NANDHA ENGINEERING COLLEGE

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

Curriculum and Syllabi

for

B.E – Electronics and Communication 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.E – ELECTRONICS AND COMMUNICATION ENGINEERING	
VISION	• To foster academic excellence imparting knowledge in Electronics, Communication and allied disciplines to meet the ever growing needs of the society.
MISSION	• To impart quality education and develop an aptitude for professional career and continuous learning with ethics and social responsibility. • To provide a framework for research and innovation to meet the emerging challenges through regular interaction with industry. • 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 Electronics and Communication Engineering will be **PEO1: Core Competency:** Successful professionals with core competency and inter-disciplinary skills to satisfy the Industrial needs. **PEO2: Research, Innovation and Entrepreneurship:** Capable of identifying technological requirements for the society and providing innovative ideas for real time problems. **PEO3: Ethics, Human values and Life-long learning: Able to demonstrate ethical practices and managerial skills through continuous learning.**
PROGRAMME SPECIFIC OUTCOMES (PSO)	The students of Electronics and Communication Engineering will be able to • Analyze, design and validate processes, products by applying knowledge and skills in Electronics, Antennas and Networks. • Design and analyze the process in VLSI and Embedded systems by selecting appropriate tools and techniques.

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 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

MAPPING OF PROGRAM SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Objectives and the outcomes is given in the following table

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

Contribution 1: Reasonable 2: Significant 3: Strong

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REGULATIONS – R22 **CHOICE BASED CREDIT SYSTEM**

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER: I									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY & EMBEDDED COURSES									
1	22EYA01	Professional Communication - I	HSMC	-	4	2	0	2	3
2	22MYB01	Calculus and Linear Algebra	BSC	-	4	3	1	0	4
3	22CYB04	Engineering Chemistry	BSC	-	3	3	0	0	3
4	22CSC01	Problem Solving and C Programming	ESC	-	3	3	0	0	3
5	22ECC02	Basics of Electrical and Instrumentation Engineering	ESC	-	3	3	0	0	3
6	22GYA01	தமிழர்மரபு /Heritage of Tamils	HSMC	-	1	1	0	0	1
PRACTICALS									
7	22CSP01	Problem Solving and C Programming Laboratory	ESC	-	4	0	0	4	2
8	22CYP01	Chemistry Laboratory	BSC	-	2	0	0	2	1
9	22GEP01	Engineering Practices Laboratory	ESC	-	4	0	0	4	2
MANDATORY NON CREDIT COURSES									
10	22MAN01	Induction Programme	MC	-	0	0	0	0	0
11	22MAN02	Soft /Analytical Skills - I	MC	-	3	1	0	2	0
12	22MAN03	Yoga - I	MC	-	1	0	0	1	0
				TOTAL	**31**	**15**	**1**	**15**	**22**

SEMESTER: II									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY & EMBEDDED COURSES									
1	22EYA02	Professional Communication- II	HSMC	22EYA01	4	2	0	2	3
2	22MYB04	Transforms Techniques and Partial Differential Equations	BSC	-	4	3	1	0	4
3	22PYB03	Solid State Physics	BSC	-	3	3	0	0	3
4	22CSC02	Data Structures using C	ESC		3	3	0	0	3
5	22ECC04	Electronic Devices and Circuits (Theory + Lab)	PCC	-	5	3	0	2	4
6	22GYA02	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSMC	-	1	1	0	0	1
PRACTICALS									
7	22PYP01	Physics Laboratory	BSC	-	2	0	0	2	1
8	22CSP02	Data Structures Laboratory	ESC	-	4	0	0	4	2
9	22MEP01	Engineering Graphics Laboratory	ESC	-	4	0	0	4	2
MANDATORY NON CREDIT COURSES									
10	22MAN04	Soft /Analytical Skills - II	MC	22MAN02	3	1	0	2	0
11	22MAN05	Yoga - II	MC	-	1	0	0	1	0
				TOTAL	**33**	**16**	**1**	**1**	**23**

SEMESTER: III									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY & EMBEDDED COURSES									
1	22MYB06	Probability and Random Processes	BSC	-	4	3	1	0	4
2	22ECC05	Digital Logic Design	PCC	-	3	3	0	0	3
3	22ECC06	Signals and Systems	PCC	22MYB01, 22MYB04	3	3	0	0	3
4	22ECC07	Analog Electronics	PCC	22ECC04	3	3	0	0	3
5	22ECC08	Electromagnetic Waves	PCC	-	3	3	0	0	3
6	22ITC04	Algorithms	ESC	-	3	3	0	0	3
PRACTICALS									
7	22ECP02	Digital Logic Design Laboratory	PCC	-	4	0	0	4	2
8	22ECP03	Analog Electronics Laboratory	PCC	22ECC04	4	0	0	4	2
MANDATORY NON CREDIT COURSES									
9	22MAN07	Soft / Analytical Skills - III	MC	-	5	3	0	2	0
10	22MAN09	Indian Constitution	MC	-	1	1	0	0	0
				TOTAL	**33**	**24**	**1**	**10**	**23**

SEMESTER: IV									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY & EMBEDDED COURSES									
1	22ITC06	Java Programming	ESC	-	3	3	0	0	3
2	22ECC09	Analog Circuit Design	PCC	22ECC04	3	3	0	0	3
3	22ECC10	Transmission Lines and RF Systems	PCC	22ECC08	3	3	0	0	3
4	22ECC11	Digital Signal Processing	PCC	22ECC06	5	3	0	2	4
5	22ECC12	Analog and Digital Communication	PCC	22ECC06	3	3	0	0	3
PRACTICALS									

6	22ITP04	Java Programming Laboratory	ESC	-	4	0	0	4	2
7	22ECP04	Analog Circuit Design Laboratory	PCC	22ECC04	4	0	0	4	2
8	22ECP05	Analog and Digital Communication Laboratory	PCC	22ECC06	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	-	1	0	0	1	0
				TOTAL	**35**	**20**	**0**	**15**	**22**

SEMESTER: V									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY & EMBEDDED COURSES									
1	22ECC13	Microprocessors and Microcontrollers	PCC	-	3	3	0	0	3
2	22ECC14	Data Communication Networks	PCC	-	3	3	0	0	3
3	22CYB06	Environmental Science and Sustainability	BSC	-	3	3	0	0	3
4	E1	Elective(PEC)	PEC	-	3	3	0	0	3
5	E2	Elective(PEC)	PEC	-	3	3	0	0	3
6	E3	Elective(PEC)	PEC	-	3	3	0	0	3
PRACTICALS									
7	22ECP06	Microprocessors and Microcontrollers Laboratory	PCC	-	4	0	0	4	2
8	22ECP07	Data Communication Networks Laboratory	PCC	-	4	0	0	2	2
MANDATORY NON CREDIT COURSES									
10	22MAN10	Soft/Analytical Skills – V	MC	-	3	1	0	2	0
11	22MAN11	Certification Course – I	MC	-	1	0	0	1	0
				TOTAL	**30**	**19**	**0**	**11**	**22**

SEMESTER: VI									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY & EMBEDDED COURSES									
1	22ECC15	VLSI and Chip Design	PCC	-	3	3	0	0	3
2	22ECC16	Embedded Systems and IOT Design	PCC	-	3	3	0	0	3
3	E4	Elective (PEC)	PEC	-	3	3	0	0	3
4	E5	Elective(PEC)	PEC	-	3	3	0	0	3
5	E6	Elective(PEC)	PEC		3	3	0	0	3
6	E7	Elective(OEC/PEC)	OEC/PEC	-	3	3	0	0	3
PRACTICALS									
7	22ECP08	VLSI Design Laboratory	PCC	-	4	0	0	4	2
8	22ECP09	Embedded Systems and IOT Design Laboratory	PCC	-	4	0	0	4	2
MANDATORY NON CREDIT COURSES									
9	22MAN12	Soft/Analytical Skills – VI	MC	-	3	1	0	2	0
10	22NAN13	Certification Course – II	MC	-	1	0	0	1	0
				TOTAL	**30**	**19**	**0**	**11**	**22**

SEMESTER: VII									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY & EMBEDDED COURSES									
1	22GEA01	Universal Human Values	HSMC	-	2	2	0	0	2
2	EM1	Elective (Management)	HSMC	-	3	3	0	0	3
3	E8	Elective(OEC)	OEC	-	3	3	0	0	3
4	E9	Elective(OEC)	OEC		3	3	0	0	3
5	E10	Elective(OEC)	OEC	-	3	3	0	0	3
PRACTICALS									
6	22GED02	Internship/ Industrial Training	EEC	-	4	0	0	0	2
7	22ECD01	Project Work - I	EEC		4	0	0	4	2
TOTAL					**23**	**15**	**0**	**8**	**18**

SEMESTER: VIII									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
PRACTICALS									
1	22ECD02	Project Work - II	EEC	-	20	0	0	20	10
				TOTAL	**20**	**0**	**0**	**20**	**10**

(A) HSMC, BSC, HSC and MC

(a) Humanities and Social Sciences and Management Courses (HSMC)			AICTE Credit Distribution Norm :12							
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C	P.S
1	22EYA01	Professional Communication - I	HSMC	-	4	2	0	2	3	I
2	22GYA01	தமிழர்மரபு /Heritage of Tamils	HSMC	-	1	1	0	0	1	I
3	22EYA02	Professional Communication- II	HSMC	22EYA01	4	2	0	2	3	II
4	22GYA02	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSMC	-	1	1	0	0	1	II
5	22GEA01	Universal Human Values	HSMC	-	2	2	0	0	2	VII
6	EM1	Elective (Management)	HSMC	-	3	3	0	0	3	VII

(b) Basic Science Courses(BSC)			AICTE Credit Distribution Norm :25							
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C	P.S
1.	22MYB01	Calculus and Linear Algebra	BSC	-	4	3	1	0	4	I
2.	22CYB04	Engineering Chemistry	BSC	-	3	3	0	0	3	I
3.	22CYP01	Chemistry Laboratory	BSC	-	2	0	0	2	1	I
4.	22MYB04	Transforms Techniques and Partial Differential Equations	BSC	-	4	3	1	0	4	II
5.	22PYB03	Solid State Physics	BSC	-	3	3	0	0	3	II
6.	22PYP01	Physics Laboratory	BSC	-	2	0	0	2	1	II
7.	22MYB06	Probability and Random Processes	BSC	-	4	3	1	0	4	III
8.	22CYB06	Environmental Science and Sustainability	BSC	-	3	3	0	0	3	V

(c) Engineering Science Courses (ESC)			AICTE Credit Distribution Norm:24							
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C	P.S
1.	22CSC01	Problem Solving and C Programming	ESC	-	3	3	0	0	3	I
2.	22ECC02	Basics of Electrical and Instrumentation Engineering	ESC	-	3	3	0	0	3	I
3.	22CSP01	Problem Solving and C Programming Laboratory	ESC	-	4	0	0	4	2	I
4.	22GEP01	Engineering Practices Laboratory	ESC	-	4	0	0	4	2	I
5.	22CSC02	Data Structures using C	ESC		3	3	0	0	3	II
6.	22CSP02	Data Structures Laboratory	ESC	-	4	0	0	4	2	II
7.	22MEP01	Engineering Graphics Laboratory	ESC	-	4	0	0	4	2	II
8.	22ITC04	Algorithms	ESC	-	3	3	0	0	3	III
9.	22ITC06	Java Programming	ESC	-	3	3	0	0	3	IV
10.	22ITP04	Java Programming Laboratory	ESC	-	4	0	0	4	2	IV

(d) Mandatory Courses (MC)										
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C	P.S
1.	22MAN01	Induction Programme	MC	-	0	0	0	0	0	I
2.	22MAN02	Soft /Analytical Skills - I	MC	-	3	1	0	2	0	I
3.	22MAN03	Yoga - I	MC	-	1	0	0	1	0	I
4.	22MAN04	Soft /Analytical Skills - II	MC	22MAN02	3	1	0	2	0	II
5.	22MAN05	Yoga - II	MC	-	1	0	0	1	0	II
6.	22MAN07	Soft / Analytical Skills - III	MC	-	5	3	0	2	0	III
7.	22MAN09	Indian Constitution	MC	-	1	1	0	0	0	III
8.	22MAN08	Soft/Analytical Skills - IV	MC	-	5	3	0	2	0	IV
9.	22GED01	Personality and Character Development	MC	-	1	0	0	1	0	IV
10.	22MAN10	Soft/Analytical Skills – V	MC	-	3	1	0	2	0	V
11.	22MAN11	Certification Course – I	MC	-	1	0	0	1	0	V
12.	22MAN12	Soft/Analytical Skills – VI	MC	-	3	1	0	2	0	VI
13.	22MAN13	Certification Course – II	MC	-	1	0	0	1	0	VI

