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 – Computer Science and Engineering (Internet of Things)[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 – COMPUTER SCIENCE AND ENGINEERING (IoT)	
VISION	To be a centre of excellence providing high quality Computing and Internet of Things education to meet the ever growing needs of the smart society.
MISSION	• To provide quality education to produce Computer Science and Internet of Things professionals with social responsibility • To excel in research in the field of Computing and Internet of Things To be a learner centric environment with continual progress to meet the global smart computing needs.
PROGRAMME EDUCATIONAL OBJECTIVES (PEO)	The graduates of Computer Science and Engineering (Internet of Things) will be **PEO1: Core Competency:** To transform the graduates as experts in the computing profession and to satisfy the needs of the IoT industry. **PEO2: Research, Innovation and Entrepreneurship:** To empower the graduates with knowledge in communicating equipments using Internet with ability to offer solutions for real time applications **PEO3: Ethics, Human values and Life- Long Learning:** To possess the necessary soft skills for working in diverse cultural and inter disciplinary teams and ensure that the graduates practice professional ethics in IoT.
PROGRAMME SPECIFIC OUTCOMES (PSO)	The students of Computer Science and Engineering (Internet of Things) will be able to **PSO1: Knowledge Proficiency:** Students at the time of graduation will be equipped with knowledge of IoT equipments in various platforms, possess computing skills with secured network control and act responsibly in legal, ethical and security related issues. **PSO2: Recent Technology:** Students at the time of graduation will be able to apply emerging appropriate technology and programming skills to find optimal solutions for complex problems by applying domain knowledge to transform innovative ideas into reality.

PROGRAM OUTCOMES:

At the end of a programme a students will be able to demonstrate ability 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, andsynthesis 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 solutionsin 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 leaderin 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 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	3	3	3	1	1	2	2	1	3	3
2	3	3	3	3	3	1	1	1	2	1	3	3
3	3	3	3	3	3	2	2	3	1	2	2	3

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	3	3	2	1	2	2	1	2	2	3
2	3	3	3	3	3	2	3	3	3	3	3	3

Contribution 1: Reasonable 2: Significant 3: Strong

NANDHA ENGINEERING COLLEGE (AUTONOMOUS), ERODE – 638 052

REGULATIONS – 2022 CHOICE BASED CREDIT SYSTEM

B.E – Computer Science and Engineering (Internet of Things)

SEMESTER: I									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
I	22MAN01	Induction Programme	MC	-	-	-	-	-	-
THEORY									
2	22EYA01	Professional Communication - I	HSMC	-	4	2	0	2	3
3	22MYB01	Calculus and Linear Algebra*	BSC	-	4	3	1	0	4
4	22PYB01	Semiconductor Physics	BSC	-	3	3	0	0	3
5	22ECC01	Basics of Electronics Engineering	ESC	-	3	3	0	0	3
6	22CSC01	Problem Solving and C Programming	ESC	-	3	3	0	0	3
7	22GYA01	தமிழர் மரபு / Heritage of Tamils*	HSMC	-	1	1	0	0	1
PRACTICAL									
8	22ECP01	Basics of Electronics Engineering Laboratory	ESC	-	4	0	0	4	2
9	22CSP01	Problem Solving and C Programming Laboratory	ESC	-	4	0	0	4	2
10	22PYP01	Physics Laboratory*	BSC	-	2	0	0	2	1
Mandatory Non Credit Courses									
11	22MAN02	Soft/Analytical Skills - I	MC	-	3	1	0	2	0
12	22MAN03	Yoga – I*	MC	-	1	0	0	1	0
				TOTAL	**32**	**16**	**1**	**15**	**22**

*Ratified by Eleventh Academic Council

SEMESTER: II									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22EYA02	Professional Communication - II	HSMC	22EYA01	4	2	0	2	3
2	22MYB03	Statistics and Numerical Methods*	BSC	-	4	3	1	0	4
3	22CIC01	Data Structures using C*	ESC	22CSC01	3	3	0	0	3
4	22CIC02	Python Programming	ESC	-	3	3	0	0	3
5	22CIC03	Digital Principles and Computer Organization	ESC	-	3	3	0	0	3
6	22GYA02	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology*	HSMC	-	1	1	0	0	1
PRACTICAL									
7	22CIP01	Data Structures Laboratory*	ESC	22CSP01	4	0	0	4	2
8	22CIP02	Python Programming 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	**32**	**16**	**1**	**17**	**23**

*Ratified in Eleventh Academic Council

SEMESTER: III									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22MYB05	Discrete Mathematics	BSC	-	4	3	1	0	4
2	22CIC04	Algorithms	PCC	-	3	3	0	0	3
3	22CIC05	Internet of Things and its Applications	PCC	-	3	3	0	0	3
4	22CIC06	Java Programming	PCC	-	3	3	0	0	3
5	22CIC07	Operating Systems	PCC	-	3	3	0	0	3
PRACTICAL									
6	22CIP03	Algorithms Laboratory	PCC	-	4	0	0	4	2
7	22CIP04	Internet of Things and its Applications Laboratory	PCC	-	4	0	0	4	2
8	22CIP05	Java Programming Laboratory	PCC	-	4	0	0	4	2
Mandatory Non Credit Courses									
9	22MAN07	Soft/Analytical Skills - III	MC	22MAN04	3	1	0	2	0
10	22MAN09	Indian Constitution	MC	-	1	1	0	0	0
				TOTAL	**32**	**17**	**1**	**14**	**22**

SEMESTER: IV									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22CIC08	Artificial Intelligence and Machine Learning	PCC	-	3	3	0	0	3
2	22CIC09	Computer Networks	PCC	-	3	3	0	0	3
3	22CIC10	Database Management System	PCC	-	3	3	0	0	3
4	22CIC11	Sensors and Actuator Devices	PCC	-	3	3	0	0	3
5	22CIC12	Privacy and Security in IoT	PCC	22CIC05	3	3	0	0	3
6	22CYB07	Environmental Science and Engineering	BSC	-	3	3	0	0	3
PRACTICAL									
7	22CIP06	Computer Networks Laboratory	PCC	-	4	0	0	4	2
8	22CIP07	Database Management System Laboratory	PCC	-	4	0	0	4	2
9	22CIP08	Sensors and Actuator Devices Lab	PCC	-	4	0	0	4	2
Mandatory Non Credit Courses									
10	22MAN08	Soft/Analytical Skills - IV	MC	22MAN07	3	1	0	2	0
11	22GED01	Personality and Character Development	EEC	-	0	0	0	1	0
				TOTAL	**33**	**19**	**0**	**15**	**24**

SEMESTER: V									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22CIC13	Design of Smart Cities	PCC	22CIC11	4	3	1	0	4
2	22CIC14	Advanced Java Programming	PCC	22CIC06	3	3	0	0	3
3	22CIC15	Web Technology	PCC	-	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(OEC/PEC)	PEC/OEC	-	3	3	0	0	3
PRACTICAL									
7	22CIP09	Advanced Java Programming Laboratory	PCC	22CIP05	4	0	0	4	2
8	22CIP10	Web Technology Laboratory	PCC	-	4	0	0	4	2
Mandatory Non Credit Courses									
9	22MAN10	Soft/Analytical Skills - V	MC	22MAN08	3	1	0	2	0
10	22MAN11	Certification Course - I	MC	-	1	0	0	1	0
				TOTAL	**31**	**19**	**1**	**11**	**23**

SEMESTER: VI									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22CIC16	Mobile Application Development for IoT	PCC	22CIC09	3	3	0	0	3
2	22CIC17	Programming for IoT Boards	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(OEC)	OEC	-	3	3	0	0	3
6	E7	Elective(OEC/PEC)	PEC/OEC	-	3	3	0	0	3
PRACTICAL									
7	22CIP11	Mobile Application Development for IoT Laboratory	PCC	-	4	0	0	4	2
8	22CIP12	Programming for IoT Boards Lab	PCC	-	4	0	0	4	2
Mandatory Non Credit Courses									
9	22MAN12	Soft/Analytical Skills - VI	MC	22MAN10	3	1	0	2	0
10	22MAN13	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									
1	22GEA01	Universal Human Values	HSMC	-	2	2	0	0	2
2	EM	Elective (Management)	HSMC	-	3	3	0	0	3
3	E8	Elective(PEC)	PEC	-	3	3	0	0	3
4	E9	Elective(OEC/PEC)	PEC/OEC	-	3	3	0	0	3
5	E10	Elective(OEC)	OEC	-	3	3	0	0	3
PRACTICAL									
6	22GED02	Internship/Industrial Training	EEC	-	0	0	0	0	2
				TOTAL	**14**	**14**	**0**	**0**	**16**

SEMESTER: VIII									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
PRACTICAL									
1	22CID01	Project Work	EEC	-	20	0	0	20	10
				TOTAL	**20**	**0**	**0**	**20**	**10**

(A) HSMC,BSC, and ESC Courses									
(a)Humanities and Management Sciences (HSMC)									
S.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	22EYA01	Professional Communication - I	HSMC	-	4	2	0	2	3
2.	22GYA01	தமிழர் மரபு / Heritage of Tamils	HSMC	-	1	1	0	0	1
3.	22EYA02	Professional Communication- II	HSMC	22EYA01	4	2	0	2	3
4.	22GYA02	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	HSMC	-	1	1	0	0	1
5.	22GEA01	Human Values and Ethics	HSMC	-	2	2	0	0	2
6.	EM	Elective - Management	HSMC	-	3	3	0	0	3

(b) Basic Sciences (BSC)									
S.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	22MYB01	Calculus and Linear Algebra	BSC	-	4	3	1	0	4
2.	22PYB01	Semiconductor Physics	BSC	-	3	3	0	0	3
3.	22PYP01	Physics Laboratory	BSC	-	2	0	0	2	1
4.	22MYB03	Statistics and Numerical Methods	BSC	-	4	3	1	0	4
5.	22MYB05	Discrete Mathematics	BSC	-	4	3	1	0	4
6.	22CYB07	Environmental Science and Engineering	BSC	-	3	3	0	0	3
(c) Engineering Sciences (ESC)									

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
1.	22ECC01	Basics of Electronics Engineering	ESC	-	3	3	0	0	3
2.	22CSC01	Problem Solving and C Programming	ESC	-	3	3	0	0	3
3.	22ECP01	Basics of Electronics Engineering Laboratory	ESC	-	4	0	0	4	2
4.	22CSP01	Problem Solving and C Programming Laboratory	ESC	-	4	0	0	4	2
5.	22CIC01	Data structures Using C	BSC	-	3	3	0	0	3
6.	22CIC02	Python Programming	BSC	-	3	3	0	0	3
7.	22CIC03	Digital Principles and Computer Organization	BSC	-	3	3	0	0	3
8.	22CIP01	Data structures Using C Laboratory	ESC	22CSP01	4	0	0	4	2
9.	22CIP02	Python Programming Laboratory	ESC	-	4	0	0	4	2
10.	22MEP01	Engineering Graphics Laboratory	ESC	-	4	0	0	4	2

(d) Mandatory Non Credit Courses (MC)

