1	1	-	-	-	1	1	-
3	-	-	-	1	1	-	1	1	-	-	-	1	1	-
4	-	3	3	3	1	-	1	1	-	-	-	3	3	-
5	-	3	3	3	1	-	1	1	-	-	-	3	3	-
CO (W.A)	-	3	3	1.8	1	-	1	1	-	-	-	2	2	-

22AGC04 - STRENGTH OF MATERIALS FOR AGRICULTURAL ENGINEERS

	L	T	P	C
	2	1	0	3

PRE-REQUISITE: NIL

	Course Objectives		Course Outcomes : Students will be able to
1.0	To provide knowledge about stress distribution and strains in regular and composite structures subjected to axial loads	**1.1**	Find stress distribution and strains in regular and composite structures subjected to axial loads
2.0	To understand the importance of centroid and centre of gravity	**2.1**	Apply the concepts of centroid and center of gravity to solve practical problems in different disciplines, using appropriate mathematical and analytical techniques.
3.0	To gain knowledge to analyze framed structures	**3.1**	evaluate the structural behavior, stability, and integrity of framed structures, ensuring their safety and optimizing their design for various engineering and farm structure applications.
4.0	To gain knowledge on cantilever beams and simply supported beams	**4.1**	Apply the knowledge on finding slope and deflection of beams
5.0	To know about the column, shells and shafts and the laws governing	**5.1**	Apply optimization techniques to enhance the design and performance of columns, shells, and shafts, considering factors such as material efficiency, cost-effectiveness, and safety

UNIT I – BASICS OF STRESSES AND STRAINS	**(6+3)**

Simple Stresses and Strains Hookes Law Modulus of Elasticity Principle of Superposition bars of varying sections thermal stresses and strains Elastic Constants – Poisson's Ratio - Bulk Modulus - Shear Modulus -interrelationships - Strain Energy and Impact Loading - Proof Resilience - Modulus of Resilience

UNIT II – CENTRE OF GRAVITY AND MOMENT OF INERTIA	**(6+3)**

Centroid and Centre of Gravity -geometrical considerations - method of moments - Plane (laminae) sections - symmetrical sections - unsymmetrical sections -Moment of Inertia - Routh rule - method of integration - Theorem of Parallel axes - Theorem of Perpendicular axes - geometric sections - solid and hollow sections

UNIT III – ANALYSIS OF FRAMED STRUCTURES (TRUSSES)	**(6+3)**

Structures built of Frames - Types of Frames - Perfect and imperfect frames - deficient and redundant frames - Loads and stresses - Method of Joints - Method of sections - Graphical method – Bow notations - - cantilever trusses - freely supported trusses - King Post and Queen Post Trusses

UNIT IV – SHEAR FORCE, BENDING MOMENT AND DEFLECTION (BEAMS)	**(6+3)**

Beams – Types - Uniformly distributed load and gradually varying load -Shear Force and Bending Moment distributions - Theory of Simple Bending - Bending stress - modulus of section - deflection in beams and cantilevers - Double integration method

UNIT V – COLUMNS, SHELLS AND SHAFTS	(6+3)

Columns and struts - Slenderness ratio - Buckling and crushing - Euler Column theory - applications - Rankine formula-Johnson formula - Indian Standards - Shells -Cylindrical and spherical shells- thin and thick shells - Shafts - torsion in circular shafts - Polar Moment of Inertia - strain energy due to torsion.

TOTAL (L:30 +T:15): 45 PERIODS

TEXT BOOKS:

1. Bhavikatti, S. S., 2008, "Engineering Mechanics", 3rd edition, New Age International.
2. Punmia, B. C., Jain, A. K. and Jain, A. K., 2002, "Strength of Materials", Firewall Media.
3. Ramamrutham, S., 2008, "Strength of Materials", Dhanpat Rai Publishing Co., 16th edition, India

REFERENCES:

1. Rajput, R. K. "Strength of Materials" (Mechanics of Solids), S. Chand & Company Ltd., 4th edition India, 2010.
2. Khurmi, R. S. Strength of Materials (Mechanics of Solids), S. Chand & Company Ltd., 24th Edition, India, 2013.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	-	1	-	1	-	-	-	-	-		1	3	
2	2	2	3	-	1	-	1	-	-	-	1	1	3	
3	3	2	3	-	2	1	-	-	-	-		1	3	
4	3	3	3	2	2	2	-	-	-	-			3	
5	3	-	2	2	3	2	2	1	-	-	2	2	2	
CO (W.A)	**2.8**	**2.7**	**2.4**	**2.0**	**1.8**	**1.7**	**2.0**	**1.0**	**-**	**-**	**2.0**	**1.3**	**2.8**	

22AGC05 - BASIC WORKSHOP TECHNOLOGY

			L	T	P	C
			3	0	0	3

PRE-REQUISITE: NIL

	Course Objectives		Course Outcomes : Students will be able to
1.0	To introduce various methods of welding processes	1.1	Select a metal joining process for various materials
2.0	To understand the working of machine tools namely lathe, drilling machines & allied machines	2.1	Identify the components of lathe, drilling machine and explain their functioning
3.0	To acquire knowledge on basic concepts of foundry and casting processes and to understand the working of grinding	3.1	Describe the principles of foundry and casting, to choose the process parameters in grinding operations, finishing operations
4.0	To gain knowledge related to metal forming and their types	4.1	Demonstrate the concept of metal forming processes for various applications
5.0	To understand the basic concepts of Non Traditional Machining Processes	5.1	Choose the appropriate process parameters of various Non-Traditional Machining processes

UNIT I – WELDING	(9)

Introduction to welding, types of welding, Oxyacetylene gas welding, types of flames, welding techniques and equipment. Principle of arc welding, equipment and tools.

UNIT II – LATHE AND DRILLING	(9)

Constructional details of center lathe, Main accessories and attachments. Main operations and tools used on center lathes. Types of shapers, Constructional details of standard shaper. Work holding devices, shaper tools and main operations. Types of drilling machines. Constructional details of pillar types and radial drilling machines. Work holding and tool holding devices. Main operations. Twist drills, drill angles and sizes.

UNIT III – CASTING AND GRINDING	(9)

Patterns - mould making - core - moulding sand - melting equipment - melting and pouring - gating system - cooling and solidification - casting - preparation, design - sand, shell mould, ceramic, vacuum, investment, die, centrifugal, continuous casting processes - casting defects, inspection and testing - Grinding - types of grinding -grinding wheel designation and selection - honing, lapping, super finishing, polishing, burnishing and buffing

UNIT IV – METAL FORMING PROCESSES	(9)

Cold and hot working - rolling - forging - extrusion - drawing - metal stamping and forming - bending, deep drawing, stretch forming, metal spinning, shear and flow forming, blanking, piercing, embossing and coining, roll forming - forming defects - shot peening - types of dies, presses - comparison of forming processes

UNIT V – NON - TRADITIONAL MACHINING	(9)

Classification of Non-traditional Machining processes - Principle of operations - Process characteristics - applications - Abrasive jet machining, Ultrasonic machining, Electric discharge machining, Chemical machining, Electro chemical machining, Electro chemical grinding, Laser beam machining, Electron beam machining

TEXT BOOKS:

1. Rajput, R. K., "A Textbook of Manufacturing Technology", Laxmi Publications (P) Ltd., 2nd ed., 2016.
2. Richard R. Kibbe, John E. Neely, Roland O. Meyer and Warren T. White, "Machine Tool Practices", Prentice Hall of India, 10th Revised edition, New Delhi, 2014.