(B) Programme Core Courses (PCC)			AICTE Credit Distribution Norm :48							
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C	P.S
1.	22ECC04	Electronic Devices and Circuits (Theory + Lab)	PCC	-	5	3	0	2	4	II
2.	22ECC05	Digital Logic Design	PCC	-	3	3	0	0	3	III
3.	22ECC06	Signals and Systems	PCC	22MYB01, 22MYB04	3	3	0	0	3	III
4.	22ECC07	Analog Electronics	PCC	22ECC04	3	3	0	0	3	III
5.	22ECC08	Electromagnetic Waves	PCC	-	3	3	0	0	3	III
6.	22ECP02	Digital Logic Design Laboratory	PCC	-	4	0	0	4	2	III
7.	22ECP03	Analog Electronics Laboratory	PCC	22ECC04	4	0	0	4	2	III
8.	22ECC09	Analog Circuit Design	PCC	22ECC04	3	3	0	0	3	IV
9.	22ECC10	Transmission Lines and RF Systems	PCC	22ECC08	3	3	0	0	3	IV
10.	22ECC11	Digital Signal Processing	PCC	22ECC06	5	3	0	2	4	IV
11.	22ECC12	Analog and Digital Communication	PCC	22ECC06	3	3	0	0	3	IV
12.	22ECP04	Analog Circuit Design Laboratory	PCC	22ECC04	4	0	0	4	2	IV
13.	22ECP05	Analog and Digital Communication Laboratory	PCC	22ECC06	4	0	0	4	2	IV
14.	22ECC13	Microprocessors and Microcontrollers	PCC	-	3	3	0	0	3	V
15.	22ECC14	Data Communication Networks	PCC	-	3	3	0	0	3	V
16.	22ECP06	Microprocessors and Microcontrollers Laboratory	PCC	-	4	0	0	4	2	V
17.	22ECP07	Data Communication Networks Laboratory	PCC	-	4	0	0	2	2	V
18.	22ECC15	VLSI and Chip Design	PCC	-	3	3	0	0	3	VI
19.	22ECC16	Embedded Systems and IOT Design	PCC	-	3	3	0	0	3	VI
20.	22ECP08	VLSI Design Laboratory	PCC	-	4	0	0	4	2	VI
21.	22ECP09	Embedded Systems and IOT Design Laboratory	PCC	-	4	0	0	4	2	VI

(D) Employability Enhancement Courses (EEC)			AICTE Credit Distribution Norm :15							
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C	P.S
1.	22GED02	Internship/ Industrial Training	EEC	-	4	0	0	0	2	VI
2.	22ECD01	Project Work - I	EEC	-	4	0	0	4	2	VII
3.	22ECD02	Project Work - II	EEC	-	20	0	0	20	10	VII

SUMMARY

S. No.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL
		I	II	III	IV	V	VI	VII	VIII	
1.	HSMC	4	4	0	0	0	0	5	0	13
2.	BSC	8	8	4	0	3	0	0	0	23
3.	ESC	10	7	3	5	0	0	0	0	25
4.	PCC	0	4	16	17	10	10	0	0	57
5.	PEC	0	0	0	0	9	12	0	0	21
6.	OEC	0	0	0	0	0	0	9	0	9
7.	EEC	0	0	0	0	0	0	4	10	14
CREDITS TOTAL		22	23	23	22	22	22	18	10	162

22EYA01 - PROFESSIONAL COMMUNICATION - I (*Common to All Branches*)					
		L	**T**	**P**	**C**
		2	**0**	**2**	**3**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To build essential English skills to address the challenges of communication in today's work environment.	1.1	The students will be able to 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	The students will be able to 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	The students will be able to 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	The students will be able to 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	The students will be able to 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", Volume 1, 3rd Edition, Orient BlackSwan Pvt.Ltd, 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**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To develop the use of matrix algebra techniques needed by engineers for practical applications.	**1.1**	The students will be able to 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**	The students will be able to 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**	The students will be able to 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**	The students will be able to 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**	The students will be able to 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. Dr.B.S.Grewal, Higher Engineering mathematics, 42nd Edition, Khanna publications, 2012.
2. Erwin Kreyszig , Advanced Engineering mathematics , 9th Edition , John Wiley & sons ,2013
3. Veerarajan.T, Engineering Mathematics of semester I & II, 3rd Edition, Tata McGraw Hill. ,2016

REFERENCES:

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

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				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

- **Ratified by Eleventh Academic Council**

22CYB04 ENGINEERING CHEMISTRY *(Common to ECE and EEE Branches)*				
L	**T**	**P**	**C**	
3	**0**	**0**	**3**	

PRE REQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To recognize the basic concepts of electrochemistry and understand electrochemical processes.	**1.1**	The students will be able to evaluate fundamentals of electrochemistry, electrodes, cells and electrode potentials.
2.0	To facilitate the students to achieve a clear conceptual understanding of technical and commercial aspects of energy sources and storage devices.	**2.1**	The students will be able to impart knowledge on renewable energy sources like nuclear, solar, wind energy and also on storage devices.
3.0	To make the students conversant with water treatment, boiler feed water techniques	**3.1**	The students will be able to identify the various water treatment techniques for domestic and industrial purpose.
4.0	To elucidate the types of polymers and concepts of surface chemistry.	**4.1**	The students will be able to use essential descriptions about polymer and surface chemistry.
5.0	To understand the concept of various analytical techniques.	**5.1**	The students will be able to impart knowledge on general principles and theory of analytical techniques.

UNIT I - ELECTROCHEMISTRY	**(9)**
Electrode potential - Nernst equation - derivation and problems - reference electrodes - standard hydrogen electrode -calomel electrode - electrochemical series - significance - Types of cell - electrolytic and electrochemical cells -reversible and irreversible cells - potentiometric titrations (redox) - conductometric titrations (acid-base).	
UNIT II - ENERGY SOURCES AND STORAGE DEVICES	**(9)**
Nuclear energy - nuclear fission - nuclear fusion - light water nuclear power plants - breeder reactor - solar energy conversion - solar cells - solar water heater - Recent developments in solar cell materials - wind energy - batteries - types of batteries - lead acid storage battery - lithium-ion battery, Electric vehicles - working principles.	
UNIT III - WATER TECHNOLOGY AND NANO MATERIALS	**(9)**
Municipal water treatment - disinfection methods (UV, ozonation, chlorination) - desalination of brackish water - reverse osmosis - boiler troubles (scale, sludge , priming, foaming and caustic embrittlement) - treatment of boiler feed water - internal treatment (carbonate, phosphate and calgon conditioning) - external treatment - demineralization process. Nanomaterials - synthesis (laser ablation, and chemical vapour deposition method) and applications of nanomaterials.	
UNIT IV - SURFACE CHEMISTRY AND POLYMERS	**(9)**
Surface chemistry - Adsorption - types - Differentiate between physical and chemical adsorption - Freundlich adsorption isotherm - Langmuir adsorption isotherm. Polymers - classification - addition - condensation - copolymerization – plastics - thermoplastics and thermosetting plastics - preparation, properties and uses of PVC and nylon- polymer processing - compression and injection moulding techniques.	

UNIT V - ANALYTICAL TECHNIQUES	(9)
Colorimetry - principles- estimation of Iron by colorimetry - UV-Visible spectroscopy- principles - instrumentation (block diagram only) - IR spectroscopy - principles - instrumentation (block diagram only) - Flame Photometry - principles - instrumentation (block diagram only) - estimation of sodium by flame photometry - Atomic absorption spectroscopy - principles - instrumentation (block diagram only) - estimation of nickel by atomic absorption spectroscopy.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Dr.Ravikrishnan, A," Engineering Chemistry I & Engineering Chemistry II , Sri Krishna Hitech Publishing chem. Co. Pvt Ltd., 13th ed., Chennai, 2020.
2. S.S. Dara," A text book of Engineering Chemistry", S.Chand & Co. Ltd. New Delhi, 2019.

REFERENCES:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", Vol I &II, Dhanpat Rai Pub, Co, New Delhi 15th ed.,2018.
2. B.Sivasankar, "Engineering Chemistry", Tata McGraw- Hill Pub. Co. Ltd., New Delhi,2018

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	1		1			2		
2	3	1				2						2	1	1
3	3	1					1		1			2		
4	3	2	2			2	2		2			2		
5	3	2				2	2					2		
CO (W.A)	3	2	2			2	2		1			2	1	1

22CSC01 - PROBLEM SOLVING AND C PROGRAMMING *(Common to AI&DS, BME, CSE, CSE(CS), CSE(IOT), ECE, EEE and IT Branches)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To understand problem solving, problem solving aspects, programming and to know about various program design tools.	**1.1**	The student will be able to 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**	The student will be able to implement the appropriate looping and control statements in C for developing applications.		
3.0	To learn the manipulation of arrays and strings	**3.1**	The student will be able to 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**	The student will be able to implement programs using user defined functions.		
5.0	To acquaint with the use and benefits of Memory Allocation and file handling.	**5.1**	The student will be able to 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", 2nd ed., Pearson Education, 2013.
2. Sumitabha Das, "Computer Fundamentals and C Programming", 1st Edition, McGraw Hill, 2018.

REFERENCES:

1. R. G. Dromey, "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. YashavantKanetkar, "Let us C", 16th Edition, BPB Publications, 2018.
4. ReemaThareja., "Programming in C ", 2nd Edition, Oxford University Press, New Delhi, 2018.
5. Balagurusamy E., "Programming in ANSI C", 7th Edition, Mc Graw Hill Education, 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	2.8	-	-	-	-	-	3	-	3	3	3	3

22ECC02 - BASICS OF ELECTRICAL AND INSTRUMENTATION ENGINEERING *(Common to ECE and BME Branches)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To make students to learn and understand the basics of Electrical Motor concepts.	**1.1**	The students will be able to Narrate Constructional details, principle of operation, performance and starters of D.C.Machines.		
2.0	To enable the student to understand the basic concepts of electrical transformer	**2.1**	The students will be able to explicate the Constructional details, principle of operation and testing of Transformer.		
3.0	To make the students to understand the concepts of induction motor and synchronous motor.	**3.1**	The students will be able to describe the Constructional details, principle of operation, starting, speed control of induction and synchronous Motors.		
4.0	To make the students to understand basic concepts of measuring and electronics instruments.	**4.1**	The students will be able to Understand the principle of operation of basic measuring and electronics instruments.		
5.0	To make the students to understand various types of transducers.	**5.1**	The students will be able to understand about operation of various types of transducers.		

UNIT I - D.C. MACHINES	**(9)**
DC Generators: Constructional details – Principle of operation – EMF Equation – Methods of excitation – Applications – DC Motor: Constructional details – Principle of operation – Torque Equation – Applications – Types of starters.	
UNIT II - TRANSFORMERS	**(9)**
Single phase Transformers: Constructional details – Principle of operation – EMF Equation – Transformation ratio – Equivalent circuit – Efficiency and Voltage Regulation – Applications.	
UNIT III - INDUCTION MOTORS	**(9)**
Three phase Induction Motor: Construction – Types – Principle of operation – Applications – Single phase Induction Motor: Construction – Principle of operation – Starting methods – Applications.	
UNIT IV - MEASUREMENTS AND INSTRUMENTATION	**(9)**
Functional elements of an instrument – Standards and calibration – Measurement Errors - types of error – Moving coil meters – Moving iron meters – CRO – Digital voltmeter: successive Approximation type.	
UNIT V -TRANSDUCERS	**(9)**
Transducers: Basic Requirements – Classification – Resistive: Strain gauge – Resistance Thermometer – Thermistor – Inductive: LVDT – Piezoelectric – Thermocouples.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:
1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", 2nd Edition, McGraw Hill Education, 2020. 2. A.K. Sawhney, Puneet Sawhney "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, New Delhi, 2015.
REFERENCES:
1. S. K, Bhattacharya, "Basic Electrical and Electronics Engineering", 2nd Edition, Pearson Education, 2017. 2. R.K.Rajput, "Electronic Measurements and Instrumentation", S.Chand & company Ltd, 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	2	2	1	2	2	2	1	-	-	-	-	-	-	-
2	2	2	1	3	1	2	1	-	-	-	-	-	-	-
3	2	2	2	2	1	2	2	-	-	-	-	-	1	-
4	2	1	2	1	2	3	1	-	-	-	-	-	1	1
5	2	1	2	2	2	2	3	-	-	-	-	-	-	1
CO (W.A)	2	2	2	2	2	2	2	-	-	-	-	-	-	1

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
1.0	To explain the origin of hardness, alkalinity, and chloride and dissolved oxygen in water.	1.1	The students will be able to 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	The students will be able to 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	The students will be able to 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	The students will be able to utilize the fundamental laboratory techniques for analyses such as pH of acidic, basic and neutral solution.

LIST OF EXPERIMENTS

1. Determination of total, temporary & 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 (P:30) : 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	2	1		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	1	
5	2	2		1		1	2					1		
CO (W.A)	2	1	-	1	2	1	2	-	-	-	1	1	1	

- **Ratified by Eleventh Academic Council**

22CSP01 - PROBLEM SOLVING AND C PROGRAMMING LABORATORY

(Common to AI&DS, BME, CSE, CSE(CS), CSE(IOT), ECE, EEE and IT Branches)

L	T	P	C
0	0	4	2

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes
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**	The student will be able to 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**	The student will be able to implement programs on arrays of different dimensions and string concepts.
3.0	To learn the importance user defined functions and pointers.	**3.1**	The student will be able to 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**	The student will be able to design programs using user defined data types and various file handling functions.
5.0	To acquire skill in dynamic memory allocation.	**5.1**	The student will be able to 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	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**	**2.8**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**	**3**	**3**	**3**

- **Ratified by Eleventh Academic Council**

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		**QUESTION PATTERN : TYPE - NIL**			
Course Objectives		**Course Outcomes**			
1.0	To provide hands on training on various basic engineering practices in Civil Engineering	1.1	The students will be able to 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	The students will be able to 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	The student will be able to 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	The students will be able to 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	The students will be able to 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	
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

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).