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE-REQUISITE	CONTACT PERIODS	L	T	P	C
1.	22MAN01	Induction Programme	MC	-	-	-	-	-	-
2.	22MAN02	Soft/Analytical Skills - I	MC	-	3	1	0	2	0
3.	22MAN03	Yoga – I	MC	-	1	0	0	1	0
4.	22MAN04	Soft/Analytical Skills - II	MC	22MAN02	3	1	0	2	0
5.	22MAN05	Yoga – II	MC	-	1	0	0	1	0
6.	22MAN07	Soft/Analytical Skills - III	MC	22MAN04	3	1	0	2	0

7.	22MAN08	Soft/Analytical Skills - IV	MC	22MAN07	3	1	0	2	0
8.	22MAN09	Indian Constitution	MC	-	1	1	0	0	0
9.	22MAN10	Soft/Analytical Skills - V	MC	22MAN08	3	1	0	2	0
10.	22MAN11	Certification Course - I	MC		1	0	0	1	0
11.	22MAN12	Soft/Analytical Skills - VI	MC	22MAN10	3	1	0	2	0
12.	22MAN13	Certification Course - II	MC		1	0	0	1	0

(B) PROGRAMME CORE (PCC)									
1.	22CIC04	Algorithms	PCC	-	3	3	0	0	3
2.	22CIC05	Internet of Things and its Applications	PCC	-	3	3	0	0	3
3.	22CIC06	Java Programming	PCC	-	3	3	0	0	3
4.	22CIC07	Operating Systems	PCC	-	3	3	0	0	3
5.	22CIP03	Algorithms Laboratory	PCC	-	4	0	0	4	2
6.	22CIP04	Internet of Things and its Applications Laboratory	PCC	-	4	0	0	4	2
7.	22CIP05	Java Programming Laboratory	PCC	-	4	0	0	4	2
8.	22CIC08	Artificial Intelligence and Machine Learning	PCC	-	3	3	1	0	3
9.	22CIC09	Computer Networks	PCC	-	3	3	0	0	3
10.	22CIC10	Database Management System	PCC	-	3	3	0	0	3
11.	22CIC11	Sensors and Actuator Devices	PCC	-	3	3	0	0	3

12.	22CIC12	Privacy and Security in IoT	PCC	22CIC05	3	3	0	1	3
13.	22CIP06	Computer Networks Laboratory	PCC	-	4	0	0	4	2
14.	22CIP07	Database Management System Laboratory	PCC	-	4	0	0	4	2
15.	22CIP08	Sensors and Actuator Devices Lab	PCC	-	4	0	0	4	2
16.	22CIC13	Design of Smart Cities	PCC	22CIC11	4	3	1	0	4
17.	22CIC14	Advanced Java Programming	PCC	22CIC06	3	3	0	0	3
18.	22CIC15	Web Technology	PCC	-	3	3	0	0	3
19.	22CIP09	Advanced Java Programming Laboratory	PCC	22CIP05	4	0	0	4	2
20.	22CIP10	Web Technology Laboratory	PCC	-	4	0	0	4	2
21.	22CIC16	Mobile Application Development for IoT	PCC	22CIC16	3	3	0	0	3
22.	22CIC17	Programming for IoT Boards	PCC	-	3	3	0	0	3
23.	22CIP11	Mobile Application Development for IoT Laboratory	PCC	22CIP11	4	0	0	4	2
24.	22CIP12	Programming for IoT Boards Lab							

(C) Engineering Employability Course (EEC)									
S.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE-REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	22GED01	Personality and Character Development	EEC	-	0	0	0	1	0
2	22GED02	Internship/Industrial Training	EEC		0	0	0	0	2
3	22CID01	Project Work	EEC		20	0	0	20	10

CREDIT DISTRIBUTION

SEM	HSMC	BSC	PCC	ESC	EEC	PEC	OEC	TOTAL
I	4	8		10				22
II	4	4		15				23
III		4	18					22
IV		3	21					24
V			14			9		23
VI			10			6	6	22
VII	5				2	3	6	16
VIII					10			10
TOTAL	13	19	63	25	12	18	12	162
R22 %	8.0	11.7	38.8	15.4	7.4	11.1	7.4	
AICTE Credits Recommended	16	23	59	29	15	12	9	163
AICTE MODEL CURRI %	10%	14%	36%	18%	9%	7%	6%	

TOTAL CREDITS (22+23+22+24+23+22+16+10) = 162 CREDITS

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 COMPONENTS 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**
PREREQUISITE : 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	

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Approved by Tenth Academic Council

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**

22PYB01 - SEMICONDUCTOR PHYSICS *(Common to AI&DS, CSE, CSE (CS), CSE (IoT) and IT Branches)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To expose the concepts of introduction to conducting materials	**1.1**	The students will be able to apply predict the importance of introduction to conducting materials in the upcoming communication field.		
2.0	To gain fundamental concepts of electrical properties of semiconductors.	**2.1**	The students will be able to apply acquire knowledge about the electrical properties of semiconductors.		
3.0	To update the knowledge of basics of semiconductor laser.	**3.1**	The students will be able to apply understand the basics of semiconductor laser.		
4.0	To gain knowledge in the field of photo dectors.	**4.1**	The students will be able to apply identify the importance of opto-electronics devices and their applications		
5.0	To update the recent development in Advanced new engineering materials	**5.1**	The students will be able to apply acquire knowledge about recent development in Advanced new engineering materials		

UNIT I - INTRODUCTION TO CONDUCTING MATERIALS	**(9)**
Classical free electron theory – Expression for electrical conductivity – Thermal conductivity, expression – Wiedemann – Franz law- Success and failure – electrons in metals- Particle in a three dimensional box- degenerate states- Fermi- Dirac statistics – Density of energy states- Electron in periodic potential- Energy bands in solids- tight binding approximation- Electron effective mass- concept of hole.	
UNIT II - ELECTRICAL PROPERTIES OF SEMICONDUCTORS	**(9)**
Elemental and compound semiconductors - Intrinsic semiconductor – carrier concentration derivation – variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors (qualitative) – variation of Fermi level with temperature and impurity concentration – Hall effect –determination of Hall coefficient – Applications	
UNIT III - SEMICONDUCTOR LASER	**(9)**
Population of energy levels – Einstein's A and B coefficients derivation -Resonant cavity – Types of Semiconductor lasers: homo junction and hetero junction- Determination of particle size using laser - Holography – construction – reconstruction – Engineering applications of lasers -Medical field (Surgery).	
UNIT IV – PHOTODECTORS	**(9)**
Classification of optical materials- Carrier generation and recombination processes- Absorption emission and scattering of light in metals , insulators and semiconductors (concept only)- Formation of P-N junction - Barrier potential and depletion layer – P-N junction diode-Solar cell–LED–organic LED- Laser diode – optical data storage technique.	

UNIT V - ADVANCED NEW ENGINEERING MATERIALS	(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 – pulsed laser deposition –structure – properties and application.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. R. A. Serway and J.W. Jewett, "Physics for Scientists and Engineers", 9th. Cengage Learning, 2018.
2. Marikani, "Materials Science", PHI Learning Private Limited, Eastern Economy Edition, 2017.
3. V.Rajendran, – "Engineering Physicsll", Tata McGraw-Hill. New Delhi.2019

REFERENCES:

1. Raghavan V, "Materials and Engineering", Prentice-Hall of India, New Delhi, 2013.
2. Dattuprasad and Ramanlal Joshi, "Engineering Physics" Tata McGraw hill education, 2016.
3. B. Rogers, J.Adams and S.Pennathur, "Nanotechnology: Understanding Small System" CRC Press, 2014.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	-	-	-	-	-	1	1	-	2	-	-
2	3	2	2	-	-	-	-	-	2	2	-	1	-	1
3	3	3	3	-	-	-	-	-	1	1	-	1	-	-
4	3	2	2	-	-	-	-	-	1	1	-	1	-	-
5	3	3	1	-	-	-	-	-	2	1	-	2	-	-
CO (W.A)	**3**	**2.4**	**1.8**	**-**	**-**	**-**	**-**	**-**	**1.4**	**1.2**	**-**	**1.0**	**-**	**1.0**

22ECC01 - BASICS OF ELECTRONICS ENGINEERING *(Common to AI&DS , CSE, CSE(CS), CSE(IOT) & IT Branches)*				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To make students to learn and understand the basics of Electrical circuits.	**1.1**	The Students can apply the Ohm's law and Kirchhoff's law and investigates the behavior of electric circuits by analytical techniques.
2.0	To enable the student to understand the analysis of DC and AC circuits using Network theorems.	**2.1**	The Students will be able to analyze and forecast the Network theorems in DC and AC circuits.
3.0	To enable the student to understand the working of semiconductor devices.	**3.1**	The Students will be able to understand the characteristics of semiconductor devices.
4.0	To make the students to understand the working of rectifiers, filters and amplifiers.	**4.1**	The students will be able to understand the concept of rectifiers, filters and amplifiers.
5.0	To make the students to understand the functions of transducer and measuring instruments.	**5.1**	The students will be able to design transducers, measuring instruments and logic circuits.

UNIT I - UNIT I - BASIC CIRCUITS ANALYSIS	**(9)**
Current, Voltage, Power – Nodes, Paths, Loops and Branches – Ohm's Law – Kirchhoff's laws – Single loop circuit – Series and parallel connected independent sources – Resistors in series and Parallel – Current and voltage division.	
UNIT II - NETWORK THEOREMS FOR DC CIRCUITS	**(9)**
Source transformation – Mesh Analysis-Node Analysis – Thevenins and Norton Theorem – Superposition Theorem – Maximum power transfer theorem.	
UNIT III - SEMICONDUCTOR DEVICES	**(9)**
PN junction diode, Characteristics – Diffusion and Drift Current – Zener diode, Characteristics – BJT: PNP and NPN, CE Configuration of BJT – JFET – MOSFET – UJT.	
UNIT IV - RECTIFIERS, FILTERS AND AMPLIFIERS	**(9)**
Transformers: Construction & Types – Rectifiers: Half Wave, Full Wave and Bridge – Filters: Induction, Capacitor, LC – Operational Amplifiers – Applications of Amplifier.	

UNIT V -TRANSDUCERS, MEASURING INSTRUMENTS AND DIGITAL CIRCUITS	(9)
LED – Piezo electric Transducers – LCD – Moving Coil and Moving Iron Instrument – CRO – Logic Gates: AND, OR, NOT and Universal Gates: NAND, NOR – Flip Flop: SR, JK.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis," 8 th ed., Tata McGraw Hill publishers, New Delhi, 2013.
2. S. Salivahanan, N. Suresh kumar and A. Vallavanraj, "Electronic Devices and Circuits", Tata McGrawHill 4th ed. 2017.

