



AL-AMEEN ENGINEERING COLLEGE

(AUTONOMOUS)

**Accredited by NAAC with “A” Grade :: An ISO Certified Institution
(Affiliated to Anna University, Chennai & Approved by AICTE, New Delhi)
Karundevanpalayam, NanjaiUthukkuli Post, Erode – 638 104, Tamilnadu, INDIA.**

CURRICULUM & SYLLABI

SEMESTERS – I to VIII

(Regulations 2023)

CHOICE BASED CREDIT SYSTEM

B.Tech. Artificial Intelligence and Data Science

Applicable to the Students admitted to B.E. / B.Tech. Programmes from the AY 2023-24

KNOWLEDGE LEVELS (BLOOM'S TAXONOMY)

Notation	Knowledge Levels
K1	Remembering
K2	Understanding
K3	Applying
K4	Analysing
K5	Evaluating
K6	Creating

VISION

The department of Information Technology aspires to become a **school of excellence** in providing **quality education, constructive research** and **professional opportunities in Information Technology**.

MISSION

To provide academic programs that engage, enlighten and empower the students to **learn technology through practice, service and outreach**.

To educate the students about **social responsibilities and entrepreneurship**

To encourage **research through continuous improvement** in infrastructure, curriculum and faculty development in collaboration with industry and institutions.

[PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)]

PEO 1	Graduates will have progressive learning and successful career in Information, Communication Technologies and their applications.
PEO 2	Graduates will be leaders in their chosen field.
PEO 3	Graduates will utilize the acquired technical skills and knowledge for the benefit of society.

PROGRAM OUTCOMES (POs)

PO 1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs

	with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES (PSOs)	
PSO 1	Technical Skills: Apply the fundamental knowledge to develop computer based solutions in the areas related to information management and networking.
PSO 2	Leadership Skills: Demonstrate professionalism and ethics in managing academic/ non-academic activities as a team and an individual.

CURRICULUM

SEMESTER I

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23MA1T1	Calculus & Differential Equations	BS	40	60	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENTS									
2	23EN1LT2	Communicative English	HS	50	50	3	0	2	4
3	23PH1LT3	Engineering Physics	BS	50	50	3	1	2	5
4	23CY1LT4	Engineering Chemistry	BS	50	50	3	1	2	5
5	23CS1LT5	Problem Solving and C Programming	ES	50	50	3	0	4	5
MANDATORY COURSES									
6		Universal Human Values 1 – Induction Programme	MC	-	-	-	-	-	-
7	23HS1T6	Heritage of Tamil	MC	100	-	1	0	0	1
Total						16	3	10	24

SEMESTER II

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23EN2T1	Technical English	HS	40	60	3	0	0	3
2	23HS2T2	Environmental Sciences	MC	100	0	3	0	0	0
3	23HS2T3	Tamil And Technology	MC	100	0	1	0	0	1
4	23MA2T4	Algebra and Number Theory	BS	40	60	3	1	0	4
THEORY COURSE WITH LABORATORY COMPONENTS									
5	23CS2LT1	Python Programming	ES	50	50	3	0	4	5
6	23EE2LT2	Basics of Electrical and Electronics Engineering	ES	50	50	3	0	4	5
Total						16	1	8	18

SEMESTER III

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23HS3T1	Constitution of India	MC	100	-	3	0	0	0
2	23AD3T2	Fundamentals of Operating Systems	PC	40	60	3	1	0	4
3	23MA3T3	Statistical Analysis	BS	40	60	3	1	0	4
THEORY COURSE WITH LABORATORY COMPONENTS									
4	23AD3LT2	Data Structures	PC	50	50	2	0	4	4
5	23AD3LT3	Foundations of Artificial Intelligence	PC	50	50	2	0	4	4
6	23CS3LT1	Object Oriented Programming with Java	PC	50	50	2	0	4	4
LABORATORY COURSE									
7	23EN3L1	Interpersonal Communication Skills Laboratory - I	HS	60	40	0	0	3	1.5
Total						15	2	15	21.5