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**	**1**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**3**	**2**	**3**	**1**

22MAN01 INDUCTION PROGRAMME
(For Common To All Branches)

	L	T	P	C
	-	-	-	-

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**	
1.0	To understand the basic concepts of grammar and apply them in a structured manner.	**1.1**	The students will be able to 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**	The students will be able to 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**	The students will be able to 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. Dr. R.S. Aggarwal, "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					2			3	1	
3		3	2	2					2			3	1	
CO (W.A)		**2**	**1.3**	**1.3**					**2.3**	**1**		**2.6**	**1**	

22MAN03 YOGA - I *(For Common To All Branches)*				
	L	**T**	**P**	**C**
	0	**0**	**I**	**0**

PRE REQUISITE : NIL

Course Objectives		**Course Outcomes**	
1.0	To make students in understanding the importance of yoga in shaping mental and physical wellness.	**1.1**	Student will be able to 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**	Student will be able to 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**	Student will be able to learn and practice meditation techniques for keeping good mental health
4.0	To strengthen the body through physical exercises.	**4.1**	Student will be able to develop their body by performing yoga exercises.
5.0	To inculcate the knowledge about different types of Asanas and their benefits	**5.1**	Students will be able to 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.	
TOTAL (P:15) : 15 PERIODS	

TEXT BOOKS/REFERENCES:
1. Light On Yoga by B.K.S. Iyengar.

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**

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

PREREQUISITE : 22EYA01

Course Objectives		Course Outcomes	
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**	The Students will be able to 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**	The Students will be able to 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**	The Students will be able to 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**	The students will be able to 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**	The Students will be able to 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 BOOKS:

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", Second Edition, McGraw Hill Education India Pvt Ltd, 2017.
2. Rodney Huddleston, Geoffrey K. Pullum and Brett Reynolds, "A Student's Introduction to English Grammar", Second Edition, Cambridge University Press, 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**

22MYB04 – TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS *(Common to BME and ECE Branches)*					
		L	**T**	**P**	**C**
		3	**1**	**0**	**4**
PRE REQUISITE : NIL					

Course Objectives		**Course Outcomes**	
1.0	To understand the concept of Fourier series and enhance the problem solving skill.	**1.1**	The students will be able to analysis the Fourier series problem
2.0	To develop the skills of the students in the areas of Transforms and Partial Differential Equations.	**2.1**	The students will be able to know the formation of partial differential equations.
3.0	To introduce the effective mathematical tools for the solutions of partial differential equations.	**3.1**	The students will be able to apply the partial differential equations to solve the various electrical and electronics application.
4.0	To acquaint the student with Fourier transform techniques used in wide variety of situations.	**4.1**	The students will be able to solve the problems using Fourier integral theorem and convolution theorem technique.
5.0	To develop Z-transform techniques for discrete time systems.	**5.1**	The students will be able to formulate Z - Transform techniques.

UNIT I – FOURIER SERIES	**(9+3)**
Dirichlet's condition – Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – RMS value – 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 –Z-TRANSFORM AND DIFFERENCE EQUATIONS	**(9+3)**
Z-transforms – Elementary properties – Inverse Z-transform (Partial fraction method and Residue method) – Convolution theorem (Excluding proof) – formation of difference equations – Solution of difference equation using Z transform.	
TOTAL (L:45+T:15) :60 PERIODS	

TEXT BOOKS:
1. Veerajan.T,"Engineering Mathematics (for semester III), 3rd ed., Tata Mc Graw Hill, New Delhi.
2. Kandasamy.P, Thilagavathy.K, and Gunavathy. K., "Engineering Mathematics; Volume III", S.Chand & Coltd., 2008.
3. Grewal B.S,"Higher Engineering Mathematics", 42nd ed., Khanna publishers, New Delhi, 2012.
REFERENCES:
1. Goyal Manish and Bali. N.P,"A Text book of Engineering mathematics", 6th ed., Laxmi Publication (P) Ltd, New Delhi, 2012.
2. Kreyszig, Erwin,"Advanced Engineering Mathematics", 9th ed., Wiley Publications, New Delhi, 2006.
3. Singaravelu.A,"Transforms and Partial Differential Equations", Reprint Edition 2013, Meenakshi Publications, Tamilnadu.
WEB REFERENCES:
1. https://youtu.be/B025y1UWkvI
2. https://youtu.be/IkAvgVUvYvY
3. https://youtu.be/RtVE2Gt-KQ4
4. https://youtube.com/playlist?list=PLs7oDAL8_ouKSagWiC_IwrEsRwvD2WJ73

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					1	1		2		
2	3	2	1	1					1	1		2		
3	3	2	1	1					1	1		2		
4	3	2	1	1					1	1		2		
5	3	2	1	1					1	1		2		
CO (W.A)	3	2	1	1					1	1		2		

- **Ratified by Eleventh Academic Council**

22PYB03 - SOLID STATE PHYSICS *(Common to ECE, EEE & BME)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To expose the concepts of semiconducting materials.	1.1	The students will be able to predict the importance of conducting materials in the communication field.		
2.0	To gain fundamental concepts of dielectric materials in the engineering field.	2.1	The students will be able to acquire knowledge about the fundamentals of dielectric materials		
3.0	To acquire the knowledge of magnetic and superconducting materials.	3.1	The students will be able to identify the importance of magnetic and superconducting materials.		
4.0	To understand the knowledge of Fabrication process of integrated circuits**.**	4.1	The students will be able to update the knowledge of Integrated circuits and its fabrication.		
5.0	To acquire the knowledge about recent development in advanced materials and nano technology.	5.1	The students will be able to explore the knowledge about recent development in advanced materials and nano materials.		

UNIT I – SEMICONDUCTING MATERIALS	**(9)**
Introduction to semiconducting materials – Elemental and compound semiconductors – Intrinsic semiconductor – carrier concentration derivation – variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors (qualitative) – Hall effect – determination of Hall coefficient – Applications	
UNIT II – DIELECTRIC MATERIALS	**(9)**
Electrical susceptibility – dielectric constant – electronic, ionic, orientation and space charge polarization – frequency and temperature dependence of polarization – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferro electricity and applications.	
UNIT III – MAGNETIC AND SUPERCONDUCTING MATERIALS	**(9)**
Origin of magnetic moment – Bohr Magneton – Types of magnetic materials – Domain theory – Hysteresis – soft and hard magnetic materials – Ferrites – applications – Superconductivity – properties – types of superconductors – BCS theory of superconductivity (qualitative) – High Tc superconductors – Application of superconductors – Magnetic levitation.	
UNIT IV – FABRICATION PROCESS OF INTERGATED CIRCUITS	**(9)**
Bulk crystal growth – Epitaxial growth – masking and etching-diffusion of impurities-selective diffusion – Formation of PN junction – resistors – capacitors – inductors – isolation methods – metal semiconductor contact – Introduction to integrated circuit – monolithic and hybrid circuits – Thin film and Thick film technology – Definition of LSI, MSI, VLSI circuits.	

UNIT V – ADVANCED MATERIALS AND NANO TECHNOLOGY	(9)
Metallic glasses: preparation, properties and applications – Shape Memory Alloys (SMA): Characteristics, properties of NiTi alloy, application – Nano materials: Properties, Preparation – Pulsed laser deposition – chemical vapour deposition of nano particles and applications – Carbon nano tubes: fabrication – arc method – structure – properties and application.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. M.N.Avadhanulu and P.G.Kshirsagar, "A text book of Engineering Physics", S. Chand and Company, New Delhi, 2019.
2. A.Marikani, "Materials Science", PHI Learning Private Limited, Eastern Economy Edition, 2017.
3. M.A.Wahab, "Solid State Physics", 3rd edition ,Narosa Publishing House Pvt.Ltd., 2016.

REFERENCES:

1. B.Rogers , J. Adams and S.Pennathur, "Nanotechnology : Understanding Small System" CRC Press, 2017.
2. Jacob Millman, Charistos C Halkilas, SatyabrataJit "Electronic Devices & Circuits", Tata McGraw Hill ,Education Private Limited, 2016, Third Edition.
3. Subrahmanyam N, Brijlal, "A Text Book Of Optics" S.Chand & Co. Ltd, New Delhi, 2019.

WEB LINKS:

1. https://bayanbox.ir/view/7764531208313247331/Kleppner-D.-Kolenkow-R.J.-Introduction-to-Mechanics-2014.pdf.
2. https://physicaeducator.files.wordpress.com/2017/11/electricity_and_magnetism-by-purcell-3ed-ed.pdf.
3. https://rajeshvcet.home.blog/regulation-2021/ph3151-engineering-physics-study-materials/
4. https://zenodo.org/record/243407#.ZEgPZXZBzIU
5. https://farside.ph.utexas.edu/teaching/qmech/qmech.pdf.
6. https://web.pdx.edu/~pmoeck/phy381/workbook%20nanoscience.pdf.

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	-	-
3	3	3	3	-	-	-	-	-	1	1	-	2	-	-
4	3	3	3	-	-	-	-	-	1	1	-	1	-	-
5	3	2	2	-	-	-	-	-	1	1	-	2	-	-
CO (w.a)	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	2.0	0.0	0.0

22CSC02 –DATA STRUCTURES USING C

(Common to 22AIC01, 22CSC02, 22CCC01, 22CIC01 and 22ITC01)

L	T	P	C
3	0	0	3

PREREQUISITE : 22CSC01

	Course Objectives		Course Outcomes
1.0	To learn the concept of pointers and strings	**1.1**	The student will be able to able to perform array and string operations using pointers
2.0	To be able to implement the abstract data type list as a linked list using the node and reference pattern.	**2.1**	The student will be able to able to manipulate different operations using linked list
3.0	To understand the Stack and Queue ADT	**3.1**	The student will be able to able to deploy different operations on stack and queue.
4.0	To gain knowledge on tree data structure.	**4.1**	The student will be able to determine the structure and operations on trees
5.0	To understand the various operations on graph	**5.1**	The student will be able to implement the various operations on graph

UNIT I - POINTERS USING ARRAYS AND STRINGS	**(9)**
Pointers : Introduction – Pointers and arrays– passing an array to a function– returning an array from function – NULL pointers –Array of pointers – Pointer-to-pointer – Dangling Pointer. Function pointers: calling a function using function pointer- Using pointer as a function argument	
UNIT II - LIST	**(9)**
Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial ADT	
UNIT III - STACKS AND QUEUES	**(9)**
Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressionsInfix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues	
UNIT IV - TREE	**(9)**
Tree ADT – Tree Traversals - Binary Tree ADT – Expression trees – Binary Search Tree ADT – AVL Trees – Priority Queue (Heaps) – Binary Heap.	

UNIT V - GRAPHS	(9)
Definitions – Representation of Graphs – Types of Graph – Graph Traversal: Depth-First Search (DFS) – Breadth-First Search (BFS) – Topological Sort – Applications of DFS: Bi-connectivity – Euler Circuits – Finding Strongly Connected Components – Applications of BFS: Bipartite Graph.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Sumitabha Das, "Computer Fundamentals &C Programming", McGraw Hill Education(India) Private Limited, 1st Edition, 2018.
2. Weiss M. A., "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2016.

REFERENCES:

1. Yashavant Kanetkar, "Pointers in C", BPP Publications, 4th Edition, 2017.
2. PradipDey, Manas Ghosh, "Programming in C", Oxford Higher Education, 2nd Edition, 2016.

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	2	1	-	-	2	-	2	3	3	3
2	3	3	2	2	2	2	-	-	1	-	2	3	3	3
3	2	3	2	2	2	2	-	-	2	-	2	3	3	3
4	3	3	2	2	2	1	-	-	1	-	2	3	3	3
5	3	3	2	2	2	1	-	-	2	-	2	3	3	3
CO (W.A)	2.8	3	2	2	2	1.4	-	-	1.6	-	2	3	3	3

- **Ratified by Eleventh Academic Council**

22ECC04 - ELECTRONIC DEVICES AND CIRCUITS *(Common to ECE and BME Branches)*				
	L	**T**	**P**	**C**
	3	**0**	**2**	**4**

PRE REQUISITE : NIL

Course Objectives		**Course Outcomes**	
1.0	To make students to examine the basics of Semiconductor Diodes and its characteristics.	**1.1**	The students will be able to examine Semiconductor Diodes and its characteristics.
2.0	To enable the student to analyze the characteristics of Bipolar Junction Transistor and FET.	**2.1**	The students will be able to analyze characteristics of BJT for various operations and FET.
3.0	To make the students to analyze the operation of Special semiconductor diodes.	**3.1**	The students will be able to analyze the operation of Special semiconductor diodes.
4.0	To make students to examine the basics of Electrical circuits.	**4.1**	The students will be able to apply the Ohm's law and Kirchhoff's law and investigates the behavior of electric circuits by analytical techniques.
5.0	To enable the student to Design simple network by exploring circuit theorems.	**5.1**	The students will be able to Design simple network by exploring circuit theorems.