REFERENCES:

1. Hajra Choudhury, S. K., Hajra Choundhury, A. K. and Nirjhar Roy, "Elements of Workshop Technology", Media Promoters & Publishers Pvt. Ltd., Vol. I, II, 2017.
2. Jain, R. K. and Gupta, S. C., "Production Technology", Khanna Publishers, New Delhi, 2014.
3. Sharma, P. C., "A Textbook of Production Technology", S. Chand Publications, 2014.
4. Serope Kalpakjian, Steven R. Schmid, "Manufacturing Engineering and Technology", Pearson Education, 4th ed., 2014.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	-	1	-	1	-	1	-	-	-	-	1	2	-
2	2	1	3	-	1	-	2	-	-	-	1	1	2	-
3	2	2	3	-	2	1	-	2	-	-	2	1	3	-
4	2	3	2	2	2	2	-	-	-	-	-	-	2	-
5	3	-	2	2	2	2	2	1	-	-	2	2	2	-
CO (W.A)	2.8	2.7	2.4	2.0	1.8	1.7	2.0	1.0	-	-	2.0	1.3	2.8	-

		L	T	P	C
22AGC06 - THERMODYNAMICS FOR AGRICULTURAL ENGINEERS					
		2	I	0	3

PREREQUISITE: NIL

Course Objectives		Course Outcomes : Students will be able to	
1.0	To study the fundamentals of thermodynamics and zeroth law, First law of thermodynamics	**1.1**	Exemplify the basic concepts and zeroth law, First law of thermodynamics
2.0	To impart the knowledge on second law of thermodynamics and entropy	**2.1**	Solve the problems related to cycles and cyclic devices using second law of thermodynamics
3.0	To study the thermodynamic properties of pure substances and its phase change processes	**3.1**	Determine the thermodynamic properties of pure substances and its phase change processes
4.0	To learn about gas power cycles and its performance	**4.1**	Analyze and compare the performance of Air Standard Cycles - Otto, Diesel, Dual and Rankine cycle .
5.0	To analyze different types of boilers and its performance	**5.1**	Analyze the working of different types of boilers and its mountings, accessories

UNIT I – BASIC CONCEPTS AND FIRST LAW OF THERMODYNAMICS	**(6+3)**

Thermodynamic, Thermodynamic Systems and Surroundings, Different Approaches in The Study of Thermodynamics-Property, Thermodynamic Equilibrium, State, Process, Cyclic Process, Quasi-Static Process and Non Quasi-Static Process-

Working Fluid, Gas, Vapour and Gas Laws-Temperature, Equality of Temperature, The Zeroth Law of Thermodynamics and Temperature Scale-Work & Heat - First law of thermodynamics - Applied to closed and open systems-isolated systems. Internal energy. Specific heat at constant volume (Cv) and Specific heat at constant pressure (Cp). Enthalpy-Limitations of Laws of thermodynamics.

UNIT II –SECOND LAW OF THERMODYNAMICS	**(6+3)**

Second law of thermodynamics - Kelvin Planck and Clausius statements. Reversibility and Irreversibility. Clausius inequality. Entropy concept-a point function or a property of a system efficiency, Principle of increase of entropy - Change of entropy during thermodynamic processes. Carnot theorem- absolute entropy- availability. CARNOT CYCLE Coefficient of Performance of heat pumps and refrigerator.

UNIT III - PROPERTIES OF PURE SUBSTANCES	**(6+3)**

Thermodynamic properties of pure substances in solid, liquid and vapour phases, Pressure-Volume (P-V), Pressure - Temperature (P-T), Temperature - Volume (T-V), Temperature - Entropy (T-S), Enthalpy - Entropy (H-S), Pressure-Volume-Temperature (P-V-T) diagrams, Triple Point And Critical Point. Thermodynamic properties of steam - Calculations of work done and heat transfer in non-flow and flow process

UNIT IV - AIR STANDARD CYCLES AND PSYCHROMETRY	(6+3)

Air standard cycles - Otto, Diesel and Dual, Calculation of mean effective pressure and Air standard efficiency. Rankine cycle concept of ideal- Psychrometric chart

UNIT V - STEAM BOILERS	(6+3)

Steam Boilers/Generators, Classification of Boilers - Lancashire Boiler - Cochran Boiler, Locomotive Boiler and Babcock-Wilcox Boiler - Boiler Mountings - Boiler Accessories

TOTAL (L:30 +T:15): 45 PERIODS

TEXT BOOKS:

1. Rajput, R. K., "A Text Book of Engineering Thermodynamics", Laxmi publication Pvt. Ltd., New Delhi, 2009.

2. Cengel Y. and Boles, "Thermodynamics - An Engineering Approach", Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi, 2003.

REFERENCES:

1. Ballaney, P. L., "Thermal Engineering (Engineering Thermodynamics & Energy Conversion Techniques)".
2. Arora, C. P., "Thermodynamics", Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi, 2003.
3. Rayner Joel, "Basic Engineering Thermodynamics", Pearson Publications, 2012.Vikas Publishing House Pvt. Ltd., New Delhi, 2005.
4. Khurmi, S., "Text book of thermodynamics and Heat transfer", S. Chand Publications, New Delhi, 2002.
5. Merle C. Potter, Craig W. Somerton, "Thermodynamics for Engineers", Schaum Outline Series, Tata McGraw Hill Publishing Company Private Limited, New Delhi, 2004.
6. Khurmi, R. S., "Steam table with Psychometric chart", S. Chand Publications, New Delhi, 2002.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	3	-	-	-	-	-	-	-	-	-	3	-	-
2	3	3	-	1	-	-	1	-	-	2	-	3	-	-
3	3	3	-	-	-	-	2	-	-	1	-	3	2	-
4	3	3	1	2	2	2	2	-	-	2	-	3	3	-
5	3	3	-	2	2	2	1	-	-	2	-	3	3	-
CO (W.A)	3	3	1	1.7	2	2	1.5	-	-	1.8	-	3	2.7	-

22AGC07 - FARM TRACTOR SYSTEMS

		L	T	P	C
		3	0	0	3

PRE-REQUISITE: NIL

	Course Objectives		Course Outcomes : Students will be able to
1.0	To gain knowledge on classification of tractors, tractor engines	**1.1**	Classify the different types of tractors based on their applications.
2.0	To impart the knowledge on working of engine system	**2.1**	Summarize engine system components
3.0	To know about the power transmission mechanism	**3.1**	Define transmission system, wheels and breaking systems
4.0	To develop skills on safe and efficient use of tractors	**4.1**	Describe tractor hydraulic system and tractor ergonomics
5.0	To work out the economics and testing procedure of tractors and power tillers	**5.1**	Recognize power tiller components, tractor testing codes and procedures

UNIT I – TRACTORS	**(9)**

Classification of tractors – Tractor engines – Principles of operation of IC 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 – inlet and outlet valves – valve timing diagram. Air cleaner – exhaust – silencer – Cooling systems – lubricating systems – fuel system – properties of fuels – governor – electrical system – engine trouble shooting

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 – wheel ballasting – 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 – tractor safety.

UNIT V – POWER TILLER AND TRACTOR TESTING	**(9)**

Power tiller – special features – clutch – gear box – steering and brake – Makes of tractors and power tillers – Need – Advancements from BS IV to VI - Types of tests – test procedure – need for testing & evaluation of farm tractor –Test code for performance testing of tractors and power tillers

TEXT BOOKS:

1. Jain, S. C. and Rai, C. R., "Farm tractor maintenance and repair" Standard publishers and distributors, 3rd Edition, New Delhi, 2016.
2. Jagdishwar Sahay, "Elements of Agricultural Engineering", Standard Publishers and Distributors Pvt Ltd, 2020

	REFERENCES:
1.	Barger, E. L., Liljedahl, J. B. and McKibben, E. C., "Tractors and their Power Units" Wiley Eastern Pvt. Ltd., New Delhi, 1997.
2.	Indian Standard Codes for Agril. Implements. Published by ISI, New Delhi.
3.	http://ecoursesonline.iasri.res.in/course/view.php?id=39

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	2	-	1	-	1	-	-	-	-	-	-	1	3	-
2	3	3	3	-	1	-	-	-	-	-	-	1	3	-
3	3	2	3	-	2	1	-	-	-	-	-	1	3	-
4	3	3	3	2	2	2	-	-	-	-	-	-	3	-
5	3	-	2	2	3	2	2	1	-	-	2	2	2	-
CO (W.A)	2.8	2.7	2.4	2	1.8	1.7	2	1	-	-	2	1.3	2.8	-