SEMESTER IV

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23HS4T1	Universal Human Values 2: Understanding Harmony	HS	100	-	2	1	0	3
2	23AD4T2	Introduction to Data Science	PC	40	60	3	1	0	4
3	23AD4T3	Fundamentals of Software Engineering	PC	40	60	3	1	0	4
4		Open Elective - I	OE	40	60	3	0	0	3
THEORY COURSE WITH LABORATORY COMPONENTS									
5	23CS4LT1	Database Management Systems	PC	50	50	2	0	4	4
6	23AD4LT2	Computer Networks & Applications	ES	50	50	2	0	4	4
LABORATORY COURSE									
7	23EN4L1	Interpersonal Communication Skills Laboratory - II	HS	60	40	0	0	3	1.5
Total						15	3	11	23.5

SEMESTER V

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1		Open Elective – II	OE	40	60	3	0	0	3
2		Business Analytics	PC	40	60	3	0	0	3
3		Professional Elective - I	PE	40	60	3	0	0	3
THEORY COURSE WITH LABORATORY COMPONENTS									
4		Data Visualization and Analytics	PC	50	50	2	0	4	4
5		Design and Analysis of Algorithms	PC	50	50	2	0	4	4
6		Data Science Using Python	PC	50	50	2	0	4	4
EMPLOYABILITY ENHANCEMENT COURSE									
7		Soft Skills -I	EEC	100	-	2	1	0	0
Total						17	1	12	21

SEMESTER VI

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1		Open Elective – III	OE	40	60	3	0	0	3
2		Professional Elective - II	PE	40	60	3	0	0	3
3		AI in Blockchain Technology	PC	40	60	3	0	0	3
THEORY COURSE WITH LABORATORY COMPONENTS									
4		AI in Natural Language Processing	PC	50	50	2	0	4	4
5		Deep Learning and its Applications	PC	50	50	2	0	4	4
6		Professional Elective - III	PE	50	50	2	0	4	4
EMPLOYABILITY ENHANCEMENT COURSE									
7		Soft Skills -II	EEC	100	-	2	1	0	0
Total						17	1	6	21

SEMESTER VII

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1		Software Testing and Quality Assurance	PC	40	60	3	0	0	3
2		Professional Ethics	HS	40	60	3	0	0	3
THEORY COURSE WITH LABORATORY COMPONENTS									
3		IoT Fundamentals and Architecture	PC	50	50	2	0	4	4
4		Distributed and Cloud Computing	PC	50	50	2	0	4	4
5		Professional Elective - V	PE	50	50	2	0	4	4
6		Professional Elective - IV	PE	50	50	2	0	4	4
LABORATORY COMPONENTS									
7		Project Work Phase-I	EEC	60	40	0	0	6	3
Total						14	0	22	25

SEMESTER VIII

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
LABORATORY COMPONENTS									
1		Project Work Phase-II	EEC	60	40	0	0	24	12
2		Internship	EEC	100	-	2 Weeks			1
Total						0	0	24	13

Total Credits: 165

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT (HS)

S. No.	Course Code	Course Title	L	T	P	C
1	23EN1LT2	Communicative English	3	0	2	4
2	23EN2T1	Technical English	3	0	0	3
3	23EN3L1	Interpersonal Communication Skills Laboratory - I	0	0	3	1.5
4	23EN4L1	Universal Human Values 2: Understanding Harmony	2	1	0	3
5	23HS4T1	Interpersonal Communication Skills Laboratory - II	0	0	3	1.5
6		Professional Ethics	3	0	0	3

BASIC SCIENCES (BS)

Sl.No.	Course Code	Course Title	L	T	P	C
1	23MA1T1	Calculus & Differential Equations	3	1	0	4
2	23PH1LT3	Engineering Physics	3	1	2	5
3	23CY1LT4	Engineering Chemistry	3	1	2	5
4	23MA2T4	Algebra and Number Theory	3	1	0	4
5	23MA3T3	Statistical Analysis	3	1	0	4

ENGINEERING SCIENCES (ES)

Sl.No.	Course Code	Course Title	L	T	P	C
1	23CS1LT5	Problem Solving and C Programming	3	0	4	5
2	23CS2LT1	Python Programming	3	0	4	5
3	23EE2LT2	Basics of Electrical and Electronics Engineering	3	0	4	5
4	23AD4LT2	Computer Networks & Applications	2	0	4	4

PROFESSIONAL CORE (PC)