UNIT I – PN DIODE AND BJT	**(9)**
Formation of PN junction – working principle – VI characteristics – PN diode currents – Switching Characteristics. NPN and PNP transistors – Current equations – Input and Output characteristics of CE, CB, CC Configurations.	
UNIT II – FET AND SPECIAL DIODES	**(9)**
JFET – Drain and Transfer Characteristics - MOSFET – Characteristics. Zener diode, Varactor diode, Tunnel diode, PIN diode, LDR	
UNIT III – BASICS OF CIRCUIT ANALYSIS	**(9)**
Ohms Law, Kirchhoff's Current Law, Kirchhoff's voltage law, Resistors in Series and Parallel, voltage and current division, Nodal analysis, Mesh analysis. Delta-Wye Conversion	
UNIT IV - NETWORK THEOREMS FOR DC	**(9)**
Linearity and superposition, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Reciprocity theorem.	
UNIT V -NETWORK THEOREMS FOR AC	**(9)**
Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem-Reciprocity theorem	

LIST OF EXPERIMENTS :

1. Plot the Characteristics of PN Junction Diode and Zener Diode.
2. Plot the Input-Output characteristics of common Emitter and common Base configuration.
3. Plot FET Characteristics.
4. Verification of KVL and KCL
5. Verification of Thevenin and NortonsTheorem.
6. Verification of Superposition Theorem and Reciprocity Theorem.

TOTAL (L:45+P:30) : 75 PERIODS

TEXT BOOKS:

1. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", 2nd ed., Pearson Education, 2019.
2. Charles K. Alexander, Matthew N. O. Sadiku, "Fundamentals of Electric Circuits", 2nd ed, McGraw-hill Education, 2017

REFERENCES:

1. S. Salivahanan, N. Suresh kumar and A. Vallavanraj, "Electronic Devices and Circuits", Tata McGrawHill Third Edition, 2013
2. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008
3. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", 8th edition., Tata McGraw Hill publishers, New Delhi, 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	3	2	1	-	-	-	-	-	-	-	-	-	1	-
2	3	3	2	1	-	-	-	-	-	-	-	1	-	1
3	1	2	1	-	-	1	1	-	-	-	1	2	-	1
4	3	3	2	2	-	-	-	-	-	-	-	-	2	-
5	3	3	2	2	-	1	-	-	-	-	1	2	2	1
CO (w.a)	**2.6**	**2.6**	**1.6**	**1.6**	**-**	**1**	**1**	**-**	**-**	**-**	**1**	**1.6**	**1.6**	**1**

22PYP01 - PHYSICS LABORATORY *(Common to All Branches)*					
			L	**T**	**P**	**C**
			0	**0**	**2**	**1**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To provide the basic practical exposure to all the engineering and technological streams in the field of physics.	1.1	The students will be able to 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	The students will be able to gain the basic knowledge about handling the laser light and Identify the basic parameters of an optical fiber		
3.0	To enable the students to correlate the theoretical principles with application oriented studies.	3.1	The students will be able to 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	The students will be able to 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	The students will be able to acquire the knowledge in semiconducting devices such as solar cells and LED		

LIST OF EXPERIMENTS

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**	**2.0**	**-**	**-**	**-**	**-**	**-**	**1.0**	**1.0**	**-**	**1.0**	**1.0**	**-**

- **Ratified by Eleventh Academic Council**

22CSP02 –DATA STRUCTURES LABORATORY
(Common to 22CSP02, 22AIP01, 22CCP01, 22CIP01 and 22ITP01)

	L	T	P	C
	0	0	4	2

PREREQUISITE :

Course Objectives		Course Outcomes	
1.0	To learn the concept of pointers	**1.1**	The students will be able to perform array operations using pointers
2.0	To learn the implementation of all types linked list with its different operations.	**2.1**	The students will be able to explore various operations on linked list.
3.0	To impart the basic stack and queue concepts and its applications.	**3.1**	The students will be able to work with stack and queue concepts.
4.0	To Explore the concepts of tree data structures	**4.1**	The students will be able to construct and manipulate various tree operations.
5.0	To understand the various operations on graph	**5.1**	The students will be able to deploy different operations on graphs.

LIST OF EXPERIMENTS:

1. Pointer using 1D, 2D array
2. Dynamic memory allocation
3. Implementation of singly linked list and its operations
4. Implementation of doubly linked list and its operations
5. Implementation of circular linked list and its operations
6. Implementation of Infix to postfix conversion using stack ADT
7. Implement the application for evaluating postfix expressions using array of stack ADT
8. Implementation of reversing a queue using stack
9. Binary Search Tree
10. AVL Tree
11. Priority Queues (Heaps)
12. Implementation of Graph Traversals(BFS, DFS)

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.

Software:

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	3	2	2	2	1	-	-	2	-	2	3	3	3
2	3	3	3	3	1	2	1	2	1	1	1	2	3	2
3	2	3	2	2	1	-	3	-	2	-	3	1	3	2
4	3	3	3	1	1	2	-	1	1	-	1	-	3	2
5	3	2	3	3	2	1	-	1	-	1	2	2	3	2
CO (W.A)	2.8	2.8	2.6	2.2	1.4	1.5	2	1.3	1.5	1	1.8	2	3	2.2

22MEP01 - ENGINEERING GRAPHICS LABORATORY

(Common to AI & DS, BME, CSE, CSE (IoT), CSE (CS), ECE and IT Branches)

L	T	P	C
0	0	4	2

PRE REQUISITE :

	Course Objectives		Course Outcomes
1.0	To Construct various plane curves drawing by Modeling software with dimensions.	**1.1**	The students will be able to construct various plane curves drawing by Modeling software with dimensions.
2.0	To Construct the concept of first angle projection of points, lines and plane drawing by Modeling software with dimensions.	**2.1**	The students will be able to construct the projection of points, lines and planes drawing by Modeling software with dimensions.
3.0	To Develop the projection of solids drawing by Modeling software with dimensions.	**3.1**	The students will be able to develop projection of solids drawing by
4.0	To Solve problems in sectioning of solids and developing the surfaces drawing by Modeling software with dimensions.	**4.1**	The students will be able to solve problems in sections of solids and development of surfaces drawing by Modeling software with dimensions.
5.0	To Apply the concepts of orthographic and isometric drawing by Modeling software with dimensions.	**5.1**	The students will be able to apply the concepts of isometric in engineering practice drawing by Modeling software with dimensions.

LIST OF EXPERIMENTS

1. Study of basic tools, commands and coordinate systems (absolute, relative, polar, etc.) used in 2D software.
2. Draw the conic curves and special curves by using drafting software.
3. Draw the front view, top view, side view of objects from the given isometric view.
4. Draw the projections of straight line inclined to both the principal planes.
5. Draw the projections of polygonal surface.
6. Draw the projections of prism, pyramid inclined to anyone of the principal plane.
7. Draw the sectional view and the true shape of the given cylinder and cone.
8. Draw the development of surfaces like prism and pyramid.
9. Draw the isometric projections of cylinder and cone.
10. Draw the isometric projections of Prism and Pyramid.

TOTAL (P:60) = 60 PERIODS

REFERENCES:

1. K.Venugopal and V.Prabhu Raja,―Engineering Graphics‖, New Age International (P) Limited,2022

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	-	3	1	-	-	-	2	-	3	-	2
2	3	2	1	-	3	1	-	-	-	2	-	3	-	2
3	3	2	1	-	3	1	-	-	-	2	-	3	-	2
4	3	2	1	-	3	1	-	-	-	2	-	3	-	2
5	3	3	2	-	3	1	-	-	-	2	-	3	-	2
CO (w.a)	**3**	**2.2**	**1.2**	**-**	**3**	**1**	**-**	**-**	**-**	**2**	**-**	**3**	**-**	**2**

22MAN04- SOFT/ANALYTICAL SKILLS - II					
		L	T	P	C
Prerequisite : NIL		1	0	2	0
Course Objectives		**Course Outcomes**			
1.0	To acquire satisfactory competency in use of Verbal Reasoning	**1.1**	The students will be able to 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**	The students will be able to 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**	The students will be able to 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. Dr. R.S. Aggarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning", S Chand and Company Ltd, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", Fourth Edition, Cambridge University 2012.

22MAN05 - YOGA – II *(For Common To All Branches)*					
		L	**T**	**P**	**C**
		0	**0**	**I**	**0**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To strengthen the body through physical exercises.	**1.1**	Student will be able to perform physical exercises like spine exercises, massage and acupressure.		
2.0	To understand the importance of value system and ethics.	**2.1**	Student will be able to 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**	Student will be able to analyze various life philosophies of yogi's and rishi's.		
4.0	To understand the nature laws, cause and effect theory.	**4.1**	Student will be able to understand life lessons and nature laws.		
5.0	To inculcate knowledge about different types of Asanas and their benefits.	**5.1**	Students will be able to 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 BOOKS/ REFERENCES:

1. Light On Yoga by B.K.S. Iyengar.

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**

22MYB06 –PROBABILITY AND RANDOM PROCESSES *(Common to BME and ECE Branches)*					
		L	**T**	**P**	**C**
		3	**1**	**0**	**4**
PRE REQUISITE :NIL					
Course Objectives		**Course Outcomes**			
1.0	To understand the concepts of probability, conditional probability and independence	**1.1**	The students will be able to understand the fundamental knowledge of the basic probability concepts.		
2.0	To obtain the distributions of functions of random variables.	**2.1**	The students will be able to well-found in knowledge of standard distributions which can describe real life phenomena		
3.0	To understand the classification of random processes.	**3.1**	The students will be able to acquire skills in handling situations involving more than one random variable and functions of random variables.		
4.0	To understand the concepts as strict stationary, wide sense stationary and Ergodic.	**4.1**	The students will be able to understand and characterize phenomena which evolve with respect to time in probabilistic manner.		
5.0	To understand the concepts of correlation function and power spectral density.	**5.1**	The students will be able to apply concept and properties of spectral density function and cross correlation functions.		

UNIT I – ONE DIMENSIONAL RANDOM VARIABLES	**(9+3)**
Probability: Random variable – Probability mass function – Probability density functions – Properties – Moments –Moment generating functions and their properties	
UNIT II-STANDARD DISTRIBUTIONS	**(9+3)**
Discrete distributions: Binomial, Poisson and Geometric distribution – Continuous distributions: Uniform, Exponential and Normal distribution and its properties.	
UNIT III –TWO DIMENSIONAL RANDOM VARIABLES	**(9+3)**
Joint distributions – Marginal distributions and conditional distribution – Covariance – correlation and Regression – Transformation of random variables – Central limit theorem (Excluding proof).	
UNIT IV–RANDOM PROCESSES	**(9+3)**
Definition and examples – first order, second order strictly stationary, wide-sense stationary and Ergodic process- Markov process – Binomial, Poisson processes.	
UNIT V – CORRELATION AND SPECTRAL DENSITIES	**(9+3)**
Auto correlation – Cross correlation – Properties –Power spectral density – Cross spectral density – Properties – Wiener – Khintchine relation (statement only) – Relationship between cross power spectrum and cross correlation function.	
TOTAL (L:45+T:15) :60 PERIODS	

TEXT BOOKS:

1. Veerarajan.T, "Probability, Statistics and Random Processes,"3rd ed.,NewDelhi,Tata McGraw-Hill,2008
2. Venkatarama Krishnan, "Probability and Random Process,"2nd Edition,John Wiley & Sons , New Jersey,2016
3. Scott L. Miller and Donald Childers, "Probability and Random Processes with applications to Signal Processing and communications," Elsevier, 2012.

REFERENCES:

1. GubnerA.John, "Probability and Random Processes for Electrical and Computer Engineers", Cambridge University press, Newyork, 2006.
2. Charles W.Therrien, Murali Tummala, "Probability and random process for electrical and computer Engineers", CRC Press, Newyork, 2012.
3. Singaravelu.A, Sivasubramanian, Ramaa, "Probability, Statistics and Random Processes," 2nd ed., MeenakshiPublication, Chennai, 2003.

WEB REFERENCES:

1. https://youtu.be/82Ad1orN-NA
2. https://youtube.com/playlist?list=PLOgMKE5DWMGLZcBxYJBFAikdhAaAXJ1_U

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	1		2		
2	3	2	2	1					1	1		2		
3	3	2	2						1	1		2		
4	2	2	2		1				1	1		2		
5	2	2			1				1	1		2		
CO (W.A)	3	2	2	1	1				1	1		2		

22ECC05 - DIGITAL LOGIC DESIGN				
	L	T	P	C
	3	0	0	3

PRE REQUISITE : Nil

Course Objectives		Course Outcomes	
1.0	To make the students to understand the principles and theorems in Digital logic circuits	**1.1**	The Students will be able to apply the Boolean laws and theorems can able to minimize the Boolean expressions
2.0	To enable the student to design and modeling of combinational circuits using Verilog.	**2.1**	The Students will be able to Design simple combinational logic circuits in hardware and simulation using Verilog.
3.0	To make the students to implement the synchronous sequential logic circuits.	**3.1**	The Students will be able to Design synchronous sequential logic circuits in hardware and simulation using Verilog.
4.0	To make the students to design the asynchronous sequential logic circuits.	**4.1**	The Students will be able to Design asynchronous sequential logic circuits.
5.0	To enable the student to design memories and programmable logics.	**5.1**	The Students will be able to construct Programmable arrays and memory logics.