22AGP02 - WORKSHOP TECHNOLOGY LABORATORY

		L	T	P	C
		0	0	4	2

PRE-REQUISITE: NIL

	Course Objectives		Course Outcomes: Students will be able to
1.0	To provide hands on training in welding practices	**1.1**	Design and model various basic prototypes in the trade of Welding such as Lap joint, Lap Tee joint, Edge joint, Butt joint and Corner joint.
2.0	To carry out machining operations in lathe machines	**2.1**	Select a suitable machining process by considering the product requirements
3.0	To gain skills in performing grinding machine	**3.1**	Select a suitable type of grinding machining process by considering the product requirements.
4.0	To understand the types of sand moulding	**4.1**	Estimate the sand mould properties
5.0	To provide exposure to the students with hands on experience on various manufacturing processes	**5.1**	Create sheet metal models using metal forming methods

LIST OF EXPERIMENTS
1.   Fabrication of a structure using welded joints (based on AWS Standards)
2.   Preparation of metal joints using gas welding
3.   Experiment in facing, plain turning
4.   Experiment in Taper Turning, Thread Cutting, Knurling
5.   Experiment in Eccentric Turning and Groove cutting
6.   Experiment in Drilling, Reaming and Tapping
7.   Abrasive machining of cylindrical shaft using cylindrical Grinding machine
8.   Finishing of flat metal surface using Surface Grinding machine
9.   Preparation of sand Mould using solid and split pattern
10. Experiment in bending and forming of sheet metal
Total (P: 60) = 60 Periods

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	1	1	-	-	-	-	-	-	-	-	1	2	-
2	3	2	1	1	-	-	-	-	-	-	-	1	1	-
3	3	2	3	2	-	-	-	-	1	-	2	2	1	-
4	3	-	-	-	1	1	1	-	-	-	-	-	1	-
5	3	-	-	-	1	1	1	1	-	-	-	1	1	-
CO (W.A)	3	1.7	1.7	1.5	1	1	1	1	1	-	2	1.3	1.2	-

22AGP03 - DRAWING OF FARM STRUCTURES LABORATORY

		L	T	P	C
		0	0	4	2

PREREQUISITES: NIL

	Course Objectives		Course Outcomes: Students will be able to
1.0	To acquire know on farmstead, machine shed and workshop	**1.1**	Design farmstead, machine shed and workshop
2.0	To acquire knowledge on dairy and poultry house	**2.1**	Design dairy and poultry house
3.0	To understand the importance of ventilation system for dairy and poultry house	**3.1**	Design ventilation system for dairy and poultry house
4.0	To study the different silo and storage structures	**4.1**	Design different storage structure for foods and silage
5.0	To understand the importance of fencing and sanitary structure	**5.1**	Design fencing and sanitary structure

LIST OF EXPERIMENTS:

1. Planning and Layout of farmstead

2. Design of stall bam

3. Design of loose housing and milk parlors

4. Design of poultry house

5. Design of a sheep / goat house

6. Design of ventilation system for dairy and poultry house

7. Design of silos – over ground and underground and hay storages

8. Design of farm fencing system

9. Design of machinery and equipment shed and workshops

10. Design of septic tank and sanitary structures

TOTAL (P: 60) = 60 PERIODS

Mapping of COs with POs / PSOs														
CO	**PO**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	-	3	-	3	-	-	-		-	-	-	-	-
2	3	-	3	-	3	-	-	-	-	-	-	-	-	-
3	3	-	3	-	3	-	-	-	-	-	-	-	-	-
4	3	-	3	-	3	-	-	-	-	-	-	-	-	-
5	3	-	3	-	3	-	-	-	-	-	-	-	-	-
CO (W.A)	**3**	**-**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

22AGP04 - FARM TRACTOR AND ENGINES LABORATORY

		L	T	P	C
		0	0	4	2

PREREQUISITES: NIL

	Course Objectives		Course Outcomes : Students will be able to
1.0	To acquire know on farmstead, machine shed and workshop	1.1	Design farmstead, machine shed and workshop
2.0	To acquire knowledge on dairy and poultry house	2.1	Design dairy and poultry house
3.0	To understand the importance of ventilation system for dairy and poultry house	3.1	Design ventilation system for dairy and poultry house
4.0	To study the different silo and storage structures	4.1	Design different storage structure for foods and silage
5.0	To understand the importance of fencing and sanitary structure	5.1	Design fencing and sanitary structure

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List of Experiments

1. Identification and study of different components of Farm engine
2. Study of valve timing diagram and reconditioning the actuation of valve timing.
3. Identification and study of different components of tractor engine – Cooling system, lubrication and ai cleaner system.
4. Dismantling and assembly of diesel engine
5. Dismantling and assembly of petrol engine
6. Mantling and dismantling of tractor engine gear box.
7. Study of clutch system – methods and its working.
8. Study of differential and final drive– components and method of working.
9. Study of braking system and steering system – components and method of working.
10. Study of tyres, rims and ballasting methods of a tractor
11. Visit to department of Agricultural Engineering, Chennai

TOTAL (L:0, P:60) = 60 PERIODS

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	1	1	-	-	-	-	-	-	-	-	1	2	-
2	3	2	1	1	-	-	-	-	-	-	-	1	1	-
3	3	2	3	2	-	-	-	-	1	-	2	2	1	-
4	3	-	-	-	1	1	1	-	-	-	-	-	1	-
5	3	-	-	-	1	1	1	1	-	-	-	1	1	-
CO (W.A)	3	1.7	1.7	1.5	1	1	1	1	1	-	2	1.3	1.2	-

Mapping of COs with POs / PSOs

22MAN07 – SOFT / ANALYTICAL SKILLS - III				
(Common to ALL Branches)				
	L	**T**	**P**	**C**
	I	**0**	**2**	**0**

PRE REQUISITE : NIL

Course Objectives		Course Outcomes : Students will be able to	
1.0	Improving overall language proficiency for personal or professional reasons	**1.1**	Enhance their writing skills
2.0	To develop problem solving skills across all levels	**2.1**	Develop problem solving skills across all levels
3.0	To develop students to workout solutions for problems that involving general reasoning.	**3.1**	Solve reasoning problems with ease.

UNIT I – Verbal Competency	**(5+10)**
Sentence Selection-Paragraph Formation- Sentence Correction- Spellings.	
UNIT II - Aptitude	**(5+10)**
Clocks, Calendar, Age Problems-Problem on Trains- Problems on Numbers - Partnerships.	
UNIT III – Logical & Reasoning	**(5+10)**
Coding and Decoding - Logical Equivalent- Venn Diagram Problem.	
TOTAL (L:15, P:30) : 45 PERIODS	

REFERENCES:

1. Aggarwal, . R. S., "A Modern Approach to Verbal & Non-Verbal Reasoning", S Chand and Company Limited, New Delhi, 2014.
2. Ashish Aggarwal, "Quick Arithmetic", S Chand and Company Limited, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", Fourth Edition, Cambridge University, 2012.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	-	-	-	-	-	-	-	-	3	3	-	2	-	1
2	-	3	2	2	-	-	1	-	2	-	-	3	2	-
3	-	3	2	2	-	-	1	-	2	-	-	3	2	-
CO (W.A)	-	3	2	2	-	-	1	-	2.3	3	-	2.7	2	1

			L	T	P	C
22MAN09 - INDIAN CONSTITUTION **(Common to All Branches)**						
			I	0	0	0

PRE REQUISITE : NIL

	Course Objectives		**Course Outcomes :** Students will be able to
1.0	To educate students to learn about the Constitutional Law of India.	1.1	Gain Knowledge about the Constitutional Law of India.
2.0	To motivate students to Understand the role of Union Government.	2.1	Know the union government and role of president and prime minister.
3.0	To make students to understand about State Government.	3.1	Acquire knowledge about State Government and role of Governor, Chief Minister.
4.0	To understand about District Administration, Municipal Corporation and Zila Panchayat.	4.1	Understand the District Administration, Municipal Corporation and Zila Panchayat.
5.0	To encourage students to Understand about the election commission.	5.1	Understand the role and function of election commission.