REFERENCES:

1. Raghavan V, "Materials and Engineering", Prentice-Hall of India, New Delhi, 2013.
2. Dattuprasad and Ramanlal Joshi, "Engineering Physics" Tata McGraw hill education, 2016.
3. B. Rogers, J.Adams and S.Pennathur, "Nanotechnology: Understanding Small System" CRC Press, 2014.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	3	-	-	-	-	-	-	-	-	3	2
2	2	2	3	3	-	-	-	-	-	-	-	-	3	2
3	3	-	2	-	3	-	-	-	-	-	-	-	3	3
4	2	-	2	-	2	3	2	-	-	-	-	-	3	3
5	2	-	2	-	-	2	3	-	-	-	-	-	3	3
CO(W.A)	**2.4**	**2**	**2.2**	**3**	**2.5**	**2.5**	**2.5**	**-**	**-**	**-**	**-**	**-**	**3**	**2.6**

22CSC01 - PROBLEM SOLVING AND C PROGRAMMING *(Common to All 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 Edition., 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. Yashavant Kanetkar, "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**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**	**3**	**3**	**3**

22ECP01- BASICS OF ELECTRONICS ENGINEERING LABORATORY *(Common to AI&DS, CSE, CSE(CS), CSE(IOT) and IT Branches)*					
			L	**T**	**P**	**C**
			0	**0**	**4**	**2**
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 BJT, FET and UJT.	**2.1**	The Students will be able to analyze characteristics of BJT, FET and UJT working principles and operations.		
3.0	To make the students to analyze the operation of Rectifier circuit.	**3.1**	The students will be able to analyze the operation of rectifier circuit and its applications		
4.0	To motivate the students to learn and practice with measurement of Electrical circuits using various theorems.	**4.1**	The Students will apply the Ohm's law ,Kirchhoff's law and various theorems (Thevenin's, Norton's etc) and investigates the behavior of electric circuits by analytical techniques.		
5.0	To motivate the students to design a digital circuits using various basic logic gates.	**5.1**	The Students will be able to Design simple digital circuits by exploring logic gates.		

List of Experiments

(Cycle- I)
1.Plot the V-I Characteristics of PN junction diode and also find the forward and reverse resistance
2.Plot the V-I Characteristics of Zener diode and also find the forward and reverse resistance
3.Plot the Input-Output characteristics of Common Emitter Configuration(CE) using BJT
4.Find the Characteristics of FET and also plot the drain and transfer characteristics
5. Plot the V-I Characteristics of UJT
6.Construct the Half wave Rectifier & Full wave Rectifier and plot the graph
(Cycle- II)
1.Verification Kirchoff's Voltage Law (KVL) ,Kirchoff's Current Law(KCL)
2.Verfication of Thevenin's Theorem
3. Verfication of Norton's Theorem
4.Verification logic gates

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
2	3	2	2	1	-	-	-	-	-	-	-	1	3	1
3	3	-	2	2	-	-	-	-	-	-	-	1	3	1
4	3	-	2	-	-	1	-	-	-	-	-	-	3	2
5	3	-	2	-	-	1	-	-	-	-	-	2	3	1
CO (W.A)	**3**	**2**	**1.8**	**1.3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1.3**	**3**	**1.4**

22CSP01 - PROBLEM SOLVING AND C PROGRAMMING LABORATORY *(Common to All Branches)*					
		L	**T**	**P**	**C**
		0	**0**	**4**	**2**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
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**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**	**3**	**3**	**3**

22PYP01 - PHYSICS LABORATORY
(Common to All Branches)

	L	T	P	C
	0	0	2	1

PREREQUISITE : 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 fibre.
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.

Physics Laboratory

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

Total (30 P) = 30 periods

*Ratified in Eleventh Academic Council

Approved by Tenth Academic Council

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

*Ratified in Eleventh Academic Council

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 of 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 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	**(10)**
Tense - One word substitution- Articles – Preposition - Conjunctions	
UNIT II – BASIC APTITUDE	**(10)**
Percentage – Ratio and Proportion – Blood Relations – Analogy	
UNIT III – LOGICAL REASONING	**(10)**
Probability – Profit and Loss - Syllogism - Statement Assumptions.	
TOTAL (L:10, P: 20) :30 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**

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

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

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) / Programme Specific Outcomes (PSOs)

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	-	

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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 BOOK:

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

REFERENCES:

1. Rizvi, M Ashraf, "Effective Technical Communication", 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

22MYB03 – STATISTICS AND NUMERICAL METHODS *(Common to CSE,IT,AI&DS,IOT,CS(Cyber security),EEE Branches)*					
		L	**T**	**P**	**C**
		3	**1**	**0**	**4**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.	**1.1**	The students will be able to select a hypothesis testing method for the given numerical set of data to analyze the significance .		
2.0	To understand the knowledge of design of experiments	**2.1**	The students will be able to apply analysis of Variance for the data set of selected number factors for analyzing the significance.		
3.0	To introduce the basic concepts of solving algebraic and transcendental equations.	**3.1**	The students will be able to solve an algebraic or transcendental equation using an appropriate numerical method.		
4.0	To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.	**4.1**	The students will be able to appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.		
5.0	To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.	**5.1**	The students will be able to solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.		

UNIT I - TESTING OF HYPOTHESIS	**(9+3)**
Sampling Distributions-Tests for single mean, difference of means (Large and Small samples)Using z ,t - distribution, F – distribution- Chi-square - Test for independence of attributes and Goodness of fit.	
UNIT II - DESIGN OF EXPERIMENTS	**(9+3)**
Analysis of variance- Completely randomized design - Randomized block design - Latin square design.	
UNIT III - SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS	**(9+3)**
Solution of algebraic and transcendental equations - Fixed point iteration method - Newton Raphson method- Solution of linear system of equations Gauss elimination method – Iterative methods of Gauss Jacobi and Gauss Seidel Methods – Eigen values of a matrix by Power method .	
UNIT IV - INTERPOLATION AND APPROXIMATION	**(9+3)**
Lagrange's and Newton's divided difference interpolations - Newton's forward and backward difference interpolation - Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules -Romberg's Methods.	

UNIT V - NUMERICAL DIFFERENTIATION AND INTEGRATION	(9+3)
Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.	
TOTAL (L:45+T:15) : 60 PERIODS	

TEXT BOOK:

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

REFERENCES:

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

WEB REFERENCES:

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

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) / Programme Specific Outcomes (PSOs)

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

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22CIC01 –DATA STRUCTURES USING C *(Common to 22AIC01, 22CSC02, 22CCC01, and 22ITC01)*				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

PREREQUISITE :

	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

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22CIC02 - PYTHON PROGRAMMING

(Common to 22AIC02, 22CSC03, 22CCC02, and 22ITC02)

	L	T	P	C
	3	0	0	3

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To acquaint with data types, input output statements, decision making, looping in Python	**1.1**	The students will be able to develop understanding of basics of Python Programming constructs.
2.0	To acquire knowledge about manipulation of strings.	**2.1**	The students will be able to impart basic knowledge of all strings functions.
3.0	To be familiarized with programming concepts like list and tuples.	**3.1**	The students will be able to choose most appropriate programming constructs and features to solve the problems with list, tuples and dictionaries.
4.0	To understand the concepts of dictionaries, function and modules.	**4.1**	The students will be able to exhibit the programming skills for the use of the logical constructs of language using function and files.
5.0	To develop the skill of designing Graphical user Interfaces in Python	**5.1**	The students will be able to demonstrate significant experience with the Python program development environment.

UNIT I - INTRODUCTION TO PYTHON	**(9)**
Introduction to python: Features - Execution of python program – Flavors of Python – Comments - Data Types: Built-in data types– Sequences – Set - Literals– Operators – Input and Output Statements - Control Statements if – if-else –if-else-if – while-For –Nested loops – the else suite - Break – Continue - pass - assert – return.	
UNIT II - STRINGS	**(9)**
Arrays: One Dimensional arrays - Multi Dimensional arrays - Strings and Characters: Creating - Length - Indexing - Slicing - Repeating - Concatenation - Comparing - Removing Spaces - Finding Sub Strings - Counting Substrings in a String - Strings are Immutable - Replacing - Splitting and Joining Strings - Changing Case - Checking Starting and Ending of a String – String Formatting - Working with Characters – Sorting - Searching Strings - Finding Number- Inserting sub string into a string.	
UNIT III - LISTS , TUPLES AND DICTIONARIES	**(9)**
Lists: Creating Lists – Updating - Concatenation - Repetition - Methods – Sorting. Tuples: Creating - Accessing – Operations – Functions - Nested Tuples - Inserting Elements, Modifying Elements, Deleting Elements from a tuples. Dictionaries: Operations – Methods - Using for Loop with Dictionaries – Sorting the Elements of a Dictionary using Lambdas - Converting Lists and Strings into Dictionary - Passing Dictionaries to Functions - Ordered Dictionaries.	

UNIT IV - FUNCTIONS AND FILES	(9)
Functions: Defining – Calling – Returning - Pass by Object Reference – Formal, Actual, Positional, Keyword, Default & Variable Length Arguments - Local and Global Variables - Recursive Functions - Lambdas - Function Decorators. Files - Types of Files - Opening & Closing a File - Working with Text Files Containing Strings - Working with Binary Files - The with Statement - The seek() and tell() Methods - Random Accessing of Binary Files - Random Accessing of Binary Files using mmap - Zipping and Unzipping Files - Working with Directories.	
UNIT V - MODULES AND FRAMEWORKS	**(9)**
Modules: Importing module –Features – Built in functions. - Python Environment and Frameworks: NumPy: NumPy Arrays – Computation on NumPy Arrays – Aggregation – Sorting Arrays – Structured Arrays.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Dr. R. Nageswara Rao, "Core Python Programming", Dream tech Press, 2021 Edition.
2. Jake Vander Plas, "Python Data Science Handbook Essential Tools for Working with Data", 1st Edition O'Reilly Publishers, 2016.

REFERENCES:

1. Kenneth A. Lambert, "Fundamentals of Python: First Programs", Cengage Learning, 2018.
2. Wesley J. Chun, "Core Python Programming", Pearson Education, 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	2	3	3	3	3	-	-	-	-	3	3	3
2	3	2	3	3	3	3	3	-	-	-	-	3	3	3
3	3	2	3	3	3	3	3	3	-	-	3	3	3	3
4	3	2	3	3	3	3	3	3	-	-	3	3	3	3
5	3	2	3	3	3	3	3	3	-	-	3	3	3	3
CO (W.A)	3	2	2.8	3	3	3	3	3	-	-	3	3	3	3

22CIC03 - DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION *(Common to 22AIC03, 22CSC04, 22CCC03, and 22ITC03)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PREREQUISITE :					
Course Objectives		**Course Outcomes**			
1.0	To make students to analyze and design combinational circuits	**1.1**	The students will be able to compile the combinational logic circuits.		
2.0	To enable the student to analyze and design sequential circuits	**2.1**	The students will be able to design the sequential logic circuits.		
3.0	To make the students to understand the basic structure and operation of a digital computer	**3.1**	The students will be able to acquire the computer fundamentals.		
4.0	To make the students to study the design of data path unit, control unit for processor and to familiarize with the hazards.	**4.1**	The students will be able to get deep insight into the processor function.		
5.0	To make the students to understand the concept of various memories and I/O devices.	**5.1**	The students will be able to catch on to about operation of various types of memories and input output devices.		

UNIT I - COMBINATIONAL LOGIC	**(9)**
Combinational Circuits – Karnaugh Map - Analysis and Design Procedures – Binary Adder –Subtractor – Decimal Adder - Magnitude Comparator – Decoder – Encoder – Multiplexer and Demultiplexers.	
UNIT II - SYNCHRONOUS SEQUENTIAL LOG	**(9)**
Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis of clocked sequential circuits – Shift Registers – Counters – Mod Counter –Up/Down Counter.	
UNIT III - COMPUTER FUNDAMENTALS	**(9)**
Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Design of Fast Address – Multiplication of Positive Numbers – Signed Operand Multiplication – Fast multiplication.	
UNIT IV - PROCESSOR	**(9)**
Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Micro programmed Control – Pipelining – Data Hazard – Control Hazards.	