UNIT I - DIGITAL FUNDAMENTALS	**(9)**
Number Systems – Decimal, Binary, Octal, Hexadecimal, Complements -1's and 2's complements, Codes – Binary, BCD, Excess-3, Gray code, Boolean Algebra-Boolean rule, Laws, theorems, Boolean Functions-Sum of products (SOP) and product of sums (POS, Karnaugh map (K-Map) Minimization (upto 4 variables)- NAND and NOR implementation.	
UNIT II - COMBINATIONAL LOGIC DESIGN	**(9)**
Design of Half and Full Adders, Half and Full Subtractor, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Parity generator and checker, Hardware Description Language (HDL) - Modeling of Combinational circuits using Verilog.	
UNIT III - SYNCHRONOUS SEQUENTIAL LOGIC DESIGN	**(9)**
Flip flops – SR, JK, T, D, Master/Slave FF – Operation and Excitation tables, Design of Counters- Ripple Counters, Ring Counters, Johnson's Counter,Modulo-N counters,Shift registers- SISO,SIPO,PIPO,PISO. Modeling of Sequential Circuits using Verilog.	
UNIT IV - ASYNCHRONOUS SEQUENTIAL LOGIC DESIGN	**(9)**
Analysis and Design Procedure - State table and State diagrams, State Reduction Techniques. Cycles and races, race free assignments, Hazards, Essential Hazards, Design of Hazard free circuits.	
UNIT V - MEMORY AND PROGRAMMABLE LOGIC FAMILIES	**(9)**
Basic memory structure – ROM -PROM – EPROM – EEPROM , RAM – Static and dynamic RAM - Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) – Implementation of combinational logic circuits using PLA, PAL	
	TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. M. Morris Mano & Michael D.Ciletti, "Digital Design with an Introduction to the Verilog HDL, 5th Edition, Prentice Hall of India Pvt.Ltd. 2015.
2. Dr. Sanjay Sharma, "Digital Electronics and Logic Design" 4th Edition., S.K.Kataria & Sons, 2017

REFERENCES:

1. Stephan D.Brown & Zvonko G.Vranesic, "Fundamentals of Digital Logic with VHDL Design, 2'nd Edition, Tata Mc Graw – Hill, 2003.
2. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis,"2'nd Edition., Prentice Hall, 2009.
3. Thomas L. Floyd & R P Jain, "Digital Fundamentals," 10th Edition., PHI, 2011.
4. Ronald J Tocci & Neal S. Widmer, "Digital Systems, Principles and Applications," 10th Edition., Pearson education, 2011.
5. Frank Vahid, "Digital Design with RTL Design, Verilog and VHDL," 10'th Edition, John Wiley and Sons, 2010

Mapping of COs with POs / PSOs

COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	2	-	2	3	-	-	1	-	-	3	3	3	2	3	2
2	3	2	1	2	3	-	-	1	1	-	3	3	3	2	3	2
3	-	-	1	-	-	1	3	1	1	3	3	3	3	3	3	2
4	3	3	2	2	3	2	3	1	2	3	3	3	3	3	3	2
5	3	3	-	2	3	-	-	1	2	3	3	3	3	3	3	2
CO (w.a)	**3**	**2.5**	**1.3**	**2**	**3**	**1.5**	**3**	**1**	**1.5**	**3**	**3**	**3**	**3**	**2.6**	**3**	**2**

22ECC06 – SIGNALS AND SYSTEMS *(Common to ECE & BME Branches)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PRE REQUISITE : 22MYB01, 22MYB04					
Course Objectives		**Course Outcomes**			
1.0	To understand the basic properties of signal & systems and its various methods of classification.	**1.1**	The students will be able to incorporate vaious operations on continuous time & discrete time signals.		
2.0	To learn the characterization of continuous time domain LTI systems.	**2.1**	The students will be able to analyze the characterization of continuous time domain LTI systems.		
3.0	To recognize various transforms and their properties applied in continuous time signal analysis.	**3.1**	The students will be able to apply Laplace transform, Fourier transform and Fourier series in continuous time signal analysis.		
4.0	To learn the characterization of discrete time domain LTI systems.	**4.1**	The students will be able to identify the characterization of discrete time domain LTI systems.		
5.0	To recognize various transforms and their properties applied in discrete time signal analysis.	**5.1**	The students will be able to design discrete time LTI system using DTFT and Z transform.		

UNIT I - CLASSIFICATION OF SIGNALS AND SYSTEMS	**(9)**
Standard Signals: Unit impulse, unit step, unit ramp, exponential, and sinusoidal signals, Classification of Continuous and discrete time signals, Types of signals: power, energy, periodic, even and odd, Basic Operations on Signals, Basic System Properties: Linearity, Time Invariant, causality, stability and invertibility, LTI.	
UNIT II - TIME DOMAIN CHARACTERISATION OF CONTINUOUS TIME LTI SYSTEM	**(9)**
Classification of systems - CT systems and DT systems - Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable - Convolution Integral, Properties of continuous time LTI system-Causality, stability, Causal continuous time LTI system described by differential equations	
UNIT III- FREQUENCY DOMAIN REPRESENTATION IN CT SIGNALS	**(9)**
Fourier series representation- exponential, Fourier transform of continuous time aperiodic signals and periodic signals, properties of continuous time Fourier transform, Laplace transform, Region of Convergence, Inverse Laplace transform.	
UNIT IV – TIME DOMAIN CHARACTERISATION OF DISCRETE TIME LTI SYSTEM	**(9)**
Sampling theorem (Low Pass) – Reconstruction of a Signal from its samples, aliasing, Convolution sum, properties of discrete time LTI system, Causal discrete time LTI system described by difference equations.	
UNIT V- FREQUENCY DOMAIN REPRESENTATION IN DT SIGNALS	**(9)**
Fourier Transform of discrete time signals(DTFT) - Properties of DTFT-Z Transform, Inverse Z transform – Long division – partial fraction, ROC, Properties of Z Transform: Linearity, time shifting, change of scale, Z-domain differentiation, differencing, accumulation, convolution in discrete time, initial and final value theorems.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Simon S. Haykin and Barry Van Veen, "Signals and Systems,"2 Nd Edition. Wiley India, 2008(Reprint).

REFERENCES:

1. B. P. Lathi, "Principles of Linear Systems and Signals", Second Edition, Oxford, 2009.
2. R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007.

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	2	2	2	1	-	-	-	-	-	-	-
2	2	2	1	3	2	3	1	-	-	-	-	-	-	-
3	3	2	3	2	1	2	2	-	-	-	-	-	1	-
4	3	1	2	1	2	2	1	-	-	-	-	-	1	1
5	2	2	2	2	1	2	3	-	-	-	-	-	-	1
CO (W.A)	2	2	2	2	1	2	2	-	-	-	-	-	1	1

22ECC07 - ANALOG ELECTRONICS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 22ECC04					
Course Objectives		**Course Outcomes**			
1.0	To understand the different biasing techniques of amplifier.	**1.1**	The Students able to understand and design amplifier biasing circuit for BJT and FET.		
2.0	To study about small signal analysis of amplifiers.	**2.1**	The Students will be able to analyze various parameters of an amplifier using h model.		
3.0	To study about frequency response of amplifiers and different types of power amplifiers.	**3.1**	The Students will be able to draw the frequency response of single stage and multi-stage amplifiers and calculate the efficiency of different power amplifiers.		
4.0	To get awareness about the analysis of feedback amplifiers and tuned amplifiers.	**4.1**	The students will be able to analyze various parameters of feedback amplifiers and able to explain the working of differnt tuned amplifiers.		
5.0	To obtain knowledge about oscillators design and multivibrators.	**5.1**	The students will be able to design oscillators, multivibrators and Schmitt Trigger circuits.		

UNIT I - TRANSISTOR BIAS STABILITY	**(9)**
BJT – Need for biasing – Stability factor - Load line and quiescent point. - Different types of biasing circuits – Method of stabilizing the Q point - Bias compensation – Diode, Thermister and Sensistor compensations – Biasing of FET.	
UNIT II - SMALL SIGNAL AMPLIFIERS	**(9)**
Introduction –Analysis of transistor amplifier circuit using h parameters- Simplified CB, CE & CC - Darlington connection for high input impedance, BJT Differential Amplifiers.	
UNIT III - FREQUENCY RESPONSE OF AMPLIFIERS AND POWER AMPLIFIERS	**(9)**
Frequency response of amplifiers: cutoff frequencies and bandwidth –Multistage amplifiers: coupling methods-CE-CC amplifier- frequency response of multi stage amplifiers. Classification of amplifiers; Class A, Transformer coupled Class A audio amplifier - Class B amplifier - Push-Pull Class B amplifier – Distortion in Power Amplifiers.	
UNIT IV - FEEDBACK AMPLIFIERS AND TUNED AMPLIFIERS	**(9)**
Feedback amplifiers: Effect of negative feedback on amplifiers, Nyquist criterion. Tuned Amplifier: single and double tuned amplifiers- Stagger tuned amplifiers. Stability of tuned amplifiers - Neutralization - Hazeltine neutralization method.	
UNIT V- OSCILLATORS AND MULTIVIBRATORS	**(9)**
Barkhausen Criterion - Analysis of LC oscillators: Hartley – Colpitts oscillator, RC oscillators: RC Phase shift oscillator - Wien bridge oscillator. Multivibrators - Astable multivibrator - Monostable multivibrator - Bistable multivibrator - Schmitt trigger	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2007.

REFERENCES:

1. Millman J and Halkias .C, Integrated Electronics, 4th Edition, Tata McGraw Hill, 2015.
2. S. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, McGraw Hill Private limited, Fifth Edition 2022.
3. David A. Bell, Electronic Devices & Circuits, Oxford Higher Education Press, 5th Edition, 2010.
4. Muhammad H. Rashid, Microelectronic Circuits: Analysis and Design, 2nd Edition, Cengage Learning, 2011.
5. Donald .A. Neamen, Electronic Circuit Analysis and Design –3rd edition, TMH, 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				3			2			3	2	1
2	3	3				2						3	1	2
3	2	2				3							3	
4	3			2							3	3	2	2
5			2						3		3		1	1
CO (W.A)	**3**	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**2**	**-**	**3**	**3**	**2**	**1**

22ECC08 - ELECTRO MAGNETIC FIELDS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 22PYB03					
Course Objectives		**Course Outcomes**			
1.0	To make students to learn and understand the basics of Vector Calculus and Gauss law.	**1.1**	The Students can apply vector calculus to static electric and magnetic fields in different engineering situations.		
2.0	To enable the student to evaluate the electric field due to charge distribution and boundary conditions	**2.1**	The Students will be able to analyze fields a potentials due to static changes		
3.0	To enable the student to evaluate the magnetic field due to line charge and boundary conditions.	**3.1**	The Students will be able to evaluate static magnetic fields		
4.0	To make the students to analyze about time varying electric and magnetic fields.	**4.1**	The students can understand the relation between the fields under time varying situations		
5.0	To make the students to know about the electromagnetic wave equation and wave polarization	**5.1**	The students can acquire knowledge about electromagnetic waves and its polarization		

UNIT I - VECTOR ANALYSIS, DIVERGENCE, CURL	**(9)**
Scalar and Vector analysis - Vector algebra - Coordinate systems: Cartesian coordinate system, cylindrical coordinate system and spherical coordinate system - Divergence, gradient and curl – Divergence and Stokes theorems- Coulomb's Law - Gauss Law & its applications	
UNIT II - STATIC ELECTRIC FIELDS	**(9)**
Electric field intensity – Continuous Charge Distribution, Electric Field due to charges distributed uniformly on an infinite, finite line and circular disc. Relationship between potential and electric field - Electric flux density. Current and Current Density – Boundary conditions for electric fields between free space and conductors, and between dielectrics	
UNIT III - STATIC MAGNETIC FIELD AND MAGNETIC MATERIALS	**(9)**
Biot-Savart Law in vector form – Magnetic Field intensity due to a finite and infinite wire carrying a current I – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I – Ampere's circuital law and simple applications-Lorentz Force Equation, Magnetic flux density, Magnetic boundary conditions. Inductance – Inductance of loops and solenoids –Mutual inductance – simple examples	
UNIT IV - TIME VARYING ELECTRIC AND MAGNETIC FIELDS	**(9)**
Faraday's law –Conduction and Displacement current density –Maxwell's four equations in integral form and differential form- Maxwell's equation in Phasor form -Poynting Vector and the flow of power – Power flow in a co-axial cable	
UNIT V - ELECTROMAGNETIC WAVES	**(9)**
Wave equations for conducting medium and in free space - Wave equations in Phasor form –Reflection of plane waves by a perfect dielectric at normal incidence - wave polarizations-Introduction to EM Shielding Case Study: Biological Effects of Electromagnetic Waves.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:
1. William H. Hayt, Jr and John A. Buck, "Engineering Electromagnetics", 8th Edition, Tata McGraw Hill Publishing Company, NewDelhi, 2012
REFERENCES:
1. Matthew N.O. Sadiku,S.V.Kulkarani, "Principles of Electromagnetics", 6th Edition, Oxford University Press, 2015. 2. Edward .C.Jordan. and Keith.G.Balmain "Electromagnetic Waves and Radiating Systems", 2nd Edition, Pearson Education, 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	3	-	-	-		2	1	-	2	-	2	2	-
2	3	3	-	-	-	2	2	1	-	2	-	2	2	-
3	3	3	-	-		2	2	1	-	2	-	2	2	-
4	3	3	2	2	2	-	1	-	-	-	-	2	2	-
5	3	3	2	2	2	-	2	1	-	-	2	2	3	-
CO (W.A)	**3**	**3**	**2**	**2**	**2**	**2**	**1.8**	**1**	**-**	**2**	**2**	**2**	**2.2**	**-**

22ITC04 ALGORITHMS *(Common to 22AIC06, 22CSC05, 22CCC04and 22CIC04 Subjects)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PREREQUISITE : 22ITC01					
Course Objectives		**Course Outcomes**			
1.0	To know the fundamental concepts and techniques for problem solving and algorithm design.	1.1	The students will be able to analyze worst, best and average case running times of algorithms using asymptotic notations.		
2.0	To learn the different sorting algorithms and the strategy followed.	2.1	The students will be able to use different sorting techniques and strategies.		
3.0	To be familiar with dynamic and greedy algorithm design techniques	3.1	The students will be able to design dynamic-programming and greedy algorithms and apply them to test for optimality.		
4.0	To learn the different kinds of iterative improvement and limitations of algorithm power	4.1	The students will be able to analyze the notion of tractable and intractable problems.		
5.0	To understand backtracking, Branch bound techniques.	5.1	The students will be able to Use the state space tree method for solving problems.		