MODULE I - THE CONSTITUTION - INTRODUCTION	**(9)**
• The History of the Making of the Indian Constitution • Preamble and the Basic Structure, and its interpretation • Fundamental Rights and Duties and their interpretation • State Policy Principles	
MODULE II – UNION GOVERNMENT	**(9)**
• Structure of the Indian Union • President – Role and Power • Prime Minister and Council of Ministers • Lok Sabha and Rajya Sabha	
MODULE III – STATE GOVERNMENT	**(9)**
• Governor – Role and Power • Chief Minister and Council of Ministers • State Secretariat	
MODULE IV – LOCAL ADMINISTRATION	**(9)**
• District Administration • Municipal Corporation • Zila Panchayat	
MODULE V – ELECTION COMMISSION	**(9)**
• Role and Functioning • Chief Election Commissioner • State Election Commission	
	TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:
1. Rajeev Bhargava, "Ethics and Politics of the Indian Constitution", Oxford University Press, New Delhi, 2008.
2. Fadia, B. L., "The Constitution of India", Sahitya Bhawan; New edition, 2017.
3. Basu, D. D., "Introduction to the Constitution of India", Lexis Nexis; Twenty-Third edition, 2018.

REFERENCES:

1. Steve Blank and Bob Dorf, The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company", K & S Ranch ISBN – 978-0984999392
2. Eric Ries, The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" , Penguin UK ISBN – 978-0670921607
3. Adrian J. Slywotzky with Karl Weber, Demand: Creating What People Love Before They Know They Want It, Headline Book Publishing ISBN – 978-0755388974
4. Clayton M. Christensen, The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business, Harvard business ISBN: 978-142219602.

WEB LINKS:

1. https://www.fundable.com/learn/resources/guides/startup
2. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate- structure/
3. https://www.finder.com/small-business-finance-tips
4. https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	3	-	3	-	2	-	3	-	-
2	-	-	-	-	-	3	-	3	-	2	-	3	-	-
3	-	-	-	-	-	3	-	3	-	2	-	3	-	-
4	-	-	-	-	-	3	-	3	-	2	-	3	-	-
5	-	-	-	-	-	3	-	3	-	2	-	3	-	-
CO (W.A)	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**	**-**	**2**	**-**	**3**	**-**	**-**

22AGC08 - FLUID MECHANICS AND HYDRAULICS				
	L	**T**	**P**	**C**
	2	**0**	**2**	**3**

PREREQUISITE: NIL

Course Objectives		Course Outcomes : The students will be able to	
1.0	To study the different properties of fluids	**1.1**	Demonstrate the properties of fluid and its behaviour in static conditions along with pressure measurements.
2.0	To gain basic knowledge on kinematics and dynamics flow	**2.1**	Analyze the various characteristics of fluid flow through fluid kinematics and dynamics.
3.0	To learn various flow measurement device and techniques.	**3.1**	Calculate the rate of flow of fluids using flow measuring devices and design channels construction
4.0	To impart knowledge on open channel flow	**4.1**	Explain the dimensional analysis methods in model studies
5.0	To understand the working of pumps	**5.1**	Classify the different types of pumps based on their application

UNIT I : BASIC CONCEPTS AND PROPERTIES	**(6)**

Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, surface tension and capillarity - Fluid statics: concept of fluid static pressure, absolute and gauge pressures -Pascal's law -hydrostatic law - pressure measurements using simple manometers and mechanical gauges

UNIT II - FLOW MEASUREMENTS	**(6)**

Euler's equation of motion - Bernoulli's equation - applications - Venturimeter - orifice meter, Pitot tube-Flow through pipes - laminar and turbulent flow in pipes - Major losses ,Darcy Weisbach equation for friction head loss -minor losses in pipes

UNIT III - OPEN CHANNEL FLOW	**(6)**

Types of flow in channel - Most economical section of channel - rectangular -trapezoidal. Flow measurement in channels – weirs and notches - rectangular, triangular

UNIT IV DIMENSIONAL AND MODEL ANALYSIS	**(6)**

Dimensions -derived quantities - dimensional homogeneity - methods of dimensional analyses - Rayleigh"s and Buckingham's method - similitude - dimensionless numbers.

UNIT V - PUMPS	**(6)**

Types of pumps - Centrifugal pumps - components- working - specific speed - characteristics curves. Submersible pumps - Jet pump- reciprocating pump

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1. Verification of Bernoulli's theorem
2. Determination of Co-efficient of discharge of Venturimeter/ orifice meter
3. Determination of co-efficient of velocity of given Flow through Pitot tube
4. Determination of Co-efficient of discharge of V-notch/ Rectangular Notch
5. To determine the major and minor head loss coefficient for different pipe fittings.
6. Conduct a test on Centrifugal pump/reciprocating pump
7. Conduct a test and on Submersible pump

	TOTAL (L:30 +P:30): 60 PERIODS

TEXT BOOKS:

1. Bansal, R. K., "A text book of Fluid Mechanics and Hydraulic Machinery", Laxmi publications (P) Ltd., New Delhi, 2002.

2. Yunus A. Cengel, John M. Cimbala, "Fluid Mechanics-Fundamentals and Applications", Tata McGraw Hill Publishing Co., New Delhi, 2006.

REFERENCES:

1. Subramanya, K., "Flow in Open Channels", Tata McGraw Hill Publishing Co., New Delhi, 2009.

2. Modi, P. N. and Seth, S. M., "Hydraulics and Fluid mechanics", Standard Publishers & Distributors, New Delhi.

3. Grade, R. J., "Fluid mechanics through problems", Wiley eastern Ltd., Chennai, 2002.

4. Jagadish Lal, "Hydraulic machines", Metropolitan book house, New Delhi, 2000.

Mapping of COs with POs / PSOs														
COs	**Pos**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	2	2	-	-	-	-	-	-	-	-	-	3	-
2	3	2	2	3	-	2	-	-	-	-	-	-	2	-
3	3	2	2	-	2	-	-	-	-	-	-	-	2	-
4	3	3	3	2	2	3	-	-	-	-	-	-	2	-
5	3	2	2	2	2	3	-	-	-	-	-	-	3	-
CO (W.A)	3	2.2	2.2	2.3	2	2.7	-	-	-	-	-	-	2.4	-

22AGC09 - HEAT AND MASS TRANSFER FOR AGRICULTURAL ENGINEERS

		L	T	P	C
		2	1	0	3

PREREQUISITE: NIL

Course Objectives			Course Outcomes : The students will be able to	
1.0	To impart the knowledge on heat transfer mechanisms in conduction	1.1	Calculate the different types of conduction in heat transfer mechanism	
2.0	To impart the knowledge on heat transfer mechanisms in Convection	2.1	Apply the concepts to solve convection problems in heat transfer mechanism.	
3.0	To impart the knowledge on heat transfer mechanisms in Radiation	3.1	Solve numerical problems in the radiation for various geometries	
4.0	To analyze heat exchangers and methods of evaluating the performance	4.1	Analyze the performance of heat exchangers and evaporators	
5.0	To introduce non-dimensional numbers and their effects in governing various modes of mass transfer	5.1	Analyze the various modes of mass transfer and apply them in engineering problems	

UNIT I CONDUCTION	(9)

Basic concepts - Mechanism of Heat transfer. Conduction - Fourier"s Law, General differential equation in Cartesian and cylindrical coordinates, one dimensional steady state heat conduction, conduction through plane wall, cylinders and spherical systems.

UNIT II – CONVECTION	(9)

Basic Concepts - Heat transfer coefficients, boundary layer concept. Types of convection – Natural and Forced convection, dimensional analysis, non-dimensional numbers, external flow, flow over plates, cylinders and spheres, internal flow, laminar and turbulent flow, combined laminar and turbulent.

UNIT III - RADIATION	(9)

Radiation heat transfer - concept of black and grey body-Laws of Radiation - Stefan-Boltzmann Law, Kirchhoff"s Law Black body radiation - Grey body radiation - Shape factor algebra - Radiation shields

UNIT IV HEAT EXCHANGERS	(9)

Heat exchangers - Types, heat exchanger analysis, fouling factor, LMTD (Logarithmic mean temperature difference) and Effectiveness-NTU (number of transfer units) Method - Overall Heat Transfer Coefficient.