UNIT V - MEMORY AND I/O DEVICES	(9)
Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping Techniques – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012.

REFERENCES:

1. David A. Patterson, John L. Hennessy, "Computer Organization and Design, The Hardware/Software Interface", 6th Edition, Morgan Kaufmann/Elsevier, 2020
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", 10th Edition, Pearson Education, 2016.
3. M. Morris Mano, Michael D. Ciletti, "Digital Design : With an Introduction to the Verilog HDL, VHDL, and System Verilog", 6th Edition, Pearson Education, 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	3	3	3	3	2	1	-	-	1	2	3	2	3
2	3	3	3	3	2	1	-	-	-	1	2	3	1	2
3	3	3	3	3	2	2	1	1	-	-	2	3	2	3
4	3	3	3	3	1	-	-	-	1	1	1	2	1	3
5	3	3	3	3	1	2	1	-	-	-	-	2	1	2
CO (W.A)	3	3	3	3	2	2	1	1	1	1	2	3	1	3

22CIP01 – DATA STRUCTURES LABORATORY

(Common to 22CSP02, 22AIP01, 22CCP01, and 22ITP01)

	L	T	P	C
	0	0	4	2

PREREQUISITE : 22CSP01

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. Implementation of singly linked list and its operations
3. Implementation of doubly linked list and its operations
4. Implementation of circular linked list and its operations
5. Implementation of Infix to postfix conversion using stack ADT
6. Implement the application for evaluating postfix expressions using array of stack ADT
7. Implementation of reversing a queue using stack
8. Binary Search Tree
9. AVL Tree
10. Priority Queues (Heaps)
11. 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

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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**

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22CIP02 - PYTHON PROGRAMMING LABORATORY

(Common to 22AIP02, 22CSP03, 22CCP02, and 22ITP02)

	L	T	P	C
	0	0	4	2

PREREQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To impart the fundamental concepts of Python Programming	**1.1**	The students will be able to understand the basics of Python Programming constructs
2.0	To learn the operator concepts of Python Programming	**2.1**	The students will be able to understand the various operators of Python Programming.
3.0	To gain exposure about string manipulation, list, and tuples	**3.1**	The students will be able to realize the need of string manipulation, list, and tuples
4.0	To get knowledge about dictionaries, function and modules	**4.1**	The students will be able to design programs involving dictionaries, function and modules
5.0	To develop the skill of designing Graphical user Interfaces in Python	**5.1**	The students will be able to develop simple programs with GUI

List of Exercises:

1. Programs for demonstrating the use of different types of operators.
2. Programs for demonstrating control statements.
3. Programs to implement various string operations.
4. Programs for demonstrating the following
   i. Lists
   ii. Tuples
   iii. Dictionaries
5. Programs to demonstrate concepts using functions
6. Programs to implement applications using File handling
7. Programs to demonstrate modules.
8. Programs to implement applications using regular expression.
9. Program to demonstrate GUI.
10. Perform data manipulation using NumPy.

TOTAL (P:60) = 60 PERIODS

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

- LAN System with 30 nodes (OR) Standalone PCs – 30 Nos,

Software:

OS – Windows / UNIX Clone

Open Source Software – Python

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	3	-	-	-	-	3	3	3
2	3	2	3	3	3	3	3	-	-	-	-	3	3	3
3	3	2	3	3	3	3	3	3	-	-	3	3	3	3
4	3	2	3	3	3	3	3	3	-	-	3	3	3	3
5	3	2	3	3	3	3	3	3	-	-	3	3	3	3
CO (W.A)	**3**	**2**	**2.8**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**3**

22MEP01 - ENGINEERING GRAPHICS LABORATORY

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

	L	T	P	C

PREREQUISITE :

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 Modeling software with dimensions
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 THE 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

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 (*Common to All Branches*)					
		L	**T**	**P**	**C**
		1	**0**	**2**	**0**
PREREQUISITE : 22MAN02					
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 Limited, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", 4th Edition, Cambridge University 2012.

Mapping of COs with POs / PSOs														
Cos	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	-	-	-	3	3	-	2	-	1
2	-	3	2	2	-	-	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

22MAN05 - YOGA – II (*Common to All Branches)*					
		L	**T**	**P**	**C**
		0	**0**	**I**	**0**
PREREQUISITE :					

Course Objectives		**Course Outcomes**	
1.0	To contribute to building a peaceful and better world by educating youth through sport practiced in accordance with Olympism and its values.	**1.1**	Students will be able to Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.
2.0	To learn different postures associated with physical games.	**2.1**	Students will be able to Assess current personal fitness levels.
3.0	To learn how to make basic plan for any activity or task.	**3.1**	Students will be able to Improve personal fitness through participation in sports activities.
4.0	To have an understanding about the basics of sport psychology	**4.1**	Students will be able to Develop understanding of psychological problems associated with the age and lifestyle.
5.0	To Utilize a thorough knowledge and understanding of Sports Medicine and relevant applied sciences to maintain standards of best practice in prevention and treatment of sports related injuries.	**5.1**	Students will be able to Demonstrate an understanding of sound nutritional practices as related to health and physical performance.

UNIT I – OLYMPIC MOVEMENT	**(3)**
Ancient & Modern Olympics (Summer & Winter) - Olympic Symbols, Ideals, Objectives & Values - Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.).	
UNIT II – POSTURES	**(3)**
Meaning and Concept of Postures - Causes of Bad Posture - Advantages & disadvantages of weight training - Concept & advantages of Correct Posture - Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis - Corrective Measures for Postural Deformities	
UNIT III – TRAINING AND PLANNING IN SPORTS	**(3)**
Meaning of Training - Warming up and limbering down - Skill, Technique & Style - Meaning and Objectives of Planning - Tournament – Knock-Out, League/Round Robin & Combination.	

UNIT IV – PSYCHOLOGY AND SPORTS	(3)
Definition & Importance of Psychology in Physical Edu. & Sports - Define & Differentiate Between Growth & Development - Adolescent Problems & Their Management - Emotion: Concept, Type & Controlling of emotions - Meaning, Concept & Types of Aggressions in Sports - Psychological benefits of exercise - Anxiety & Fear and its effects on Sports Performance - Motivation, its type & techniques - Understanding Stress & Coping Strategies.	
UNIT V – SPORTS MEDICINE	**(3)**
Following subtopics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc. History of the Game/Sport – Latest General Rules of the Game/Sport – Specifications of Play Fields and Related Sports Equipment – Important Tournaments and Venues – Sports Personalities – Proper Sports Gear and its Importance.	
TOTAL (P:15) : 15 PERIODS	

TEXT BOOKS:

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Light On Yoga by B.K.S. Iyengar.
3. Health and Physical Education – NCERT (11th and 12th Classes).

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**	-	-

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22MYB05 - DISCRETE MATHEMATICS *(Common to CSE, AI&DS, CSE(IoT), CSE(CS) and IT Branches)*					
			L	**T**	**P**	**C**
			3	**1**	**0**	**4**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To understand the basic concepts of logic and their applications.	**1.1**	The students will be able to rephrase real world statements as logical propositions and demonstrate whether the proposition is satisfy, tautology or a contradiction.		
2.0	To gain knowledge about these discrete structures including logic, predicate calculus.	**2.1**	The students will be able to infer whether a logical argument is valid from the given set of premises by applying the inference rules of predicate calculus.		
3.0	To get exposed to concepts and properties of set theory and functions.	**3.1**	The students will be able to show mathematical reasoning and arrive at conclusions about sets and relations.		
4.0	To acquire ideas about the general counting methods involving permutations and combinations. These methods are very useful in constructing computer programs and in mastering many theoretical topics of computer science.	**4.1**	The students will be able to construct the number of arrangements and selections using the principles of counting.		
5.0	To understand the concepts of Lattices and its properties.	**5.1**	The students will be able to avail the concept of Lattices and its properties.		

UNIT I - PROPOSITIONAL CALCULUS	**(9+3)**
Propositions-Logical connectives-Compound propositions-Conditional and biconditional propositions-Truth tables-Tautologies and Contradictions-Logical Equivalences and implications – De morgan's Laws-Normal forms-Rules of inference-Arguments-Validity of arguments.	
UNIT II - PREDICATE CALCULUS	**(9+3)**
Predicates-Statement Function-Variables-free and bound variables-Quantifiers-Universe of discourse-Logical equivalences and implications for quantified statements-Theory of inference-The rules of universal specification and generalization-Validity of arguments.	
UNIT III - SET THEORY AND FUNCTIONS	**(9+3)**
Set Operations-Properties-Power set-Relations-Graph and matrix of a relation-Partial Ordering-Equivalence relation-Functions-Types of functions-Composition of relation and functions-Inverse functions.	
UNIT IV - COMBINATORICS	**(9+3)**
Basics of counting - Counting arguments - Pigeonhole Principle - Permutations and Combinations- Recursion and recurrence relations - Generating Functions - Mathematical Induction – Inclusion and Exclusion.	

UNIT V - LATTICES	(9+3)
Posets-Lattices as posets-Properties of lattices-Lattices as Algebraic systems – Sub lattices - Direct product and Homomorphism.	
TOTAL (L:45+ L:15) : 60 PERIODS	

TEXT BOOKS:

1. Tremblay J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science " , Tata McGraw-Hill, New Delhi, Reprint 2010.
2. Veerarajan.T, "Discrete Mathematics with Graph Theory and Combinatorics", 4th edition, Tata McGraw Hill, New Delhi, 2008.
3. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 5th edition, Tata McGraw Hill Publications, New Delhi, 2007.

REFERENCES:

1. Venkatraman M.K., "Discrete Mathematics" , the National Publishing Company, Chennai, 2007.
2. S.Santha, "Discrete Mathematics with Combinatorics and Graph Theory" ,Cengage Learning India Pvt. Ltd. 2010 .
3. Swapan Kumar Sarkar, "A Text Book of Discrete Mathematics" , S. Chand & Company Ltd., New Delhi.

WEB REFERENCES:

1. https://archive.nptel.ac.in/courses/106/108/106108227/
2. https://www.youtube.com/watch?v=dK8iaQYcbms

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

22CIC04 - ALGORITHMS
(Common to 22AIC06, 22CSC05, 22CCC04, and 22ITC04)

L	T	P	C
3	0	0	3

PREREQUISITE : NIL

	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 colouring problem. Branch and Bound: Solving 15-Puzzle problem - Assignment problem – Knapsack Problem – Travelling Salesman Problem.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOK:

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**

22CIC05 – INTERNET OF THINGS AND ITS APPLICATIONS					
		L	T	P	C
		3	0	0	3
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To make students know the IoT ecosystem.	**1.0**	To understand the critical ecosystem required to mainstream IoTs.		
2.0	To provide an understanding of the technologies and the standards relating to the Internet of Things.	**2.0**	To understand the technology and standards relating to IoTs.		
3.0	To develop skills on IoT technical planning.	**3.0**	To Acquire skills on developing their own national and enterprise level technical strategies.		
4.0	To make the students to know about Arduino processor and working of Analog and Digital I/O pins.	**4.0**	Students will be able to explain Arduino processor, working of Analog and Digital I/O pins and illustrate small projects		
5.0	To develop skills on IoT applications for industry.	**5.0**	To Acquire skills on developing their own IoT applications for industry.		