UNIT I - INTRODUCTION	**(9)**
Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms – Visualization.	
UNIT II - BRUTE FORCE AND DIVIDE-AND-CONQUER	**(9)**
Brute Force – Computing an – String Matching - Selection Sort and Bubble Sort – Sequential Search - Closest-Pair and Convex-Hull Problems - Exhaustive Search: Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort –Closest-Pair and Convex - Hull Problems.	
UNIT III - DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	**(9)**
Dynamic Programming: Computing a Binomial coefficient – Warshall's and Floyd's Algorithm – Optimal Binary Search trees - 0/1 Knapsack Problem. Greedy Technique: Prim's algorithm and Kruskal's Algorithm - Huffman Trees.	
UNIT IV - ITERATIVE IMPROVEMENT AND LIMITATIONS OF ALGORITHM POWER	**(9)**
Iterative Improvement - The Simplex Method - The Maximum-Flow Problem- Maximum Matching in Bipartite Graphs. Limitations of Algorithm Power: Lower bound arguments – Decision trees – P, NP and NP complete Problems.	
UNIT V - STATE SPACE SEARCH ALGORITHMS	**(9)**

Backtracking: N Queen's problem – Hamiltonian Circuit problem – Subset problem - Graph coloring problem. Branch and Bound: Solving 15-Puzzle problem - Assignment problem – Knapsack Problem – Travelling Salesman Problem.
TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 3rd ed.., 2017.

REFERENCES:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran "Computer Algorithms/C++" Orient Blackswan, 2nd Edition, 2019.
2. S. Sridhar, "Design and Analysis of Algorithms ", Oxford university press, 2014.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", 3rd Edition, Prentice Hall of India, 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	-	-	-	1	-	-	-	-	-	3	2
2	3	3	2	-	-	-	-	-	-	-	-	-	3	2
3	3	2	1	1	-	-	1	-	-	-	-	-	3	1
4	3	2	1	1	-	-		-	-	-	-	-	3	2
5	3	2	1	1	-	-	1	-	-	-	-	-	3	2
CO (W.A)	3	2.4	1.4	1	-	-	1	-	-	-	-	-	3	1.8

22ECP02 - DIGITAL LOGIC DESIGN LABORATORY

	L	T	P	C
	0	0	4	2

PRE REQUISITE : Nil

Course Objectives		Course Outcomes	
1.0	To make students to learn and practice the basics of logic gates	**1.1**	The Students can be able to understand the function of logic gates.
2.0	To enable the students to design the combinational logic circuits.	**2.1**	The Students will be able to design the combinational circuits like adder, subtractor, code convertors, encoder & decoders.
3.0	To make the students to learn and practice with design of sequential logic circuits.	**3.1**	The Students will be able to design the sequential circuits like counters and shift registers.
4.0	To enable the students to learn about Verilog code for combinational and sequential circuits	**4.1**	The students will be able to write a program for combinational and sequential circuits using Verilog.
5.0	To motivate the students to implement the project using basic digital logics.	**5.1**	The Students will be able to design projects based on digital logic circuits

LIST OF EXPERIMENTS:

Hardware Experiments

1.Verification of Boolean expressions
2. Construct a Half Adder, Full Adder
3. Construct a Code Converter circuit.(Binary to gray and BCD to Excess-3)
4. Implementation of Magnitude Comparator circuit using logic gates.
5. Design Encoder and decoder circuits using logic gates
6. Construct a Multiplexer and De-Multiplexer circuit using logic gates
7. Verification of SR, JK, D and T Flip Flops
8. Design of Synchronous Counter using flip-flops
9. Design of Shift Registers using flip-flops

Software Experiments(Using Model Sim)

1. Modeling and Simulation of Half adder, Full adder using Verilog.
2. Modeling and Simulation of Multiplexer, Demultiplexer using Verilog.
3. Modeling and Simulation of Synchronous Counters using Verilog.
4. Modeling and Simulation of D-FF using Verilog.

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		1	2
2	3	3	2	2	2		2	1	2		1	1	1	2
3	3	3	2	1	1	1	2	1	2	1	1	1	1	3
4	3	2	1		2	1	2	1		1	1	1	1	3
5	2	2	1	1	1	1	2	2	2	1	3		1	3
CO (w.a)	**2.8**	**2.4**	**1.6**	**1**	**1.5**	**1**	**2**	**1.25**	**2**	**3**	**1.4**	**1**	**1**	**2.6**

22ECP03 - ANALOG ELECTRONICS LABORATORY					
		L	T	P	C
		0	0	4	2
PRE REQUISITE : 22ECC04					
Course Objectives		**Course Outcomes**			
1.0	To design and construct different amplifiers biasing circuits.	**1.1**	The Students can be able to design, construct and draw the frequency response of amplifier biasing and Darlington circuits.		
2.0	To gain design knowledge of negative feedback amplifiers.	**2.1**	The Students can be able to design and analyze the frequency response Power amplifiers, Negative feedback amplifiers and Tuned Amplifiers.		
3.0	To learn about designing of various types of oscillators.	**3.1**	The Students will be able to design different oscillator circuits and observe their output waveform		
4.0	To construct and analysis the different power amplifier	**4.1**	The Students will be able to design different Multivibrator circuits and observe their output waveform		
5.0	To understand working multivibrators and wave shapers.	**5.1**	The students will be able to experiment the multivibrator and wave shapers.		

LIST OF EXPERIMENTS:

1. Design and Construct BJT CE amplifier using Biasing Techniques (Fixed bias and Voltage follower Bias).
2. Construct Darlington Amplifier using BJT and measure its bandwidth.
3. Design and implementation of Class B Power Amplifier.
4. Design and implementation of Negative feedback amplifier (Current Series and Voltage Series).
5. Design and implementation of Single tuned amplifier.
6. Design and implementation of RC phase shift oscillator.
7. Design and implementation of Hartely oscillator.
8. Design and implementation of Astable and Monostable multivibrators.
9. Simulation of Class A amplifiers using PSPICE.
10. Simulation of Astable Multivibrator using PSPICE.
11. Simulation of Schmitt Trigger using PSPICE.

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	2		2	3			2			2	1
2	3	3	2	2		2	3			3			1	2
3	3	3	3	3		3	2			2			3	
4	3		2	2			3						2	2
5							3						1	1
CO (W.A)	**3**	**3**	**1.8**	**1.8**	**-**	**1.4**	**3**	**-**	**-**	**1.4**	**-**	**-**	**1.8**	**1.2**

22MAN07– SOFT / ANALYTICAL SKILLS - III					
		L	T	P	C
		1	0	2	0
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	Improving overall language proficiency for personal or professional reasons	**1.1**	The students will be able to enhance their writing skills		
2.0	To develop problem solving skills across all levels	**2.1**	The students will be able to develop problem solving skills across all levels		
3.0	To develop students to workout solutions for problems that involving general reasoning.	**3.1**	The students will be able to 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. Dr. R.S. Aggarwal, "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)	-	2	1.3	1.3	-	-	0.6	-	2.3	1	-	2.6	1.3	0.3

22MAN09 - INDIAN CONSTITUTION (Common to All Branches)					
		L	**T**	**P**	**C**
		1	**0**	**0**	**0**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To educate students to learn about the Constitutional Law of India.	**1.1**	The students will be able to Gain Knowledge about the Constitutional Law of India.		
2.0	To motivate students to Understand the role of Union Government.	**2.1**	The students will be able to know the Union Government and role of President and Prime Minister.		
3.0	To make students to understand about State Government.	**3.1**	The students will be able to 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**	The students will be able to understand the District Administration, Municipal Corporation and Zila Panchayat.		
5.0	To encourage students to Understand about the election commission.	**5.1**	The students will be able to understand the role and function of election commission.		

UNIT 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.	
UNIT II - UNION GOVERNMENT	**(9)**
Structure of the Indian Union - President - Role and Power - Prime Minister and Council of Ministers - Lok Sabha and Rajya Sabha	
UNIT III - STATE GOVERNMENT	**(9)**
Governor - Role and Power - Chief Minister and Council of Ministers - State Secretariat	
UNIT IV - LOCAL ADMINISTRATION	**(9)**
District Administration - Municipal Corporation - Zila Panchayat	
UNIT 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. B.L. Fadia, "The Constitution of India", Sahitya Bhawan; New edition (2017).
3. DD Basu, "Introduction to the Constitution of India", Lexis Nexis; Twenty-Third 2018 edition.

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.

REFERENCES: Web link

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**		

22ITC06 - JAVA PROGRAMMING *(Common to 22AIC04 ,22CSC07, 22CCC06 and 22CIC06)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PRE REQUISITE : Nil					
Course Objectives		**Course Outcomes**			
1.0	To understand Object oriented programming concepts and characteristics of Java	**1.1**	The students will be able to develop Java programs using OOP principles		
2.0	To know the principles of Inheritance, abstraction and interfaces	**2.1**	The students will be able to develop Java programs with the concepts of inheritance		
3.0	To define exceptions and use I/O streams	**3.1**	The students will be able to construct applications with exception handling.		
4.0	To understand threads concepts	**4.1**	The students will be able to develop Java applications using threads		
5.0	To design and build simple GUI programs using AWT and Swings.	**5.1**	The students will be able to develop interactive Java applications using GUI components.		

UNIT I - INTRODUCTION TO OOP AND JAVA FUNDAMENTALS	**(9)**
Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment - Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Strings, Packages - JavaDoc comments.	
UNIT II - INHERITANCE AND INTERFACES	**(9)**
Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods-Keywords: Static-final-this- final methods and classes – Method overloading-Method overriding-Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces	
UNIT – III EXCEPTION HANDLING AND I/O	**(9)**
Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing File	
UNIT – IV –THREADS	**(9)**
Java Thread Model – Main Thread – Creating a Thread – Creating Multiple Threads — Thread Priorities – Synchronization – Inter thread Communication – Suspending, Resuming, and Stopping Threads – Using Multithreading.	
UNIT – V EVENT DRIVEN PROGRAMMING	**(9)**
Graphics programming - Frame – Components Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy - Introduction to Swing – layout management - Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.	
	TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:
1. Herbert Schildt, "Java: The Complete Reference", 11th Edition, McGraw Hill Education, New Delhi, 2019. 2. Herbert Schildt, "Introducing Java FX 8 Programming", 1st Edition, McGraw Hill Education, New Delhi, 2015.
REFERENCE: 1. Cay. S. Horstmann, Gary Cornell, "Core Java-JAVA Fundamentals", Prentice Hall, 10th ed., 2016. 2. Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015.3. SCJP Sun Certified Programmer for Java 6 Study Guide. 6th edition, McGrawHill.

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				1			1	2	1
2	3	1	1		1				1			1	1	2
3	3	1	1		1				2			1	2	1
4	3	2	1		1				2			2	1	1
5	3	2	2	2	1				3	1	3		1	1
CO (W.A)	**3.0**	**1.6**	**1.2**	**2.0**	**1.0**	**-**	**-**	**-**	**1.8**	**1.0**	**3.0**	**1.2**	**1.4**	**1.2**

22ECC09 - ANALOG CIRCUIT DESIGN					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 22ECC04					
Course Objectives		**Course Outcomes**			
1.0	To make the students to understand the circuit configurations for Linear Integrated Circuits.	**1.1**	The Students will able to understand basic concepts of Linear IC's.		
2.0	To enable the student to design the basic applications of an op-amp.	**2.1**	The Students will be able to design all Linear and Non linear op-amp configurations.		
3.0	To enable the student to design analog multiplier, PLLs and their applications.	**3.1**	The Students will be able to Design simple analog multiplier circuits and PLL applications		
4.0	To make the students to design A to D and D to A converters.	**4.1**	The Students will be able to Design A to D and D to A converters.		
5.0	To make the students to design the simple circuits using timers.	**5.1**	The Students will be able to Design simple analog circuits using op-amp.		