UNIT V - MASS TRANSFER	(9)

Mass transfer- introduction - Fick law for molecular diffusion - molecular diffusion in gases - equimolar counters diffusion in gases- diffusion through a varying cross sectional area-diffusion coefficients for gases - molecular diffusion in liquids

TOTAL (L:30 + T: 15): 45 PERIODS

TEXT BOOKS:

1. Rajput, R. K., "Heat and Mass Tranfer", S Chand and company Ltd., New Delhi, 2002.
2. Sachdeva, R. C., "Fundamentals of Engineering Heat and Mass Transfer", New Age International private limited, New Delhi, 2010.

REFERENCES:

1. Yunus A. Cengel, "Heat and Mass Transfer: a Practical Approach", Tata McGraw Hill publishing Company private limited, New Delhi, 2007.
2. Kothandaraman, C. P. and Subramanyan, S., "Fundamentals of Heat and Mass Transfer", New Age International private limited, New Delhi, 2014.
3. Frank P. Incropera, "Fundamentals of Heat and Mass Transfer", John Wiley, New Delhi, 2007.
4. Holman, J. P., "Heat Transfer", Tata McGraw Hill publishing Company private limited, New Delhi, 2009.

COs	Mapping of COs with POs / PSOs													
	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	-	-	-	-	-	-	-	-	-	3	-
2	3	2	2	3	-	2	-	-	-	-	-	-	2	-
3	3	2	2	-	-	-	-	-	-	-	-	-	2	-
4	3	3	3	2	-	3	-	-	-	-	-	-	2	-
5	3	2	2	2	-	3	-	-	-	-	-	-	3	-
CO (W.A)	3	2.2	2.2	2.3	-	2.7	-	-	-	-	-	-	2.4	-

22AGC10 - CROP PROCESS ENGINEERING

		L	T	P	C
		3	0	0	3

PREREQUISITE : NIL

Course Objectives		Course Outcomes : The students will be able to	
1.0	To know the importance of moisture content during harvesting, threshing and storage of non-perishable crops	**1.1**	Interpret moisture content of crop to minimize post-harvest losses
2.0	To gain knowledge on psychrometry and its uses and drying methods.	**2.1**	Design dryers for different type of crops
3.0	To know the threshing and different types of cleaning, grading and material handling equipments	**3.1**	Design threshers and recommend cleaners, graders and conveying equipment to different types of crops.
4.0	To acquire knowledge on different storage structures	**4.1**	Design storage structure to minimize post-harvest losses
5.0	To gain knowledge on milling of cereals, pulses and oil seeds	**5.1**	suggest and differentiate between various types of milling equipment used for processing

UNIT I- INTRODUCTION	**(9)**

Post-harvest engineering – introduction – objectives – post harvest losses of cereals, pulses and oilseeds – importance – optimum stage of harvest. Engineering properties of agricultural materials- optimum stage of harvest and its importance – importance of loss reduction- post harvest handling operations- moisture content – measurement - direct and indirect methods- equilibrium moisture content- RH measurement, air-grain measurement.

UNIT II PSYCHROMETRY AND DRYING	**(9)**

Psychrometry – importance – Psychrometric charts and its uses – Drying – principles and theory of drying – thin layer and deep bed drying – Hot air drying – methods of producing hot air – Types of grain dryers – selection – construction, operation and maintenance of dryers – Design of dryers

UNIT III THRESHING, CLEANING, GRADING AND MATERIAL HANDLING	**(9)**

Threshing – traditional methods mechanical threshers – types – principles and operation - principles – air screen cleaners – types – adjustments – cylinder separator – spiral separator – magnetic separator –colour sorter – inclined belt separator – length separators – effectiveness of separation and performance index. Different types of graders. Materials handling – belt conveyor – screw conveyor – bucket elevators – pneumatic conveying.

UNIT IV- PRINCIPLES AND PRACTICES OF STORAGE	**(9)**

Importance of scientific storage systems, Post-harvest Physiology of semi-perishables and perishables- Damages direct damages-indirect damages- causes of spoilage in storage (moisture, temperature, humidity, respiration loss, heat of respiration, Sprouting)- destructive agents (rodents, birds, insects, etc.,)- sources of infestation and control. Storage structures- traditional storage structures- modern storage structures - conditions for storage - control of temperature and relative humidity inside storage.

UNIT V - CROP PROCESSING	**(9)**

Paddy processing – parboiling of paddy – methods – merits and demerits – dehusking of paddy – methods – merits and demerits – rice polishers – types – constructional details – polishing – layout of modern rice mill

– performance evaluation of modern mills. Wheat milling. Pulse milling methods – Wet, Dry, CFTRI, CIAE, Punjab. Oil seed processing. Principles and operation – maize sheller, husker sheller for maize – groundnut decorticator – castor sheller.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Chakraverty, A., "Post Harvest Technology of cereals, pulses and oilseeds", Oxford & IBH publishing & Co. Pvt. Ltd., Third Edition, New Delhi, 2017
2. Sahay, K. M. and Singh, K. K., "Unit operations in Agricultural Processing", Vikas Publishing House Pvt. Ltd., Second revised and enlarged edition, New Delhi, 2004.
3. Ojha, T. P. and Michael, A. M., "Principles of Agricultural Engineering". Jain Brothers, Tenth edition, Vol.- 1, New Delhi, 2018.

REFERENCES:

1. Henderson, S. M. and Perry, R. L., "Agricultural process engineering", John Willey and Sons, New York, 1995.
2. Pandey, P. H., 1994, "Principles of agricultural processing", Kalyani Publishers, Ludhiana.
3. Mohsenin, N. N., "Physical Properties of Plant and Animal Materials", Gordon and Breach publishers, New York, 1986.
4. McCabe, W. L. and Smith, J. C., "Unit Operations of Chemical Engineering", McGraw Hill Education (India) Pvt. Ltd, Seventh Edition, Tokyo, 2015.

COs	Mapping of COs with POs / PSOs													

| COs | POs | | | | | | | | | | | | PSOs | |
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	1	1	-	-	-	-	-	-	-	-	1	-	2
2	3	1	-	-	1	-	-	-	-	-	1	2	-	3
3	3	2	2	1	1	-	-	-	1	-	1	2	2	3
4	3	2	1	1	-	-	-	-	-	-	1	1	1	3
5	3	2	2	2	2	-	-	-	1	-	1	1	2	3
CO (W.A)	3	1.6	1.5	1.3	1.3	-	-	-	1	-	1	1.4	1.7	2.8

22AGC11 - IRRIGATION AND DRAINAGE ENGINEERING		L	T	P	C
		3	0	0	3

PREREQUISITE : NIL

	Course Objectives		Course Outcomes : The students will be able to
1.0	To acquire knowledge on water resources	**1.1**	Compare the development and utilization of water resources in India, as well as in Tamil Nadu, and estimate evapo-transpiration using direct and indirect methods
2.0	To understand the concept of soil water relationship	**2.1**	Analyse the relationship and measurement of soil water
3.0	To understand the concept of irrigation methods	**3.1**	Design different methods of surface irrigation and their adaptability to the specific characteristics of soil, topography and crops
4.0	To understand the concept and functioning of command area development programme	**4.1**	Execute the command area development works including on farm development works, maintenance and its economics and water distribution system like warabhandhi and rotational waters supply system
5.0	To understand different agricultural drainage systems	**5.1**	Design, monitor and maintain the surface and sub surface drainage systems for controlling the salinity and water logging in the agricultural area.

UNIT I – WATER SOURCES AND IRRIGATION REQUIREMENTS	(9)

Surface and ground water resources – River basins- Irrigation- development and Utilization in India and TamilNadu -Moisture use of crop- Evapotranspiration-methods. Crop water Requirement – duty and delta- Effective rainfall – crop water Requirement –measurement of irrigation water: weirs, notches and flume - Irrigation Scheduling - Irrigation Frequency, Irrigation Efficiencies.