UNIT I - INTRODUCTION TO INTERNET OF THINGS	**(9)**
Characteristics of IoT - Physical and Logical Design of IoT - IoT Enabling Technologies - Wireless Sensor Networks - Cloud Computing - Big Data Analytics - Communication Protocols - Embedded Systems - Functional Blocks - Communication Models and APIs - IoT Levels and Deployment Templates - Overview of Microcontroller, Basics of Sensors and Actuators - Examples and Working Principles of Sensors and Actuators.	
UNIT II - M2M AND IOT ARCHITECTURE	**(9)**
Building Architecture - An IoT Architecture Outline - M2M and IoT Technology Fundamentals: Devices and Gateways - Local and Wide Area Networking - Data management, Everything as a Service, M2M and IoT Analytics - Knowledge Management - IoT Reference Model.	
UNIT III - IOT PROTOCOLS	**(9)**
PHY/MAC Layer: 3GPP MTC, IEEE 802.15 - WirelessHART- Z-Wave, BLE- Zigbee - DASH7 - Network Layer: 6LoWPAN - 6TiSCH - RPL - CORPL - CARP - Transport Layer: TCP - MPTCP - UDP- DCCP- Session Layer: HTTP- CoAP- XMPP- AMQP- MQTT.	
UNIT IV - PROGRAMMING USING ARDUINO	**(9)**
Introduction to Arduino processor- General Block diagram- Working of Analog and Digital I/O pins- Serial (UART), I2C Communications and SPI communication - Arduino Boards: Mega, Due, Zero and 101 - Prototyping basics - Technical description - Setting Up Arduino IDE- Introduction to Arduino programming - Case Studies.	

UNIT V - APPLICATIONS OF IOT	(9)
Various Real time applications of IoT- Home Automation - Smart Parking - Environment: Weather monitoring system - Agriculture: Smart irrigation – Domain Specific applications - Case Studies.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Nitesh Dhanjani, Abusing the Internet of Things, Shroff Publisher/O'Reilly Publisher, 2015.
2. Internet of Things, RMD Sundaram Shriram K Vasudevan, Abhishek S Nagarajan, John Wiley and Sons, Second Edition, 2019.
3. Arshdeep Bahga, Vijay Madisetti, "Internet of Things-A hands-on approach", Universities Press, 2015.

REFERENCES:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, 1st Edition, Academic Press, 2014.
2. Vijay Madisetti and Arshdeep Bahga, Internet of Things (A Hands-on-Approach), 1st Edition, VPT, 2014.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	1	2	2	1	2	2	2	2	2	1	3	-
2	2	2	2	2	2	1	2	2	3	3	3	1	3	-
3	2	3	3	3	3	2	2	2	3	3	3	3	3	2
4	2	3	3	3	3	2	2	2	3	3	3	3	3	2
5	2	3	3	3	3	2	2	2	3	3	3	3	3	2
CO (W.A)	2	2.6	2.4	2.6	2.6	1.6	2	2	2.8	2.8	2.8	2.2	3	2

22CIC06 - JAVA PROGRAMMING *(Common to 22AIC04,22CSC07,22CCC06, and 22ITC06)*					
		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 for Units I, II, III, IV.
2. Herbert Schildt, "Introducing JavaFX 8 Programming", 1st Edition, McGraw Hill Education, New Delhi, 2015 for Unit V.

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

22CIC07 - OPERATING SYSTEMS *(Common to 22AIC08,22CSC08, and 22ITC05)*					
			L	**T**	**P**	**C**
			3	**0**	**0**	**3**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To learn about the basics of operating system and system calls.	**1.1**	The students will be able to perceive knowledge on the systematic approach of the Operating system.		
2.0	To impart the knowledge about how the process scheduling work together to perform computing tasks.	**2.1**	The students will be able to apply the concepts of CPU scheduling and Process synchronization		
3.0	To Learn about the process synchronization and Deadlock concepts.	**3.1**	The students will be able to use various synchronization and deadlock handling methods.		
4.0	To learn the importance of memory management in the operating system.	**4.1**	The students will be able to apply page replacement policies to address demand paging		
5.0	To explore the disk and files management of operating systems	**5.1**	The students will be able to work with file and disk organizations for a real time applications.		

UNIT I - FUNDAMENTALS	**(9)**
Introduction - System Architecture - Operating System Structure - Operations - Process Management - Memory Management - Storage Management - System Structure - User Operating System Interface - System Calls - Types - System Programs - Operating System Design and Implementation - Virtual machines.	
UNIT II - PROCESS MANAGEMENT	**(9)**
Process Concept - Process Scheduling - Operations on Processes- Inter Process Communication - Shared Memory and Message Passing Systems - CPU Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Threads Overview - Thread Scheduling.	
UNIT III - PROCESS SYNCHRONIZATION	**(9)**
Synchronization: The Critical-Section Problem - Peterson's solution - Hardware support for Synchronization - Mutex – Semaphores - Deadlocks: Deadlock Characterization - Methods for handling deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock.	
UNIT IV - MEMORY MANAGEMENT	**(9)**
Main Memory - Swapping - Contiguous Memory Allocation - Paging - Segmentation - Virtual Memory - Demand Paging - Copy on Write - Page Replacement - Allocation of Frames - Thrashing,	

UNIT V - SECONDARY STORAGE MANAGEMENT	(9)
Secondary Storage Structure - Disk Structure - Disk Attachment - Disk Scheduling - Disk Management - Swap Space Management - File System - File Concepts: Access Methods - Directory Structure - File System Mounting - File System Implementation - Structure – Implementation - Directory Implementation - Allocation Methods -Free Space Management - I/O Systems - I/O Hardware - Application I/O Interface - Kernel I/O Subsystem.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley and Sons Inc.,, 2018.

REFERENCES:

1. William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition, Prentice Hall, 2018.
2. Andrew S. Tanenbaum, "Modern Operating Systems", 4th Edition, Prentice Hall of India Pvt., 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	1	2	2	-	-	-	-	3	2	-	1	3	1
2	2	2	3	1	1	-	-	-	2	1	-	2	3	1
3	1	3	2	2	1	-	-	-	2	2	-	1	3	1
4	1	3	2	2	1	-	-	-	2	2	-	1	3	1
5	1	3	3	3	-	-	-	-	1	2	-	2	3	1
CO (W.A)	**1.6**	**2.4**	**2.4**	**2**	**1**	**-**	**-**	**-**	**2**	**1.8**	**-**	**1.4**	**3**	**1**

22CIP03 - ALGORITHMS LABORATORY *(Common to 22AIP05, 22CSP04, 22CCP03, and 22ITP03)*				
	L	**T**	**P**	**C**
	0	**0**	**4**	**2**

PREREQUISITE : NIL

Course Objectives		**Course Outcomes**	
1.0	To make the use of programs using Brute force technique.	**1.1**	The students will be able to implement programs using Brute force technique.
2.0	To gain exposure about the concept of divide and conquer design techniques.	**2.1**	The students will be able to Make use of algorithm design techniques like divide and conquer.
3.0	To understand the dynamic programming technique.	**3.1**	The students will be able to apply dynamic programming to solve problems
4.0	To explore knowledge about greedy techniques.	**4.1**	The students will be able to apply greedy techniques to solve problems
5.0	To understand the knowledge on Backtracking techniques.	**5.1**	The students will be able to apply Backtracking techniques to solve problems

LIST OF EXPERIMENTS:

1. Given a text txt [0...n-1] and a pattern pat [0...m-1], write a function search (char pat [ ], char txt [ ]) that prints all occurrences of pat [ ] in txt [ ]. You may assume that n > m.
2. Sort a given set of elements using the Insertion sort, Selection sort and Bubble sort
3. Implementation of Linear Search.
4. Implementation of Recursive Binary Search
5. Develop a program to find out the maximum and minimum numbers in a given list of n numbers using the divide and conquer technique.
6. Develop a program to sort the numbers using Merge and Quick sort .
7. Implement Floyd's algorithm for the All-Pairs- Shortest-Paths problem.
8. Compute the transitive closure of a given directed graph using Warshall's algorithm.
9. Find the minimum cost spanning tree of a given undirected graph using Prim's algorithm.
10. Implement N Queens problem using Backtracking.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

LAN System with 30 nodes (OR) Standalone PCs – 30 Nos,.

Software:

C/C++/JAVA/ Python

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	-	-	-	-	-	-	-	-	-	3	2
2	3	3	2	-	-	-	-	-	-	-	-	-	3	2
3	3	2	1	1	-	-	1	-	-	-	-	-	3	1
4	3	2	1	1	-	-	1	-	-	-	-	-	3	1
5	3	2	1	1	-	-	1	-	-	-	-	-	3	2
CO (W.A)	**3**	**2.4**	**1.4**	**1**	**-**	**-**	**1**	**-**		**-**	**-**	**-**	**3**	**1.6**

22CIP04 - INTERNET OF THINGS AND ITS APPLICATIONS LABORATORY

L	T	P	C
0	0	4	2

PREREQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To understand the fundamentals of LED and light intensity control.	**1.1**	Students will be able to acquire knowledge about Arduino, LED and control intensity of light.
2.0	To understand about the components such as Buzzer and LCD.	**2.1**	Students will be able to implement buzzer and LCD in applications.
3.0	To understand how to work with sensors such as temperature and LDR.	**3.1**	Students will be able to implement LM35sensor, LDR in applications.
4.0	To understand about key input and servo motor.	**4.1**	Students will be able to implement the way to blink LED through key input and working with servo motor.
5.0	To understand the concept NODEMCU with app and sensor value to upload in Cloud.	**5.1**	Students will be able to implement applications with NODEMCU with Blynk app and upload sensor value in Cloud.

LIST OF THE EXPERIMENTS

1. Implement a program to Blink LED using Arduino.
2. Implement a program to control intensity light using Arduino.
3. Implement a program for LCD Display using Arduino.
4. Implement a program for Buzzer Indication using Arduino.
5. Implement a program for LDR using Arduino.
6. Implement a program for LM35 Sensor using Arduino.
7. Implement a program for Key Input with LED using Arduino.
8. Implement a program for Servo Motor Control using Arduino.
9. Implement a program for blinking LED using NODEMCU with Blynk.
10. Implement a program for Sensor value logging in Cloud.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 33 STUDENTS:

Hardware:

WiFi UNIT or ESP 8266 UNIT 33, Connecting cable or USB cable 33, Ultrasonic sensor 33, Jumper wires 33, Vibration sensor 33, Touch Sensor 33, Temperature and humidity sensor 33, Raspberry pi 33, HDMI 33, Micro USB power input 33, Breadboard 33, Resistor (47K/1W) 33, LED 33, Arduino Uno 33, 16 x 2 LCD display 33, ACS712 Voltage sensor 33, 9/12V Battery 33, Center tapped transformer (230/6-0-6V) 33 , Diode (IN4007) 33, Opto-coupler 33

Software:

OS – Windows / UNIX Clone 33

Computer with Arduino IDE software 33

TOTAL (P:45) = 45 PERIODS

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	1	2	2	1	2	2	2	2	2	1	3	-
2	2	2	2	2	2	1	2	2	3	3	3	1	3	-
3	2	3	3	3	3	2	2	2	3	3	3	3	3	2
4	2	3	3	3	3	2	2	2	3	3	3	3	3	2
5	2	3	3	3	3	2	2	2	3	3	3	3	3	2
CO (W.A)	2	2.6	2.4	2.6	2.6	1.6	2	2	2.8	2.8	2.8	2.2	3	2

22CIP05 - JAVA PROGRAMMING LABORATORY *(Common to 22AIP03,22CSP06,22CCP05, and 22ITP04)*				
	L	**T**	**P**	**C**
	0	**0**	**4**	**2**

PREREQUISITE : 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

TOTAL (P:60) : 60 PERIODS

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

- LAN System with 33 nodes (OR) Standalone PCs – 33 No's, Printers – 3 Nos.