UNIT I - CIRCUIT CONFIGURATION FOR LINEAR ICS	**(9)**
Introduction-Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Ideal operational amplifier, General operational amplifier stages, IC 741 Op-Amp, slew rate, CMRR, Open and closed loop configurations.	
UNIT II - APPLICATIONS OF OPERATIONAL AMPLIFIERS	**(9)**
Sign Changer, Scale Changer, Voltage Follower, V-to-I and I-to-V converters, Summing amplifier, Differential Amplifier, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Precision Rectifier, Schmitt trigger, Low-pass, high-pass and band-pass filters.	
UNIT III - ANALOG MULTIPLIER AND PLL	**(9)**
Analog Multiplier- Applications- Squarer and frequency doubler, Gilbert Multiplier cell - Variable trans conductance technique, Operation of the basic PLL, Capture range, Lock in range and pull in time, Application of PLL for AM detection, FM detection, FSK modulation and demodulation.	
UNIT IV - DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS	**(9)**
Introduction- D/A converter - specifications -Binary weighted resistor type, R-2R Ladder type, High speed sample-and-hold circuits, A/D Converters -specifications - Flash type - Successive Approximation type - Single Slope type - Dual Slope type.	
UNIT V -WAVEFORM GENERATORS AND SPECIAL FUNCTION IC's	**(9)**
Sine-wave generators, and Triangular wave generator, Saw-tooth wave generator, CL8038 function generator, Timer IC 555- Astable and Monostable operation, IC Voltage regulators - Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator -Monolithic switching regulator, Frequency to Voltage and Voltage to Frequency converters.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

2. Robert F. Coughlln and Driscoll, "Operation amplifiers and Linear Integrated Circuits", 6th ed., Pearson Education.2009.
3. Serglo Franco, "Design with Operational Ampliifers and Analog Integrated Circuits", 3rd Edition, TMH, 2007.

REFERENCES:

3. S.Saliahanan and V.S.Kanchana Bhaaskaran, "Linear Integrated Circuits", Tata McGraw Hill (2008).
4. P.R. Gray and R.G.Meyer, "Ananlysis and Design of Analog Integrated Circuit", John Willey, 2009.
5. D.Roy Choundhury and Shail B.Jain, "Linear Integrated Circuits", New Age International (P) Limited, 2011.

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	2	2	2	1	-	-	-	-	-	-	-
2	2	2	1	3	1	3	1	-	-	-	-	-	-	-
3	2	2	3	2	1	2	2	-	-	-	-	-	1	-
4	3	1	2	1	2	2	1	-	-	-	-	-	1	1
5	2	2	2	2	2	2	3	-	-	-	-	-	-	1
CO (W.A)	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**1**

22ECC10 - TRANSMISSION LINES AND RF SYSTEMS			
L	T	P	C
3	0	0	3

PRE REQUISITE : 22ECC08

Course Objectives		Course Outcomes	
1.0	Introduce various types of transmission lines and analyze the lumped circuit model of a transmission line and their characteristics	**1.1**	The students will be able to analyze the transmission line along with its parameters.
2.0	To find SWR, Reflection Coefficient and impedance matching using Smith Chart.	**2.1**	The students will be able to measure VSWR and impedance using smith chart in single stub and double stub matching
3.0	To investigate the propagation of electromagnetic waves in Parallel plane waveguides.	**3.1**	The students will be able to compute the characteristics of guided waves between the parallel planes
4.0	To investigate the propagation of electromagnetic waves in rectangular and circular waveguides.	**4.1**	The students will be able to evaluate the characteristics of rectangular and circular waveguides
5.0	To illustrate about the basic RF components	**5.1**	The students will be able to use RF components for design Microwave circuits.

UNIT I - TRANSMISSION LINE THEORY	**(9)**
Line Parameters, The transmission line – general solution, Physical significance of the equation, Wavelength and velocity of wave propagation, Waveform distortion, The distortion less line, the telephone cable, Loading of Transmission Line, Line not terminated in Z0- Reflection coefficient, Open circuit and short circuit line, Reflection factor and Reflection loss, Insertion Loss.	
UNIT II - IMPEDANCE MATCHING	**(9)**
Standing waves and standing wave ratio, Impedance matching- Half wavelength and Quarter wave transformer, single stub matching and Double stub matching. Smith chart, Applications - Measurement of VSWR, impedance, single stub and double stub using smith chart.	
UNIT III - GUIDED WAVES	**(9)**
Wave between the parallel planes, Transmission of TM waves between Parallel planes – Transmission of TE waves between Parallel planes. Transmission of TEM waves between Parallel planes –Velocities of the waves. Characteristic impedance of parallel plane.	
UNIT IV - RECTANGULAR AND CIRCULAR WAVEGUIDES	**(9)**
Applications of Maxwell's equations to the rectangular waveguide, TM waves in Rectangular waveguide, TE waves in Rectangular waveguide, Dominant mode in Rectangular waveguide - TM waves in Circular waveguide, TE waves in Circular waveguide , Dominant mode in Circular waveguide	
UNIT V - RF COMPONENTS	**(9)**
Active RF components: Semiconductor basics in RF, bipolar junction transistors, RF field effect transistors, High electron mobility transistors Basic concepts of RF design, Mixers, Low noise amplifiers, voltage control oscillators, Power amplifiers, transducer power gain and stability considerations.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. John D Ryder, "Networks, lines and fields", 2nd Edition, Prentice Hall India, 2015.
2. Mathew M. Radmanesh, "Radio Frequency &Microwave Electronics", Pearson Education Asia, Second Edition, 2002.

REFERENCES:

1. Reinhold Ludwig and Powel Bretchko," RF Circuit Design – Theory and Applications", Pearson Education Asia, First Edition, 2001.
2. D. K. Misra, "Radio Frequency and Microwave Communication Circuits- Analysis and Design", John Wiley & Sons, 2004.
3. E.C.Jordan and K.G. Balmain, –Electromagnetic Waves and Radiating Systems Prentice Hall of India, 2006.
4. G.S.N Raju, "Electromagnetic Field Theory and Transmission Lines Pearson Education, First edition 2005.

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			3	2		1			3	
2	3	2	1	1	3			2		1			2	
3	3	2	1	1			2	2		1			1	
4	3	2	1	1			2	1		1			1	
5	3	2	1	1	1			1		1			2	
CO (W.A)	**3**	**2**	**1**	**1**	**2**		**2.3**	**1.6**		**1**			**1.8**	

22ECC11 - DIGITAL SIGNAL PROCESSING					
		L	T	P	C
		3	0	2	4
PRE REQUISITE : 22ECC06					

Course Objectives		Course Outcomes	
1.0	To learn discrete Fourier transforms and Fast Fourier Transform and its properties.	**1.1**	The students will be able to apply DFT and FFT for the analysis of discrete signals & systems
2.0	To know the characteristics of FIR filters learn the design of finite impulse response filters for filtering undesired signals.	**2.1**	The students will be able to design and implement digital FIR filters.
3.0	To know the characteristics of IIR filters learn the design of infinite impulse response filters for filtering undesired signals.	**3.1**	The students will be able to design and implement digital IIR filters.
4.0	To understand Finite word length effects.	**4.1**	The students will be able to characterize Finite Word length effect on filters.
5.0	To understand the fundamental concepts of multi rate signal processing and its applications	**5.1**	The students will be able to apply in real time applications.

UNIT I - FAST FOURIER TRANSFORMS	**(9)**
Introduction to DFT and IDFT, Properties of DFT, FFT Algorithm-Radix-2 - Decimation in Time (DIT)-Decimation in Frequency (DIF)Fast Convolution-Overlap Save method-Overlap Add Method.	
UNIT II – DIGITAL IIR FILTERS	**(9)**
Review of design techniques for analog low pass filter (Butterworth and Chebyshev type-1), Frequency transformation in Analogue domain, IIR filter Design: Bilinear and Impulse Invariant Techniques, Realization structures for IIR filters.	
UNIT III - DIGITAL FIR FILTERS	**(9)**
Design characteristics of FIR filters with linear phase – Frequency response of linear phase FIR filters - Design of FIR filters using window functions (Rectangular, Hamming, Hanning, and Blackman) - Realization structures for FIR filters.	
UNIT IV - FINITE WORD LENGTH EFFECTS	**(9)**
Fixed point and floating point number representation - ADC - quantization - truncation and rounding-quantization noise - input / output quantization - coefficient quantization error - product quantizationerror - overflow error - limit cycle oscillations due to product quantization and summation	
UNIT V - MULTIRATE SIGNAL PROCESSING	**(9)**
Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor I/D – Implementation of sampling rate conversion : Polyphase filter Structures- Interchange of filters and Downsamplers /Upsamplers –Application of Multirate signal processing.	

LIST OF PROGRAMS USING MATLAB (Assignment/Online Test**)**:

1. Generation of Signals Using Mat lab Function.
2. Implementation of DIT and DIF Algorithms.
3. Implementation of Linear convolution and Circular convolution.
4. Implementation of Low pass and high pass FIR filter for a given sequence.
5. Implementation of Band pass and Band stop FIR filter for a given sequence.
6. Implementation of Low pass and high pass IIR filter for a given sequence.
7. Implementation of Band pass and Band stop IIR filter for a given sequence.
8. Verification of Sampling Theorem.
9. Determination of Power Spectrum of a given signal.
10. Implementation of Decimation Process

TOTAL (L:45 P:30) : 75 PERIODS

TEXT BOOKS:

1. J.G.Proakis, D.G.Manolakis and D.Sharma, "Digital Signal Processing, Algorithms and Applications", Pearson Education, 2012.

REFERENCES:

1. S. Salivahanan, A. Vallavaraj and G.Gnanapriya, "Digital Signal Processing", Tata McGraw-Hill Company Publication Limited, 21 st Reprint 2007.
2. Oppenheim V.A.V and Schaffer R.W, "Discrete – time Signal Processing", 2nd Edition, Prentice Hall, 2013.
3. S.K.Mitra, Digital Signal Processing, 4th Edition, TMH, 2010.
4. Lawrence R Rabiner and Bernard Gold, "Theory and Application of Digital Signal Processing", PHI 2010.

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	2		2	3			2			2	1
2	3	3	2	2		2	3			3			1	2
3	3	3	3	3		3	2			2			2	2
4	3		2	2			3						1	2
5							3						2	3
CO (W.A)	3	2	2	2		2	3			2			2	2

22ECC12 – ANALOG AND DIGITAL COMMUNICATION					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 22ECC06					
Course Objectives		**Course Outcomes**			
1.0	To provide knowledge on complete analysis of Amplitude modulation.	**1.1**	The students will be able to design parameters in various techniques of Amplitude modulation and demodulation schemes.		
2.0	To acquire knowledge about Angle modulation.	**2.1**	The students will be able to acquire the knowledge about the design techniques in Angle modulation and demodulation schemes.		
3.0	To learn the concepts of information theory and basics of error control coding.	**3.1**	The students will be able to calculate Entropy and performance of communication systems and perform error control coding.		
4.0	To analyze the performance of Baseband Transmission.	**4.1**	The students will be able to describe different methods of Pulse modulation and Baseband data transmission and reception.		
5.0	To deliberate the performance of Pass band and spread spectrum communication.	**5.1**	The students will be able to analyze the performance of various Pass band data transmission, reception techniques and spread spectrum communication.		

UNIT I - AMPLITUDE MODULATION	**(9)**
Functional block diagram of communication systems- Linear modulation schemes: Generation of AM: DSBFC using balanced modulator- Introduction to DSBSC, SSBSC and VSB Signals- Comparison of Amplitude Modulation Systems. Super heterodyne receivers- Noise in AM receivers - coherent detection, envelope detection.	
UNIT II - ANGLE MODULATION	**(9)**
Frequency modulation, Narrowband FM, Wideband FM-Generation of FM: indirect method-FM demodulation: frequency discriminator-Non linear effects in FM systems-Noise in FM receivers-capture effect-pre emphasis and de-emphasis in FM.	
UNIT III - INFORMATION THEORY AND CODING	**(9)**
Entropy and its properties-source coding theorem: Shanon-Fano coding, Discrete memory less channel-mutual information and its properties-channel coding theorem-information capacity theorem; Hamming codes- convolutional codes-Trellis diagram-Viterbi algorithm	
UNIT IV - PULSE MODULATION AND BASEBAND TRANSMISSION	**(9)**
Sampling process-PAM, PPM, PWM-Quantization process-PCM-DPCM-Delta Modulation-Adaptive delta modulation-Classification of line coding and Decoding-Matched Filter –Error rate due to noise –Inter symbol Interference-Eye patterns - Nyquist criterion for distortion less base band Binary Transmission-Correlative level coding: Duo binary with and without precoder- Modified duo binary with and without precoder.	