UNIT II – SOIL WATER TENSION AND MEASUREMENT OF SOIL WATER	(9)

Rooting characteristics – soil water tension and soil water stress - crop adaptation to moisture stress. Soil water potential concept – soil-water-plant relationships – soil water retention – hydraulic conductivity – determination. Measurement of soil water-gravimetric, volumetric – tensiometric, electrical resistance, pressure plate and pressure membrane apparatus methods – neutron scattering, immersion, dielectric, thermal conductivity, penetrometric and air permeability methods.

UNIT III – METHODS AND QUALITY IRRIGATION	(9)

Soil, plant and meteorological factors determining water needs of crops, depth and Methods of Irrigation – Pressurized Irrigation, Hydraulics and design- alluvial channels Kennedy's and Lacey's theories, Materials for lining water courses and field channel, Water control and diversion structure - Underground pipeline irrigation system - Land grading - Land leveling methods. Quality of irrigation water and management of saline water for irrigation; water management in problem soils.

UNIT IV – COMMAND AREA DEVELOPMENT	(9)

Command area - Concept, Components of CADA - CADA programmes in Tamil Nadu - On Farm Development works, Execution - maintenance and economics of OFD works, Farmer's committee and its role for water distribution and system operation, Strategic outlet command – stream size for efficient warabandhi and rotational irrigation system

UNIT V - AGRICULTURAL DRAINAGE AND SYSTEM	(9)

Agricultural drainage - Drainage coefficient; principles of flow through soils, Darcy law -infiltration theory, Surface drainage systems - Subsurface drainage - Design of subsurface drainage- Pipe materials - mole drains, drainage wells, Leaching requirements -irrigation and drainage water quality - recycling of drainage water for irrigation.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:
1. Michael, A.M., "Irrigation – Theory and Practice", Vikas publishing house, Second edition, New Delhi, 2015.
2. Murthy, V. V. N., "Land and water management", Kalyani publishing, Sixth edition, New Delhi, 2016.
3. Suresh, R., "Land and water management principles", standard publishers, Second edition, New Delhi, 2017.

REFERENCES:
1. Dilip Kumar Majumdar, "Irrigation water Management – Principles and Practice", Prentice – Hall of India Pvt. Ltd., New Delhi, 2006.
2. Luthin, J. N., "Drainage Engineering", John Wiley and Sons, New York, 1966.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	3	2	3	-	-	2	-	-	1	-	2	-
2	3	2	3	2	3	-	-	2	-	-	1	2	3	1
3	3	2	-	1	3	-	-	2	-	-	2	2	2	2
4	3	1	-	1	1	3	-		-	-	3	-	2	2
5	3	1	3	2	3	-	-	2	-	-	2	2	3	2
CO (W.A)	3	1.6	3	1.6	2.6	3	-	2	-	-	1.8	2	2.4	1.8

22AGC12 - HYDROLOGY AND WATER RESOURCES ENGINEERING				
	L	T	P	C
	3	0	0	3

PRE-REQUISITE: NIL

Course Objectives		Course Outcomes : The students will be able to	
1.0	To acquire knowledge on hydrologic cycle and measurement of infiltration	**1.1**	Apply the basic concept of hydrologic cycle and measure the interception losses including evaporation, transpiration, infiltration and infiltration indices
2.0	To understand the importance and interpretation of runoff and hydrograph	**2.1**	Classify the methods of estimation of runoff and construct the hydrographs based on different methods
3.0	To know about the importance of drought prone program.	**3.1**	Analyze the frequency of disaster and provide solution to the area
4.0	To classify and estimate the reservoirs	**4.1**	Classify and estimate the sedimentation and storage of reservoirs
5.0	To gain knowledge on groundwater flow	**5.1**	Calculate the ground water flow and estimate the aquifer parameters by following various methods based on the groundwater movement and geological formation.

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 – GROUNDWATER AND MANAGEMENT	(9)

Origin - Classification and types - Properties of aquifers - Governing equations – Steady and unsteady flow - Artificial recharge - RWH in rural and urban areas – Government schemes for Groundwater management.

TEXT BOOKS:

1. Michael, A. M., "Irrigation: Theory and Practices", Vikas Publishing House Pvt., Limited, 2009.
2. Raghunath, H. M., "Groundwater", New Age International (p) Ltd., New Delhi, 2011.
3. Subramanya, K., "Engineering Hydrology", Tata McGraw Hill pub. Co., New Delhi, 2013.

REFERENCES:

1. Mutreja, K. N.,1990, "Applied Hydrology", Tata McGraw Hill pub. Co. New Delhi.
2. Ven te chow, David R. Maidment, Larry W. Mays, "Applied Hydrology", McGraw Hill pub. Co. New Delhi.
3. http://ecoursesonline.iasri.res.in/course/view.php?id=39

Mapping of COs with POs / PSOs														
COs	**Pos**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	1	-	-	2	2	-	-	-	-	-	1	-	-
2	3	1	-	-	3	-	2	-	-	-	-	2	-	-
3	1	-	1	-	-	2	2	3	3	3	1	-	-	-
4	3	2	2	-	-	1	1	-	-	-	1	-	-	-
5	-	-	1	-	2	2	3	-	-	-	-	1	-	-
CO (W.A)	2.5	1.3	1.3	-	2.3	1.8	2	3	3	3	1	1.3	-	

22AGC13 - SURVEYING AND LEVELLING FOR AGRICULTURAL ENGINEERS

		L	T	P	C
		2	0	2	3

PRE REQUISITE: NIL

Course Objectives		Course Outcomes : The students will be able to	
1.0	To understand the principle, concepts and methods of surveying	1.1	Identify the instruments required for conducting the survey in level and sloping ground
2.0	To understand area and volume computation	2.1	Compute the area and volume of earth work by simple and numerical methods
3.0	To practice compass traversing and plane table surveying	3.1	Identify the angle between the stations by prismatic compass and conduct the plane table surveying for locating the new station
4.0	To learn leveling and contouring	4.1	Find the Reduced level for all points by using level instruments, prepare the contour map and also identify the horizontal, vertical angle using Theodolite
5.0	To gain knowledge in total station survey	5.1	Demonstrate proficiency in planning and executing field surveys using a total station

UNIT I - PRINCIPLES OF SURVEYING	(6)

Introduction - Principles and basic concepts and uses of surveying - classification and basic methods of surveying- Types of chains, Ranging rod, Ranging - Direct and Indirect methods –Method of Chaining on level and sloping ground - Obstacles in chaining.

UNIT II - COMPUTATION OF AREA AND VOLUME	(6)

Introduction – Formulae for calculation of cross sectional area – calculation of volume - Area computation, Mid-Ordinate rule, Average ordinate rule, Trapezoidal rules, Simpson rule and Coordinate method of finding area-Computation of volume. Computation of Area from field notes and plot plan

UNIT III - COMPASS TRAVERSING	(6)

Basic terminologies of Compass traversing – Prismatic and Surveyors Compass - Checking the accuracy of traverse - Errors and mistakes in Compass survey - Plane tabling - instruments and accessories - Radiation, Traversing, Orientation - Intersection and Resection.

UNIT IV - LEVELLING AND CONTOURING	(6)

Levelling - definition - Benchmarks - different types of levels - Basic principles of leveling - Theory of simple, compound, cross sectional and reciprocal levelling -Contouring - definition - contour characteristics - direct and indirect methods -gradient contour - uses – Minor instruments, Hand level - Clinometer - Abney level– Theodolite types – adjustments – setting up – reading angles – measurements – Area and elevation determination.