Software:

- Java / Equivalent Compiler

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	3
2	2	2	3	3	3	1	3	3	2	2	3	3	1	3
3	2	2	3	3	3	1	3	3	2	2	3	3	1	3
4	2	2	3	3	3	1	3	3	2	2	3	3	1	3
5	2	2	3	3	3	2	3	3	2	2	3	3	1	3
CO (W.A)	**2.2**	**2.2**	**3**	**3**	**2.8**	**1**	**3**	**2.8**	**2**	**2**	**3**	**3**	**1**	**3**

22MAN07-SOFT / ANALYTICAL SKILLS - III			
L	T	P	C
1	0	2	0

PREREQUISITE : 22MAN04

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 (P:15 L: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
PREREQUISITE : 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 Coporation and Zila Panchayat.	**4.1**	The students will be able to understand the District Administration, Municipal Coporation 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.

Module I: The Constitution - Introduction	**(9)**
• The History of the Making of the Indian Constitution • Preamble and the Basic Structure, and its interpretation • Fundamental Rights and Duties and their interpretation • State Policy Principles	
Module II – Union Government	**(9)**
• Structure of the Indian Union • President – Role and Power • Prime Minister and Council of Ministers • Lok Sabha and Rajya Sabha	
Module III - State Government	**(9)**
• Governor – Role and Power • Chief Minister and Council of Ministers • State Secretariat	
Module IV – Local Administration	**(9)**
• District Administration • Municipal Corporation • Zila Panchayat	

Module V – Election Commission	(9)
• Role and Functioning • Chief Election Commissioner • State Election Commission	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Rajeev Bhargava, Ethics and Politics of the Indian Constitution, Oxford University Press, New Delhi, 2008.
2. 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**	**-**	**-**

22CIC08- ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING *(Common to 22CSC09, and 22CCC08)*					
			L	**T**	**P**	**C**
			3	**0**	**0**	**3**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To study about uninformed and Heuristic search techniques.	**1.1**	The students will be able to use appropriate search algorithms for problem solving.		
2.0	To learn techniques for reasoning under uncertainty.	**2.1**	The students will be able to apply reasoning under uncertainty.		
3.0	To introduce machine Learning and supervised learning algorithms.	**3.1**	The students will be able to build supervised learning models.		
4.0	To study about ensembling and unsupervised learning algorithms.	**4.1**	The students will be able to build ensembling and unsupervised models.		
5.0	To learn the basics of deep learning using neural networks	**5.1**	The students will be able to develop neural network models.		

UNIT I -PROBLEM SOLVING	**(9)**
Introduction to AI - AI Applications - Problem solving agents – search algorithms – uninformed search strategies – Heuristic search strategies – Local search and optimization problems – adversarial search – constraint satisfaction problems (CSP).	
UNIT II - PROBABILISTIC REASONING	**(9)**
Acting under uncertainty – Bayesian inference – naïve bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks.	
UNIT III - SUPERVISED LEARNING	**(9)**
Introduction to machine learning – Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Probabilistic discriminative model - Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random forests.	
UNIT IV - ENSEMBLE TECHNIQUES AND UNSUPERVISED LEARNING	**(9)**
Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization.	
UNIT V - NEURAL NETWORKS	**(9)**
Artificial Neural Networks – Structures, perceptron, Multilayer perceptron, activation functions, network training, Learning in multilayer networks , Learning neural network structures, Case study: Handwritten digit recognition, Word senses and house prices.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021.
2. EthemAlpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020.

REFERENCES:

1. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013.
2. MehryarMohri, AfshinRostamizadeh, AmeetTalwalkar, "Foundations of Machine Learning", MIT Press, 2012.
3. Ian Goodfellow, YoshuaBengio, Aaron Courville, "Deep Learning", MIT Press, 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	2	3	3	-	-	-	-	1	3	3	3	1	2
2	1	1	1	3	1	-	-	-	1	2	1	3	2	3
3	2	1	2	1	1	-	-	-	2	1	1	3	1	1
4	3	1	3	1	-	-	-	-	2	1	2	1	2	2
5	3	1	1	2	2	-	-	-	2	2	2	3	2	2
CO (W.A)	**2.4**	**1.2**	**2**	**2**	**1.3**	**-**	**-**	**-**	**1.6**	**1.8**	**1.8**	**2.6**	**1.6**	**2**

22CIC09 - COMPUTER NETWORKS *(Common to 22AIC12, 22CSC06, 22CCC05, and 22ITC07)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To understand the concepts of data communications	**1.1**	The students will be able to gain knowledge on Data Communication Concepts		
2.0	To impart the fundamental concepts of Data Link Layer	**2.1**	The students will be able to use services of the Data Link Layer.		
3.0	To gain exposure about Addressing and Routing Protocols	**3.1**	The students will be able to work with network addressing and Routing Protocols.		
4.0	To get knowledge about services in Transport Layer	**4.1**	The students will be able to apply Transport Layer protocols.		
5.0	To learn about Application Layer functionalities	**5.1**	The students will be able to work with Application layer protocols		

UNIT I - INTERNET AND DATA COMMUNICATIONS	**(9)**
Internet – Network Edge – Network of Networks – Data communication Components – Data representation and Data flow –Networks – Protocols and Standards – OSI model – TCP/IP protocol suite – Physical Layer: Multiplexing – Transmission Media.	
UNIT II - DATA LINK LAYER	**(9)**
Framing – Error Control: Introduction – Block coding – Linear block codes – Cyclic codes – Checksum – Media Access Control: Random Access – CSMA/CD, CDMA/CA – Controlled Access – Wired LANs – Wireless LANs.	
UNIT III - NETWORK LAYER	**(9)**
IPV4 – IPV6 – ICMP – Transition from IPV4 to IPV6 – Routing Algorithm: Distance-Vector Routing, Link-State Routing, Path-Vector Routing – Unicast Routing protocols – Multicast Routing protocols.	
UNIT IV - TRANSPORT LAYER	**(9)**
Process to Process Communication – User Datagram Protocol – Transmission Control Protocol – SCTP – Congestion Control – Quality of Service.	
UNIT V - APPLICATION LAYER	**(9)**
Domain Name System – Standard Application: WWW and HTTP, FTP, Electronic Mail, TELNET – Firewalls – Network Management System – SNMP.	
	TOTAL (L:45) : 45 PERIODS

TEXT BOOK:

1. Behrouz A. Forouzan, "Data communication and Networking with TCP/IP Protocol Suite", 6th Edition, McGraw–Hill, 2022.

REFERENCES:

1. William Stallings, "Data and Computer Communication", 8th Edition, Pearson Education, 2017.
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 8th Edition, Pearson Education, 2020.

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	-	3	3	3	-	3	3	3
2	3	3	3	-	3	-	-	-	3	-	-	3	3	3
3	3	3	3	3	3	-	-	-	3	3	-	3	3	3
4	3	3	3	2	3	-	-	-	3	3	-	3	3	3
5	3	3	3	2	3	-	-	-	3	3	-	3	3	3
CO (W.A)	**3**	**3**	**3**	**2.3**	**3**	**3**		**3**	**3**	**3**		**3**	**3**	**3**

22CIC10 - DATABASE MANAGEMENT SYSTEM *(Common to 22CSC11, and 22ITC11)*					
			L	**T**	**P**	**C**
			3	**0**	**0**	**3**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To know the fundamentals of data models.	**1.1**	The students will be able to identify suitable data models for real time application and conceptualize a database system using ER Diagram		
2.0	To learn about Relational database architecture and querying through SQL.	**2.1**	The students will be able to write queries in relational algebra and SQL.		
3.0	To know about normalization	**3.1**	The students will be able to normalize the database design.		
4.0	To understand the storage structures and the queries processing/optimization.	**4.1**	The students will be able to apply storage structure and process/optimize Queries.		
5.0	To gain knowledge about transaction processing, concurrency control and recovery.	**5.1**	The students will be able to apply concepts of query processing, transaction processing, and concurrency control.		

UNIT I - DATABASE SYSTEM CONCEPT	**(9)**
Purpose of Database systems – Views of data – Database Languages - Database design – Database system architecture – Data models – Data Dictionary – Database Administration – Entity-Relationship model – EER Model.	
UNIT II - RELATIONAL DATABASE	**(9)**
Structure of Relational Database – Integrity Constraints – Relational Algebra – Relational Calculus – SQL – Views – Joins – Functions and Procedures – Triggers.	
UNIT III - DATABASE DESIGN	**(9)**
Functional Dependencies – Decomposition: Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.	
UNIT IV - PHYSICAL DATABASE DESIGN AND QUERY PROCESSING	**(9)**
Storage and file structure: RAID – File Organization – Organization of Records in Files – Data dictionary Storage - Indexing, Hashing and Transactions: Ordered indices – B tree index files – B+ Tree index files – Multiple key access – Static and Dynamic Hashing – Bitmap indices — Query Processing	
UNIT V - TRANSACTION PROCESSING	**(9)**
Transactions: Desirable properties of Transactions – Serializability – Concurrency Control: Lock-Based Protocols – Timestamp-Based Protocols – Validation-Based Protocols – Recovery systems.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOK:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 7th Edition, McGraw Hill, 2020.