UNIT V - PASSBAND DATA AND SPREAD SPECTRUM MODULATION	(9)
Pass band Transmission model-Generation, detection ,signal space diagram, bit error probability and power spectra of Binary Modulation schemes (ASK,FSK,PSK), Quadrature Modulation schemes (QPSK,QAM) – Comparison of Binary and Quadrature modulation techniques. Spread Spectrum: PN sequence and its properties- Direct sequence spread spectrum-Frequency Hopping spread spectrum.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Simon Haykin, "Communications Systems", Wiley Education, 5th Edition, 2009.
2. T L Singal, "Analog & Digital Communications", Tata McGraw-Hill Education, 4th Edition, 2012

REFERENCES:

1. Taub H and Schilling D L, "Principles of Communication Systems", McGraw Hill, 4th Edition, 2017.
2. Wayne Tomasi, "Electronic Communications Systems–Fundamentals Through advanced", Pearson Education, 4th Edition, 2007.
3. Praokis J.G., "Digital Communications" 5th Edition, McGraw Hill, 2014.
4. Bernard Sklar, Pabitra Kumar Ray "Digital Communications: Fundamentals & Applications", Pearson Education, 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	2	2							3		2	
2	3	3	2	3							2		2	
3	2	2	3	3	2								2	
4	3	2	2	2	2				2	3	2	2	3	
5	3	3	2	2	3				2	2		2	2	
CO (W.A)	2.8	2.4	2.2	2.4	2.3				2	2.5	2.3	2	2.2	

22ITP04 - JAVA PROGRAMMING LABORATORY *(Common to 22AIC04 ,22CSC07, 22CCC06 and 22CIC06)*					
		L	**T**	**P**	**C**
		0	**0**	**4**	**2**
PRE REQUISITE : Nil					

Course Objectives		**Course Outcomes**	
1.0	To impart fundamental concepts of OOP using java	1.1	The students will be able to create simple Java programs using basic programming elements in Java.
2.0	To gain exposure about inheritance, packages and Interfaces	2.1	The students will be able to develop applications using inheritance, packages and interfaces.
3.0	To explore about the exception handling mechanism	3.1	The students will be able to construct applications with exception handling.
4.0	To understand threads concepts	4.1	The students will be able to build applications using threads and collection framework
5.0	To know about Event handling using swing components.	5.1	The students will be able to create GUIs and event driven programming applications for real world problems.

LIST OF EXPERIMENTS:

1. Write simple Java programs using operators, arrays and control statement
2. Programs using Static, final and this keywords.
3. Demonstrate the concepts of inheritance
4. Programs illustrating overloading and overriding methods in Java
5. Programs to use packages and Interfaces in Java.
6. Implement exception handling and creation of user defined exception.
7. Implement program to demonstrate multithreading and inter thread communication.
8. Write a program to perform file operations.
9. Develop applications using swing layouts

HARDWARE OR SOFTWARE REQUIREMENT:

HARDWARE:

1. LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
2. Printers – 3 Nos.

SOFTWARE:

1. Java / Equivalent Compiler

TOTAL: P: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		3	2	2	2	3	3	1	1
2	2	2	3	3	3	1	3	3	2	2	3	3	1	
3	2	2	3	3	3	1	3	3	2	2	3	3	1	1
4	2	2	3	3	3	1	3	3	2	2	3	3	1	
5	2	2	3	3	3	2	3	3	2	2	3	3	1	2
CO (W.A)	2.2	2.2	2.4	3.0	2.8	1.25	3.0	2.8	2.0	2.0	3.0	3.0	1.0	1.1

22ECP04 - ANALOG CIRCUIT DESIGN LABORATORY					
		L	T	P	C
		0	0	4	2
PRE REQUISITE : 22ECC04					
Course Objectives		**Course Outcomes**			
1.0	To make students to able to design various voltage amplifiers using Op-amp	1.1	The Students will be able to design various voltage amplifiers using Op-amp		
2.0	To make students to able construct the linear application circuits of Op-amp	2.1	The Students will be able to construct the linear application circuits of Op-amp		
3.0	To make the students able to design the Oscillator circuit using Op-amp	3.1	The Students will be able to design the Oscillator circuit using Op-amp		
4.0	To enable the students construct active filters and verify their response	4.1	The students will be able to construct active filters and verify their response		
5.0	To make the students to design and construct the application circuits of 555 timer IC	5.1	The Students will be able to design and construct the application circuits of 555 timer IC		

LIST OF EXPERIMENTS
1. Design of Inverting and Non Inverting amplifier for a specified gain using IC741.
2. Design of a Inverting and Non Inverting Summing amplifier and using IC-741.
3. Design of differentiator and integrator for a specified gain using IC741.
4. Design of a sinusoidal oscillator for specified frequency based on RC phase shift oscillators using IC-741.
5. Design of Astable Multivibrators using NE555 Timer.
6. Design of Pulse Width Modulator circuit using NE555 Timer.
6. Design of Monostable Multivibrators using NE555 Timer.
8. Design of Active LPF and HPF and plot their frequency response.
9. Study of Voltage Regulator using IC723
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	3	4
1	3	3	2	2	-	-	-	-	1	-	3	2	3	1	1	2
2	3	3	2	2	-	-	-	-	1	-	3	2	3	1	1	2
3	3	2	-	2	-	-	-	-	1	-	3	2	3	1	2	3
4	3	2	-	2	-	-	-	-	1	-	3	2	3	1	2	3
5	3	2	-	2	-	-	-	-	1	-	3	2	3	1	2	3
CO (W.A)	**3**	**2.4**	**1**	**2**	**0**	**0**	**0**	**0**	**2.5**	**0**	**3**	**2**	**3**	**1**	**1.6**	**2.6**

22ECP05 – ANALOG AND DIGITAL COMMUNICATION LABORATORY					
		L	T	P	C
		0	0	4	2
PRE REQUISITE : 22ECC06					
Course Objectives		**Course Outcomes**			
1.0	To demonstrate the concepts of generation and detection of analog modulation schemes	**1.1**	The students will be able to transmit and receive the signal using Analog modulation and demodulation schemes		
2.0	To understand the concepts of Emphasis Techniques	**2.1**	The students will be able to analysis the response of pre - Emphasis and de-emphasis		
3.0	To demonstrate the concepts of generation and detection of digital modulation schemes	**3.1**	The students will be able to transmit and receive the signal using digital modulation and demodulation schemes		
4.0	To demonstrate the concepts of pulse modulation schemes	**4.1**	The students will be able to transmit and receive the signal using Analog and digital pulse modulation and demodulation schemes		
5.0	To acquire the knowledge about error control coding using MATLAB	**5.1**	The students will be able to apply the Error control coding techniques using MATLAB in communication		

List of Experiments

1. Generation and Detection of Amplitude modulation signals.
2. Generation and Detection of Frequency Modulation.
3. Response of Pre-Emphasis / De-emphasis Circuits.
4. Sampling process: Generation of Pulse Modulation waveforms–PAM / PWM / PPM.
5. Generation of Line Coding and Decoding techniques.
6. Generation and detection of digital modulation schemes- ASK, PSK, FSK.
7. Generation and detection of QPSK waveforms.
8. Generation and detection of Delta Modulation waveforms.
9. Implementation of Pulse Code modulation/TDM for digital input.
10. Implementation of DSB modulator and demodulator.
11. Implementation of Error control coding using MATLAB.
12. Analysis of PLL and Frequency synthesizer.

TOTAL : 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	2		2	3			2			2	1
2	3	3	2	2		2	3			3			1	2
3	3	3	3	3		3	2			2			3	
4	3		2	2			3						2	2
5							3						1	1
CO (W.A)	**3**	**3**	**1.8**	**1.8**	**-**	**1.4**	**3**	**-**	**-**	**1.4**	**-**	**-**	**1.8**	**1.2**

22MAN08 – SOFT / ANALYTICAL SKILLS - IV					
		L	T	P	C
		1	0	2	0
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To recollect the functional understanding of basic grammar and its structure	**1.1**	The students will be able to 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**	The students will be able to solve aptitude problems with ease		
3.0	To enrich their knowledge and to develop their logical reasoning ability	**3.1**	The students will be able to solve reasoning problems with ease.		

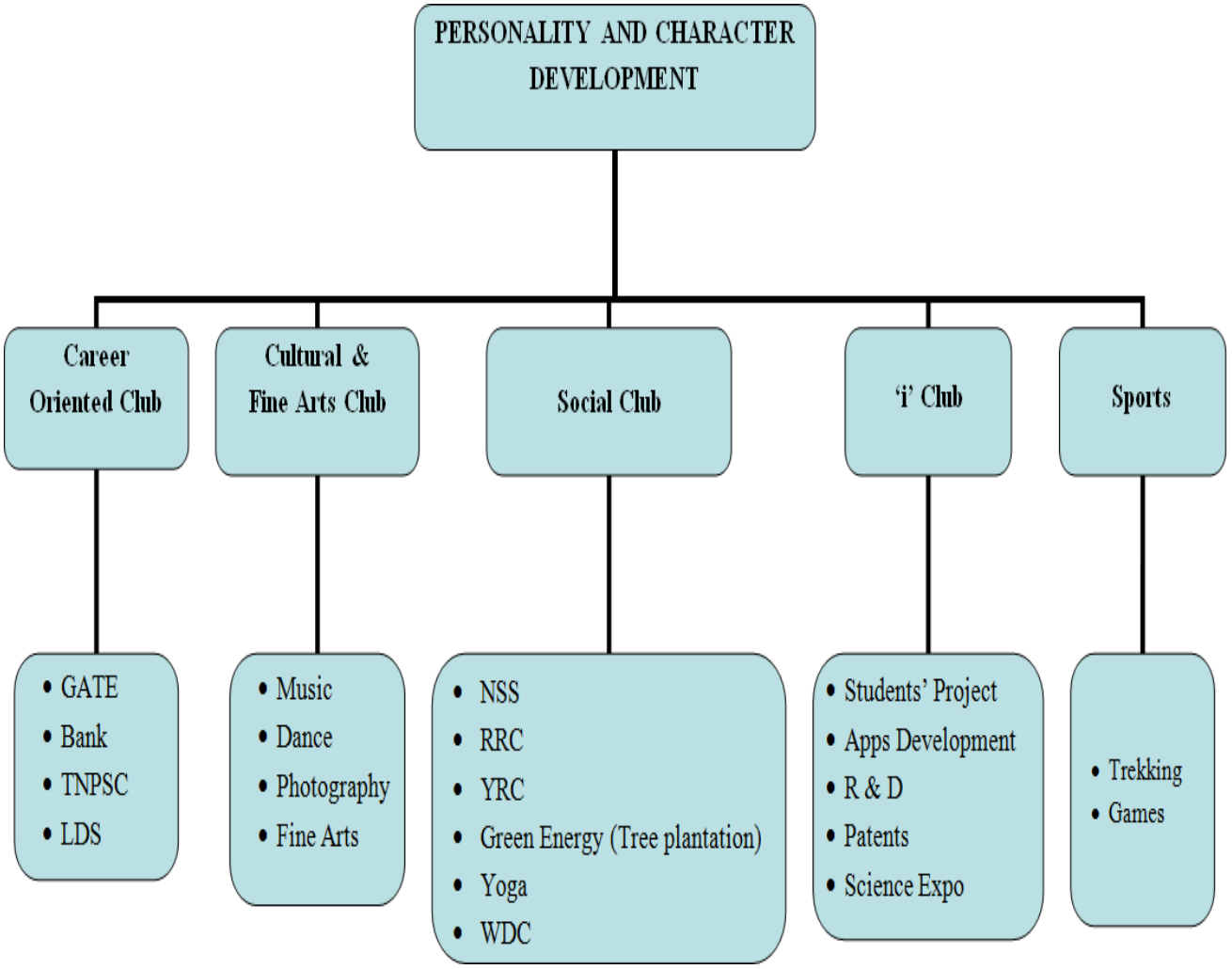
UNIT I - Verbal	**(5+10)**
Articles -Fill in the blanks - Grammatical Error - Sentence improvement	
UNIT II – Aptitude	**(5+10)**
Speed and Distance -Time and Work-Mixture And Alligations-Permutation and Combinations	
UNIT III - Logical and Reasoning	**(5+10)**
Seating Arrangement- Directions and Distance- Non verbal Reasoning	
TOTAL (L:15, P:30) : 45 PERIODS	

REFERENCES:

1. Dr. R.S. Aggarwal, "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)	-	2	1.3	1.3	-	-	0.6	-	2.3	1	-	2.6	1.3	0.3

22GED01 – PERSONALITY AND CHARACTER DEVELOPMENT				
	L	T	P	C
	0	0	I	0
PRE REQUISITE : NIL				



*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 purityof 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**
	I	**0**	**0**	**I**
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 – தமிழ்க 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, ஒயிலாட்டாம், 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 பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் –இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ் புத்தக்களின் அச்சு 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)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
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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 தமிழரும் தொழில்நுட்பமும் (அனைத்து பாடப்பிரிவினருக்கும்)				
	L	T	P	C
	I	0	0	I
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 நீர்பாசனத் தொழில் நுட்பம்:	**(3)**
அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் 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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