UNIT V - TOTAL STATION	(6)

Introduction- Accuracy of a Total Station- Accessories for Total Station- Functions Performed by Total Stations- Applications of Total Station- Remote Elevation Measurement (REM)- Missing Line Measurement (MLM)- Area Calculation- Setting out

LIST OF EXPERIMENTS:

1. Open and closed compass traversing, Plotting and correction of closing error
2. Differential levelling problems - Cross-sectioning – plotting
3. Contouring – Grid method - Plotting of contour - preparation of map

4.	Theodolite surveying - elevation determination by measuring horizontal and vertical angles
5.	Remote elevation measurement Using Total Station
6.	Missing Line Measurement Using Total Station
7.	Area measurement using Total Station

TOTAL (L+P: 30+30) = 60 PERIODS

TEXT BOOKS:

1. Basak, V. N., "Surveying and Levelling", Tata McGraw hill publications, New Delhi. 1994.
2. Gopi, S., "Advanced surveying: total station, GIS and remote sensing", Pearson Education, Second Edition, India. 2018

REFERENCES:

1. Duggal, S. K., "Surveying", McGraw hill education (India) Pvt. Ltd., 4th edition, New Delhi, 2013.
2. Kanetkar, T. P., and Kulkarni, S. V., "Surveying and levelling Part II", Pune Vidyarthi Griha Prakashan.
3. Bharikatti, S. S., "Surveying Theory and Practice", I.K. International publishing house Pvt. Ltd., New Delhi, 2013.
4. Narinder Singh, "Surveying", Tata McGraw hill publishing company Ltd., New Delhi, 1992.
5. Michael, A. M. and Ojha, T. P., "Principles of Agricultural Engineering", Jain Brothers, Vol. II, New Delhi, 2009.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	3	2	2	-	-	-	-	3	-	-	-	-	1
2	3	3	3	3	-	-	-	-	3	-	-	3	-	3
3	3	3	-	3	2	-	-	-	3	-	-	3	-	1
4	3	3	3	3	3	-	-	-	3	-	-	2	-	2
5	3	3	3	3	3	3	-	-	3	-	-	2	-	3
CO (W.A)	3	3	2.8	2.8	2.7	3	-	-	3	-	-	2.5	-	2

		L	**T**	**P**	**C**
	22AGP05 - CROP PROCESS ENGINEERING LABORATORY				
		0	**0**	**4**	**2**

PREREQUISITE :

	Course Objectives		Course Outcomes : The students will be able to
1.0	To know the moisture content determination methods	**1.1**	Determine various engineering properties of grains
2.0	To gain knowledge to determine engineering properties of agricultural produces and products	**2.1**	Design cleaners and graders
3.0	To know the different types of cleaning, grading equipments	**3.1**	Test and evaluate different post-harvest equipment
4.0	To gain knowledge on different material conveying equipments	**4.1**	Design different conveying equipment
5.0	To know the drying methods of cereals	**5.1**	Design or alter the existing methods to minimize post-harvest loss

LIST OF EXPERIMENTS:

1. Determination of moisture content of grains by oven method and moisture meter.
2. Determination of porosity of grains.
3. Determination of coefficient of friction and angle of repose of grains.
4. Evaluation of efficiency of grain cleaning cum grading machine
5. Evaluation of cleaning efficiency of spiral separator and inclined belt separator
6. Evaluation of shelling efficiency of rubber roll sheller
7. Determining the efficiency of bucket elevator
8. Determining the efficiency of screw conveyor
9. Evaluation of thin layer drier
10. Visit to modern rice mill and pulse milling industry

TOTAL (P: 60) = 60 PERIODS

	Mapping of COs with POs / PSOs													
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	2	1	-	-	2	2	-	-	1	-	-	-	-	3
2	3	2	2	-	1	-	-	-	2	-	-	-	2	3
3	3	2	2	-	-	2	-	-	-	-	-	-	2	3
4	3	2	2	-	2	2	-	-	1	-	-	-	2	3
5	3	2	2	-	1	3	-	-	-	-	-	-	3	3
CO (W.A)	2.8	1.8	2	-	1.5	2.3	-	-	1.3	-	-	-	2.3	3

22AGP06 - IRRIGATION AND DRAINAGE ENGINEERING LABORATORY						

	L	**T**	**P**	**C**
	0	0	4	2

PREREQUISITE : NIL

	Course Objectives		**Course Outcomes :** The students will be able to
1.0	To impart knowledge on meteorological instruments	**1.1**	Calculate various meteorological observations
2.0	To understand the methods for soil moisture, infiltration and evapotranspiration determination	**2.1**	Determine moisture content, infiltration rate and evapotranspiration
3.0	To know the relationship of duty delta and flow properties of water	**3.1**	Estimate duty, delta and water flow properties
4.0	To understand drip irrigation system and uniformity coefficient determination	**4.1**	Design and determine the uniformity coefficient of drip irrigation system
5.0	To understand sprinkler irrigation system and uniformity coefficient determination	**5.1**	Design and determine the uniformity coefficient of sprinkler irrigation system

List of Experiments:

1. To study various instruments in the Meteorological Laboratory

2. Determination of soil moisture by different methods – gravimetric and tensiometer

3. Determination of infiltration rate using double ring and digital infiltrometer

4. Estimation of Evapotranspiration

5. Problems on Duty and Delta relationship of water

6. Measurement of flow properties in open irrigated channels (flumes, notches)

7. Design of Drip irrigation system

8. Determination of uniformity coefficient for drip irrigation system (catch can method)

9. Design of sprinkler irrigation system

10. Determination of uniformity coefficient for sprinkler irrigation system (catch can method)

TOTAL (P: 60) = 60 PERIODS

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	2	2	-	-	-	1	1	-	-	-	3	2	2	-
2	2	-	2	-	3	-	-	2	-	-	2	1	2	-
3	2	2	2	1	2	-	-		-	-	1	-	3	1
4	1	-	-	-	-	2	-	2	-	-	2	1	3	1
5	1	-	2	1	2	2	-	2	-	-	2	1	3	1
CO (W.A)	1.6	2	2	1	2.3	1.7	1	2	-	-	2	1.3	2.6	1

22MAN08 – SOFT / ANALYTICAL SKILLS - IV *(Common to ALL Branches)*				
	L	**T**	**P**	**C**
	1	0	2	0

PRE REQUISITE : Nil

	Course Objectives		**Course Outcomes :** The students will be able to
1.0	To recollect the functional understanding of basic grammar and its structure	**1.1**	Apply the knowledge of basic grammar to construct the sentences.
2.0	To develop students to workout solution for problems that involves mathematics aptitude.	**2.1**	Solve aptitude problems with ease
3.0	To enrich their knowledge and to develop their logical reasoning ability	**3.1**	Solve reasoning problems with ease.

UNIT I - Verbal	**(5+10)**
Articles -Fill in the blanks - Grammatical Error - Sentence improvement	

UNIT II – Aptitude	**(5+10)**
Speed and Distance -Time and Work-Mixture And Alligations-Permutation and Combinations	

UNIT III - Logical and Reasoning	**(5+10)**
Seating Arrangement- Directions and Distance- Non verbal Reasoning	