REFERENCES:

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson Education, 2017
2. Date C.J., Kannan A. and Swamynathan S., "An Introduction to Database Systems", 8th Edition, Pearson Education, 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	3	3	2	3	3	-	3	3	-	3	3	3	3
2	3	3	3	3	2	-	-	-	-	-	3	3	3	3
3	3	3	3	3	2	-	-	2	3	-	3	3	3	3
4	3	3	3	3	3	-	-	2	2	-	3	3	3	3
5	3	3	3	3	3	3	-	3	3	-	3	3	3	3
CO (W.A)	**3**	**3**	**3**	**2.8**	2.6	**3**	**-**	**2.5**	**2.75**	**-**	**3**	**3**	**3**	**3**

22CIC11 - SENSORS AND ACTUATOR DEVICES					
		L	T	P	C
		3	0	0	3
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To create a conceptual understanding of the basic principles of sensors, actuators, and their operations	**1.0**	Classify different Sensors & Actuators based on various physical phenomena and differentiate their performance characteristics		
2.0	To analyze the real-world problems and provide solutions using sensors and actuators	**2.0**	Analyze the working principles of thermal, optical & electric sensors and actuators to interpret their mathematical model		
3.0	To promote awareness regarding recent developments in the fields of Mechanical Sensors and Actuators	**3.0**	Interpret the functional principles of Mechanical Sensors and Actuators to interpret their mathematical model		
4.0	To promote awareness regarding recent developments in the fields of Acoustic Sensors , Chemical sensors and actuators	**4.0**	Interpret the functional principles of Acoustic Sensors & Chemical sensors and actuators to interpret their mathematical model		
5.0	To promote awareness regarding recent developments in the fields of Radiation sensors, MEMS and smart sensors	**5.0**	Interpret the functional principles of Radiation sensors, MEMS and smart sensors and actuators to interpret their mathematical model		

UNIT I - Overview of Sensors and Actuators & Temperature Sensors and Thermal Actuators	**(9)**
The five senses: vision, hearing, smell, taste, and touch – Definitions: Sensors & Actuators – Overview of Sensor and Actuator classifications – Performance characteristics of Sensors & Actuators: Transfer Function, Range, Span, Input and Output Full Scale, Resolution, and Dynamic Range - Calibration & Reliability. Thermo resistive sensors: Thermistors, Resistance temperature, and silicon resistive sensors – Thermoelectric sensors – Other Temperature sensors: Optical and Acoustical – Thermo mechanical Sensors and Actuators – Case study: Breath analyzer using temperature	
UNIT II - Optical Sensors , Electric and Magnetic Sensors and Actuators	**(9)**
Principles of Optics: Optical units – Quantum effects – Quantum-based Optical sensors – Photoelectric sensors – Charge coupled device (CCD) based – Thermal-based Optical sensors – Active infrared (AFIR) sensors – Optical Actuators – Case study: Liquid Level Indicator using Optical Sensors. Principles of Electric and Magnetic fields: Basic units – The Electric field: Capacitive Sensors & Actuators – Magnetic sensors and actuators – Magnetoresistance – Magnetostrictive Sensors and Actuators – Magnetometers – Magnetic actuators: Voice Coil Actuators, Motors as Actuators & Magnetic Solenoid Actuators and Magnetic Valves – Case Study: Speed sensing and odometer in a car using smart sensors.	
UNIT III - Mechanical Sensors and Actuators	**(9)**
Definitions and units – Force Sensors: Strain Gauges, Semiconductor Strain Gauges & Tactile Sensors – Accelerometers: Capacitive Accelerometers, Strain Gauge Accelerometers & Magnetic Accelerometers –	

Pressure Sensors: Mechanical, Piezoresistive, Capacitive & Magnetic – Velocity sensing – Inertial sensors and actuators: Mechanical or Rotor & Optical Gyroscopes – Case study: Tire-pressure monitoring system using smart sensors.

UNIT IV - Acoustic Sensors , Chemical Sensors and Actuators **(9)**

Definitions and units – Elastic waves and their properties – Microphones: Carbon, Magnetic, Ribbon and Capacitive Microphones – Piezoelectric effect – Piezoelectric Sensors – Acoustic Actuators: Loudspeakers, Headphones and Buzzers - Magnetic and Piezoelectric – Ultrasonic sensors and actuators – Case Study: Ultrasonic parking system. Chemical units and Definitions – Electrochemical sensors: Metal Oxide Sensors and Solid Electrolyte Sensors – Potentiometric smart sensors: Glass Membranes, Soluble Inorganic Salt Membrane and Polymer - Immobilized Ionophore Membranes sensors – Thermochemical, Optical, Mass humidity gas sensors – Chemical Actuators: The Catalytic Converter - The Airbag System using smart sensors – Case study: Water quality monitoring system.

UNIT V - Radiation sensors, MEMS and smart sensors and actuators **(9)**

Radiation sensors: Ionization sensors- Scintillation sensors- Semiconductor radiation detectors. Microwave radiation: Microwave sensors. Antennas as sensors and actuators: General relations- Antennas as sensing elements- Antennas as actuators. MEMS sensors and actuators: MEMS sensors- MEMS actuators- Nanosensors and actuators- Smart sensors and actuators.

TOTAL (L:45) : 45 PERIODS

TEXT BOOK:

1. Nathan Ida, "Sensors, Actuators and their Interfaces - A Multidisciplinary Introduction", 2020, 2nd Edition, IET, United Kingdom.

REFERENCES:

1. Jacob Fraden, "Handbook of Modern Sensors Physics, Designs, and Applications", 2016, 5th Edition, Springer, Switzerland.
2. Subhas Chandra Mukhopadhyay, Octavian Adrian Postolache, Krishanthi P. Jayasundera, Akshya K. Swain, "Sensors for Everyday Life Environmental and Food Engineering", 2017, Volume 23, Springer, Switzerland.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	2	2	2	1	2	2	2	2	2	2	3	-
2	2	2	2	2	2	1	3	3	3	3	2	2	3	-
3	3	3	2	3	3	2	3	3	3	3	3	3	3	2
4	3	3	2	3	3	2	3	3	3	3	3	3	3	2
5	3	3	2	3	3	2	3	3	3	3	3	3	3	2
CO (W.A)	2.6	2.6	2	2.6	2.6	1.6	2.8	2.8	2.8	2.8	2.6	2.6	3	2

22CIC12 – PRIVACY AND SECURITY IN IOT					
		L	T	P	C
		3	0	0	3
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To impart knowledge on the state-of-the-art methodologies and Security in Internet of Things (IoT).	**1.0**	Identify different Internet of Things technologies and their applications.		
2.0	To understand the blockchain Technology and Privacy Preservation in Internet of Things (IoT).	**2.0**	Assess the need for Privacy and security model for the Internet of Things.		
3.0	To understand the Privacy Protection in Internet of Things (IoT).	**3.0**	Assess the need for Privacy Protection in IoT Applications		
4.0	To understand the Trust Models in Internet of Things (IoT).	**4.0**	Explore various Trust Model for IoT and customize real time data for IoT applications.		
5.0	To study security framework and management	**5.0**	Design security framework and solve IoT security issues.		

UNIT I - Security in IoT, Network Robustness and Malware Propagation Control in IoT	**(9)**
IoT security: Vulnerabilities, Attacks and Countermeasures - Security Engineering for IoT development - IoT security lifecycle. Network Robustness - Fusion Based Defense Scheme - Sequential Defense Scheme - Location Certificate Based Scheme - Sybil node detection scheme - Formal Modeling and Verification -Sybil Attack Detection in Vehicular Networks - Performance evaluation of various Malware Dynamics Models - Analysis of Attack Vectors on Smart Home Systems.	
UNIT II - Blockchain Technology in IoT, Privacy Preservation in IoT	**(9)**
Technical Aspects - Integrated Platforms for IoT Enablement - Intersections between IoT and Distributed Ledger - Testing at scale of IoT Blockchain Applications - Access Control Framework for Security and Privacy of IoT - Blockchain Applications in Healthcare. Privacy Preservation Data Dissemination: Network Model, Threat Model - Problem formulation and definition - Baseline data dissemination - Spatial Privacy Graph based data dissemination -Experiment Validation - Smart building concept-Privacy Threats in Smart Building - Privacy Preserving Approaches in Smart Building.	
UNIT III - Privacy Protection in IoT	**(9)**
Lightweight and Robust Schemes for Privacy Protection in IoT Applications: One Time Mask Scheme, One Time Permutation Scheme - Mobile Wireless Body Sensor Network - Participatory Sensing	
UNIT IV - Trust Models for IoT	**(9)**
Trust Model Concepts - Public Key Infrastructures Architecture Components - Public Key Certificate Formats - Design Considerations for Digital Certificates - Public Key Reference Infrastructure for the IoT - Authentication in IoT - Computational Security for IoT.	

UNIT V - Security Protocols for IoT Access Networks	(9)
Time Based Secure Key Generation -Security Access Algorithm: Unidirectional, Bidirectional Transmission - Cognitive Security - IoT Security Framework - Secure IoT Layers - Secure Communication Links in IoT - Secure Resource Management, Secure IoT Databases.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOK:

1. Hu, Fei. Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations, 2016, 1st edition, CRC Press, USA.

REFERENCES:

2. Russell, Brian and Drew Van Duren. Practical Internet of Things Security, 2016,1st edition, PACKT Publishing Ltd, UK
3. Kim, S., Deka, G. C., & Zhang, P. (2019). Role of blockchain technology in IoT applications. Academic Press.
4. Whitehouse O Security of things: An Implementers' guide to cyber-security for internet of things devices and beyond, 2014, 1st edition, NCC Group, UK.

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	1	2	2	2	2	2	1	3	-
2	2	2	2	3	3	1	2	2	3	3	3	1	3	-
3	2	3	3	3	3	2	2	2	3	3	3	3	3	2
4	2	3	3	3	3	2	2	2	3	3	3	3	3	2
5	2	3	3	3	3	2	2	2	3	3	3	3	3	2
CO (W.A)	2	2.6	2.4	2.8	2.8	1.6	2	2	2.8	2.8	2.8	2.2	3	2

22CYB07 - ENVIRONMENTAL SCIENCE AND ENGINEERING *(Common to AI&DS, CSE, CSE(CS), CSE(IOT) and IT)*					
			L	**T**	**P**	**C**
			3	**0**	**0**	**3**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To recognize the basic concepts of environment, ecosystems and biodiversity.	**1.1**	The students will be able to know the importance of environment and functions ecosystems and biodiversity		
2.0	To impart knowledge on the causes, effects and control measures of environmental pollution.	**2.1**	The students will be able to identify the causes, effects of environmental pollution and contribute the preventive measures to the society.		
3.0	To make the students conversant with the global and Indian scenario of renewable resources, causes of their degradation and measures to preserve them.	**3.1**	The students will be able to identify and understand the renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.		
4.0	To familiarize the e–waste, recognize and analyze the challenges of environmental management.	**4.1**	The students will be able to recognize the different methods of management of e-waste and apply them for suitable technological advancement and societal development.		
5.0	To impart knowledge on the e-waste and its recycling methods of cell phone, battery, laptop and PCB.	**5.1**	The students will be able to demonstrate the recycling of battery, cell phone , laptop and PCB		

UNIT I - ENVIRONMENT AND BIODIVERSITY	**(9)**
Environment - scope and importance - Eco-system- Structure and function of an ecosystem-types of biodiversity- genetic - species and ecosystem diversity– Values of biodiversity - India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity - habitat loss - poaching of wildlife - man-wildlife conflicts – endangered and endemic species of India – Conservation of biodiversity - In-situ and ex-situ.	
UNIT II - ENVIRONMENTAL POLLUTION	**(9)**
Pollution – Causes - Effects and Preventive measures of Water – Soil - Air - Noise Pollution - Solid waste management - methods of disposal of solid waste – various steps of Hazardous waste management - E-Waste management - Environmental protection – Air acts – water acts.	
UNIT III - RENEWABLE SOURCES OF ENERGY	**(9)**
Energy management and conservation -New Energy Sources - Different types new energy sources – Hydrogen energy – Geothermal energy - Solar energy – wind energy – biomass energy - Applications of Hydrogen energy - Ocean energy resources -Tidal energy conversion.	

UNIT IV - E- WASTE AND ITS MANAGEMENT	(9)
E-waste – sources of e-waste – hazardous substance in e-waste – chlorinated compounds – heavy metals - need for e-waste management – management of e-waste – Inventory management – production process – modification- Disposal treatment of e –waste – Incineration –acid baths – landfills.	
UNIT V - BATTERIES AND RECYCLING OF E-WASTE	**(9)**
Battery – types – Lifecycle - Mobile battery life cycle – Laptop battery life cycle – battery maintenance – process of recycling battery – lead acid battery – lithium ion battery – benefits of recycling battery – recycling of computing devices - mobile phones - PCB and servers.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

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

REFERENCES:

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

WEB LINK :

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

Mapping of COs with POs / PSOs

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

22CIP06 - COMPUTER NETWORKS LABORATORY *(Common to 22CSP05, 22CCP04, and 22ITP05)*				
	L	**T**	**P**	**C**
	0	**0**	**4**	**2**

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To know the connectivity of systems with different types of cables	**1.1**	The students will be able to connect a system with various topologies
2.0	To work with addressing protocols	**2.1**	The students will be able to apply addressing protocols
3.0	To gain knowledge about the working of routing algorithms	**3.1**	The students will be able to implement various routing algorithms
4.0	To learn socket programming	**4.1**	The students will be able to program using Sockets
5.0	To use analyzing tools to analyze the performance of protocols in different layers in computer networks	**5.1**	The students will be able to use Analyzer tools

LIST OF EXPERIMENTS:

1. Study of Color coding Jack RJ45 and do the following Cabling works in a network
   a. Cable Crimping
   b. Standard Cabling
   c. Cross Cabling and
   d. Establish a LAN connection using three systems using any topology.
2. Configure IP Address in a system in LAN (TCP/IP Configuration) and Implement the client server communication using socket connection
3. Write a program for transferring a file between nodes in a network.
4. Perform CRC computation
5. By varying the number of frames, design the Sliding Window Protocol
6. Simulation of ARP/RARP
7. Display the routing table for the nodes in a network using Distance Vector Routing (DVR) algorithm.
8. Write a program for downloading a file from HTTP server
9. Develop a client that contacts a given DNS server to resolve a given host name.
10. Configure a Network topology using Packet tracer software
11. Study of Network simulator (NS) and Simulation of any one of routing protocol using NS2.

TOTAL (P:60) : 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 60 STUDENTS SOFTWARE :

HARDWARE:

Standalone desktops 60 Nos., Jack RJ45 connectors

SOFTWARE:

C / C++ / Java / Equivalent Compiler

Network simulator like Ethereal / NS2 / NS3 / Glomosim /OPNET/ 60 Equivalent.

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	3	-	-	-	-	-	-	-	3	3	3
2	3	3	3	3	-	-	-	-	-	-	-	3	3	3
3	3	3	3	3	-	-	-	-	-	3	-	3	3	3
4	3	3	3	2	-	-	-	-	-	3	-	3	3	3
5	3	3	3	2	3	-	-	-	-	3	-	3	3	3
CO (W.A)	**3**	**3**	**3**	**2.6**	**3**	-	**-**	-	-	**3**	**-**	**3**	**3**	**3**

22CIP07 - DATABASE MANAGEMENT SYSTEM LABORATORY
(Common to 22CSP07, and 22ITP06)

	L	T	P	C
	0	0	4	2

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To design a database system.	**1.1**	The students will be able to define database with various integrity constraints.
2.0	To study the usage of DDL and DML commands.	**2.1**	The students will be able to work with various DDL, DML queries.
3.0	To learn about joins, views, various built in functions and procedures and functions	**3.1**	The students will be able to create various views and make use of various types of joins and procedures and functions
4.0	To know about normalization	**4.1**	The students will be able to design and normalize the design.
5.0	To work with database connectivity.	**5.1**	The students will be able to work with real time data base connectivity

LIST OF EXPERIMENTS

1. Structured Query Language : Creating Database
    - Creating a Table
    - Specifying Relational Data Types
    - Specifying Constraints
    - Creating Indexes
2. Table and Record Handling
    - INSERT statement
    - Using SELECT and INSERT together
    - DELETE, UPDATE, TRUNCATE statements
    - DROP, ALTER statements
3. Retrieving Data from a Database
    - The SELECT statement
    - Using the WHERE clause
    - Using Logical Operators in the WHERE clause
    - Using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING Clause
    - Using Aggregate Functions Combining Tables
    - Using JOINS Sub queries
4. Database Management
    - Creating Views
    - Creating Column Aliases
    - Creating Database Users
    - Using GRANT and REVOKE
5. High level language extension with Triggers
6. Database design using E-R model and Normalization

7. Design and implementation of Payroll processing system
8. Design and implementation of Banking system
9. Design and implementation of Library Information System
10. Design and implementation of Student Evaluation System

TOTAL (P:60) : 60 PERIODS

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

HARDWARE:

1. 33 nodes with LAN connection or Standalone PCs

SOFTWARE:

1. MYSQL 8.0
2. Visual Basic 6.0

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

22CIP08 - SENSORS AND ACTUATOR DEVICES LABORATORY

L	T	P	C
0	0	4	2

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To create a conceptual understanding of the basic principles of sensors, actuators, and their operations.	**1.1**	Classify different Sensors & Actuators based on various physical phenomena and learn various sensor calibration techniques.
2.0	To learn various sensor calibration techniques.	**2.1**	Select the relevant sensors and actuators to design real-time data acquisition from ambience via case studies.
3.0	To analyze the real-world problems.	**3.1**	Design temperature control actuators for vehicles.
4.0	To provide solutions using sensors and actuators.	**4.1**	Generate new ideas in designing the sensors and actuators for automotive application.
5.0	To promote awareness regarding recent developments in the fields of sensors and actuators.	**5.1**	Understand the operation of the sensors, actuators and electronic control.

LIST OF THE EXPERIMENTS

1. Hands-on with the Arduino Programming Environment (IDE) and the different Sensors and Actuators available with the Arduino Kit
2. Design a data logger with different types of sensors and learn various sensor calibration techniques
3. Design and implementation of Breath analyzer using temperature sensors
4. Design and implementation of Liquid Level Indicator using optical Sensors
5. Design and implementation of odometer prototype to sense speed of an automobile
6. Design and implementation of a prototype to monitor real-time tire-pressure
7. Develop and validate a prototype for sensing PH and humidity parameters using polymer-based sensors
8. Design and demonstrate a water quality monitoring system
9. Demonstrate a simple parking system using ultrasonic sensors

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 33 STUDENTS:

Hardware:

WiFi UNIT or ESP 8266 UNIT 33, Connecting cable or USB cable 33, Ultrasonic sensor 33, Jumper wires 33, Vibration sensor 33, Touch Sensor 33, Temperature and humidity sensor 33, Raspberry pi 33, HDMI 33, Micro USB power input 33, Breadboard 33, Resistor (47K/1W) 33, LED 33, Arduino Uno 33, 16 x 2 LCD display 33, ACS712 Voltage sensor 33, 9/12V Battery 33, Center tapped transformer (230/6-0-6V) 33 , Diode (IN4007) 33, Opto-coupler 33

Software:

OS – Windows / UNIX Clone 33

Computer with Arduino IDE software 33

TOTAL (P:45) = 45 PERIODS

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	2	2	2	1	2	2	2	2	2	2	3	-
2	2	2	3	3	2	1	3	2	3	3	3	3	3	-
3	2	3	3	3	3	2	3	2	3	3	3	3	3	2
4	2	3	3	3	3	2	3	2	3	3	3	3	3	2
5	2	3	3	3	3	2	3	2	3	3	3	3	3	2
CO (W.A)	2	2.6	2.8	2.8	2.6	1.6	2.8	2	2.8	2.8	2.8	2.8	3	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:

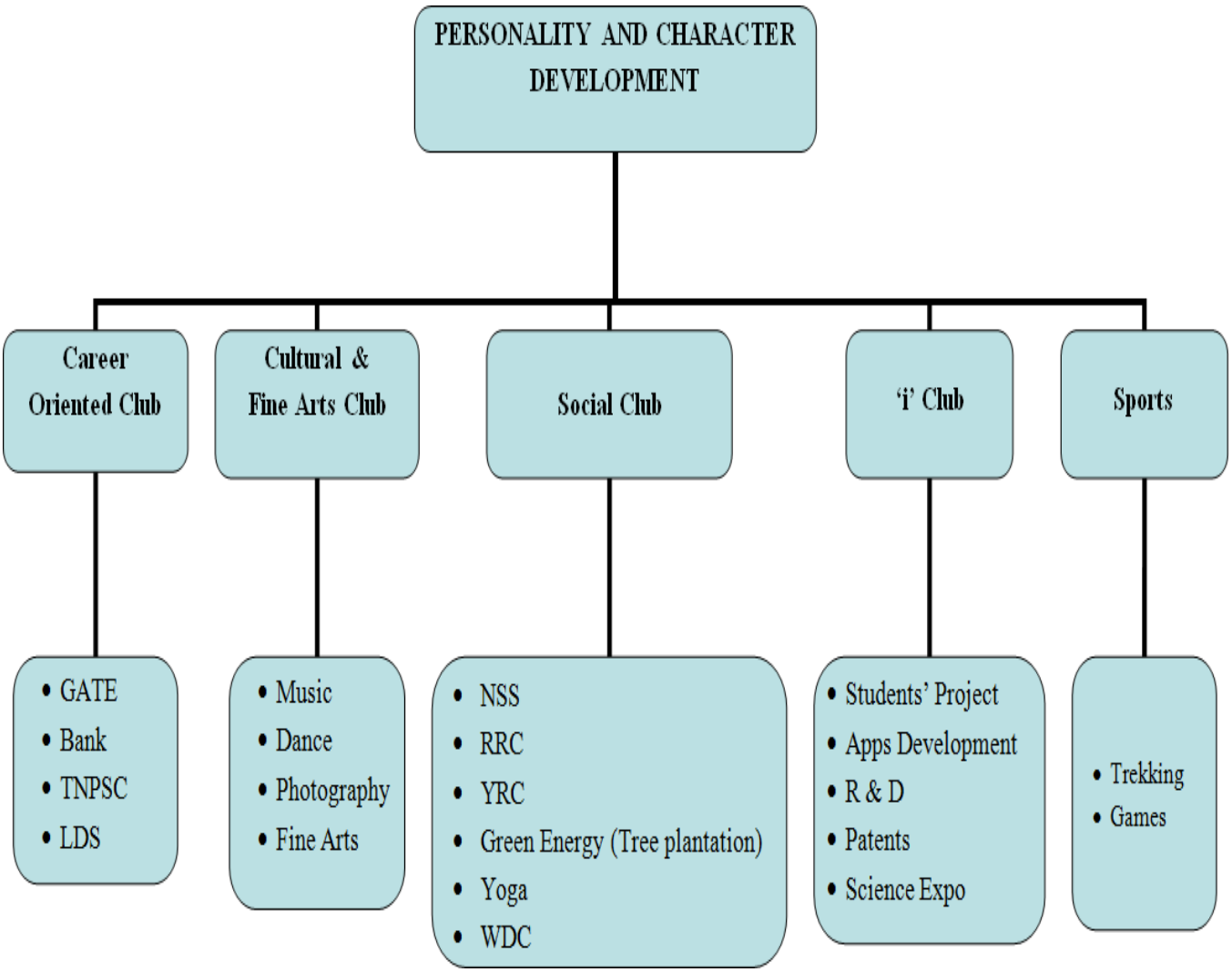
1. Dr. R.S. Aggarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning", S Chand and Company Limited, New Delhi, 2014.
2. Ashish Aggarwal, "Quick Arithmetic", S Chand and Company Limited, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", Fourth Edition, Cambridge University, 2012.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) / Programme Specific Outcomes (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	1	0



***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 inculcatemanagerial 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 knowledgeor 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.
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8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
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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)

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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	

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