TOTAL (L:15, P:30) : 45 PERIODS

REFERENCES:
1. Aggarwal, R. S., "A Modern Approach to Verbal & Non-Verbal Reasoning", S Chand and Company Limited, New Delhi, 2014.
2. Ashish Aggarwal, "Quick Arithmetic", S Chand and Company Limited, New Delhi, 2014.
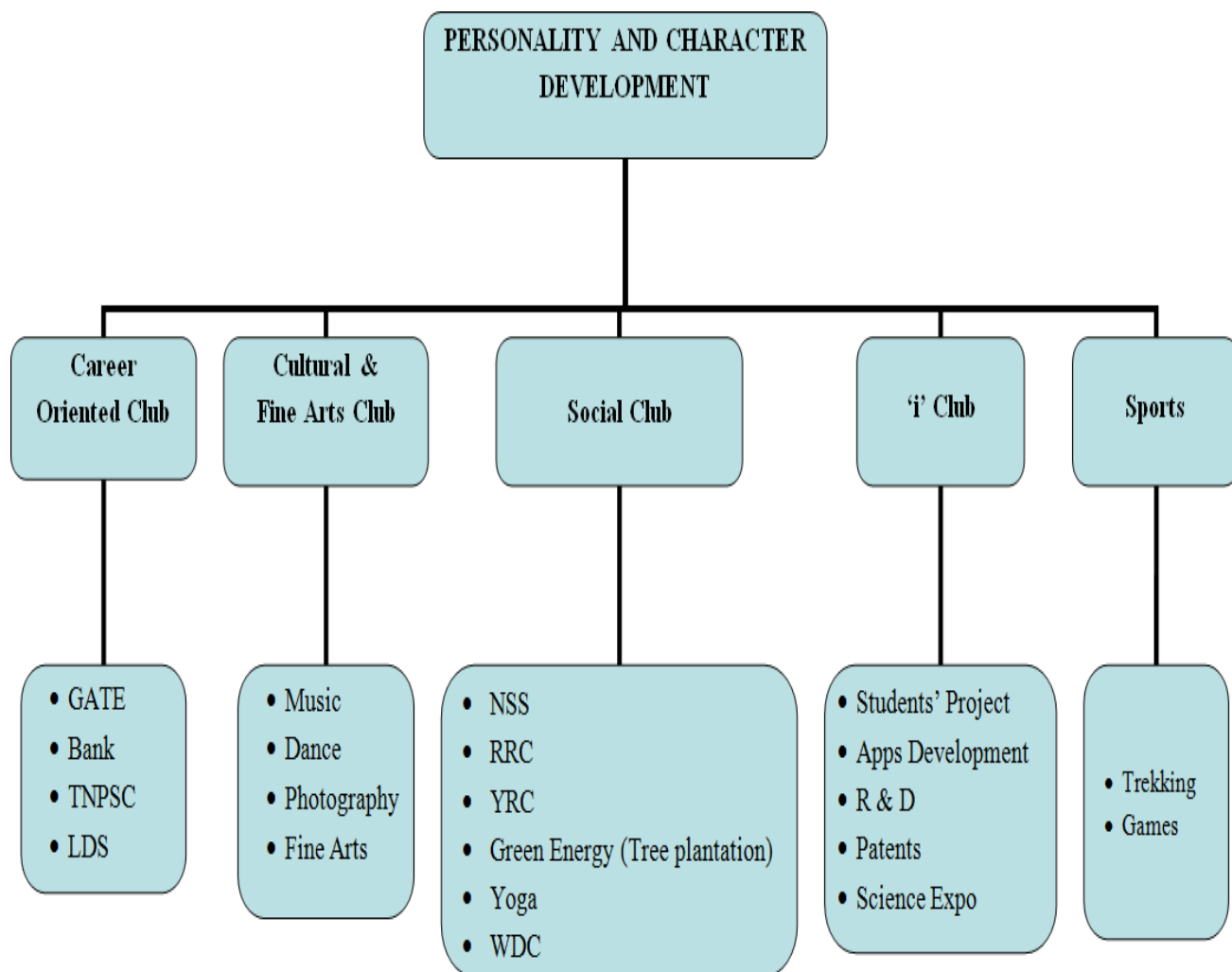3. Raymond Murphy, "English grammar in use", Fourth Edition, Cambridge University, 2012.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	-	-	-	-	-	-	-	-	3	3	-	2	-	1
2	-	3	2	2	-	-	1	-	2	-	-	3	2	-
3	-	3	2	2	-	-	1	-	2	-	-	3	2	-
CO (W.A)	-	3	2	2	-	-	1	-	2.3	3	-	2.7	2	1

22GED01 – PERSONALITY AND CHARACTER DEVELOPMENT

		L	T	P	C
		0	0	1	0

PRE REQUISITE : NIL

```
                    PERSONALITY AND CHARACTER
                            DEVELOPMENT


    Career          Cultural &                        'i' Club         Sports
  Oriented Club    Fine Arts Club    Social Club


  • GATE          • Music           • NSS            • Students' Project
  • Bank          • Dance           • RRC            • Apps Development
  • TNPSC         • Photography     • YRC            • R & D            • Trekking
  • LDS           • Fine Arts       • Green Energy    • Patents          • Games
                                      (Tree plantation)
                                    • Yoga           • Science Expo
                                    • WDC
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*LDS - Leadership Development Skills

OBJECTIVES :

Career Oriented Club	Cultural & Fine Arts Club	Social Club	'i' club	Sports
• To provide support for identifying specific career field of interests and career path • To provide support for preparing for competitive exams	• To bring out the hidden talent of students in music, dance and other fine arts. • To promote photography skill among the students • To develop and enhance the performance of students by participating in various events. • To inculcate managerial capabilities such as event management and stage organization.	• To create social awareness and develop a sense of social and civic responsibility • To inculcate socially and environmentally sound practices and be aware of the benefits • To encourage the students to work along with the people in rural areas, thereby developing their character, social consciousness, commitment, discipline and being helpful towards the community.	• To inculcate the basic concepts of innovation • To foster the networking between students, build teams, exchange ideas, do projects and discuss entrepreneurial opportunities. • To enrich the academic experience, build competencies and relationships beyond the classroom	• To provide opportunities to excel at sports • To promote an understanding of physical and mental well-being through an appreciation of stress, rest and relaxation. • To develop an ability to observe, analyze and judge the performance of self and peers in sporting activities. • To develop leadership skills and nurture the team building qualities. **Trekking:** • To provide opportunities to explore nature and educating about the purity of nature • To improve physical and mental health.

OUTCOMES : At the end of this course, the students will be able to				
• Find a better career of their interest. • Make use of their knowledge during competitive exams and interviews.	• Take part in various events. • Develop team spirit, leadership and managerial qualities.	• Develop socially responsive qualities by applying acquired knowledge. • Build character, social consciousness, commitment and discipline.	• Apply the acquired knowledge in creating better solutions that meet new requirements and market needs. • Develop skills on transforming new knowledge or new technology into viable products and services on commercial markets as a team.	• Demonstrate positive leadership skills that contribute to the organizational effectiveness • Take part an active role in their personal wellness (emotional, physical, and spiritual) that supports a healthy lifestyle • Create inclination towards outdoor activity like nature study and Adventure.

TOTAL [2 x (P: 15)]: 30 PERIODS

(Cumulatively for Two Semesters)

22GYA01 HERITAGE OF TAMILS
(For Common To All Branches)

			L	T	P	C
			1	0	0	1

PRE REQUISITE : NIL

UNIT I - LANGUAGE AND LITERATURE	(3)

Language Families in India - Dravidian Languages – Tamil as aClassical 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, Yazh 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 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 (L:15) : 15 PERIODS

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. பொருநை – 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.

22GYA01 தமிழர் மரபு
(அனைத்து பாடப்பிரிவினருக்கும்)

	L	T	P	C
	1	0	0	1

முன் தேவை: இல்லை

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 – தமிழக 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 2 மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக்கலை:	(3)

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு 3 நாட்டுப்பறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:	(3)

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டாம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு 4 தமிழர்களின் திணைக் கோட்பாடுகள்:	(3)

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளின் சோழர்களின் வெற்றி.

அலகு 5 இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:	(3)

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறபகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் –இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ் புத்தகங்களின் அச்ச வரலாறு.

TOTAL (L:15) : 15 PERIODS

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. பொருநை – 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.

22GYA02 TAMILS AND TECHNOLOGY
(For Common To All Branches)

	L	T	P	C
	I	0	0	I

PRE REQUISITE : NIL

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 n 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 beats - 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 (L:15) : 15 PERIODS

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. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
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12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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22GYA02 தமிழரும் தொழில்நுட்பமும்
(அனைத்து பாடப்பிரிவினருக்கும்)

முன் தேவை: இல்லை

அலகு 1 நெசவு மற்றும் பானைத் தொழில்நுட்பம்:	(3)

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

அலகு 2 வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:	(3)

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் மற்றும் சங்ககாலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுக்கல்லும் – 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 3 உற்பத்தி தொழில் நுட்பம்:	(3)

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எக்கு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள்–சங்கு மணிகள் – எலும்புத் துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:	(3)

அணை, ஏரி, குளங்கள், மதகு–சோழர்காலக் குழுழித் 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 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:	(3)

அறிவியல் தமிழின் வளர்ச்சி – கணித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின் பதிப்பு செய்தல்– தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.

TOTAL (L:15) : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் –கே.கே.பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
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