Sl.No.	Course Code	Course Title	L	T	P	C
1	23AD3T2	Fundamentals of Operating Systems	3	1	0	4
2	23AD3LT2	Data Structures	2	0	4	4
3	23AD3LT3	Foundations of Artificial Intelligence	2	0	4	4
4	23CS3LT1	Object Oriented Programming with Java	2	0	4	4
5	23AD3LT2	Introduction to Data Science	3	1	0	4
6	23AD4T3	Fundamentals of Software Engineering	3	1	0	4
7	23CS4LT1	Database Management Systems	2	0	4	4
8		Business Analytics	3	0	0	3
9		Data Visualization and Analytics	2	0	4	4
10		Design and Analysis of Algorithms	2	0	4	4
11		Data Science Using Python	2	0	4	4
12		AI in Blockchain Technology	3	0	0	3
13		AI in Natural Language Processing	2	0	4	4
14		Deep Learning and its Applications	2	0	4	4
15		Software Testing and Quality Assurance	3	0	0	3
16		IoT Fundamentals and Architecture	2	0	4	4
17		Distributed and Cloud Computing	2	0	4	4

PROFESSIONAL ELECTIVES (PE): VERTICALS

VERTICALS-I: CLOUD COMPUTING						
PE. No.	Course Code	Course Title	L	T	P	C
PE I		Cloud Services Management	3	0	0	3
PE II		Data Warehousing	3	0	0	3
PE III		Storage Technologies	2	0	4	4
PE IV		Software Defined Networks	2	0	4	4
PE V		Security and Privacy in Cloud	2	0	4	4

VERTICALS-II: COMPUTING ANALYTICS						
PE. No.	Course Code	Course Title	L	T	P	C
PE I		Knowledge Engineering	3	0	0	3
PE II		Soft Computing	3	0	0	3
PE III		Text and Speech Analytics	2	0	4	4
PE IV		Image and Video analytics	2	0	4	4
PE V		Computer vision	2	0	4	4

VERTICALS-III: COGNITIVE COMPUTING						
PE. No.	Course Code	Course Title	L	T	P	C
PE I		Health Care Analytics	3	0	0	3
PE II		Ethics and AI	3	0	0	3
PE III		Optimization Techniques	2	0	4	4
PE IV		Game Theory	2	0	4	4
PE V		Cognitive Science	2	0	4	4

VERTICALS-IV: EMERGING TECHNOLOGIES

PE. No.	Course Code	Course Title	L	T	P	C
PE I		Augmented Reality /Virtual Reality	3	0	0	3
PE II		Quantum Computing	3	0	0	3
PE III		Crypto currency and Block Chain Technologies	2	0	4	4
PE IV		Game Development	2	0	4	4
PE V		3D Printing and Design	2	0	4	4

VERTICALS-V: FULL STACK DEVELOPMENT FOR IT

PE. No.	Course Code	Course Title	L	T	P	C
PE I		Software Testing and Automation	3	0	0	3
PE II		Web Application Security	3	0	0	3
PE III		App development	2	0	4	4
PE IV		UI and UX Design	2	0	4	4
PE V		Dev-ops	2	0	4	4

OPEN ELECTIVES (OE)

Sl.No.	Course Code	Course Title	L	T	P	C
1.		Open Elective-I	3	0	0	3
2.		Open Elective-II	3	0	0	3
3.		Open Elective-III	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. No.	Course Code	Course Title	L	T	P	C
1		Soft Skills- I	2	1	0	0
2		Soft Skills – II	2	1	0	0
3		Project Work Phase - I	0	0	6	3
4		Project Work Phase - II	0	0	24	12
5		Internship	2 Weeks			1

MANDATORY COURSES (MC)

Sl.No.	Course Code	Course Title	L	T	P	C
1.		Universal Human Values 1 – Induction Programme	0	0	0	0
2	23HS1T6	Heritage of Tamil	3	0	0	0
3	23HS2T2	Environmental Sciences	3	0	0	0
4	23HS2T3	Tamil And Technology	1	0	0	1
5	23HS3T1	Constitution of India	3	0	0	0

VALUE ADDED COURSES (VAC)

S.No.	Course Code	Course Title	Credits
1.		J2EE	3
2.		Php, Mysql	2
3.		Android Application Development	2
4.		Arduino	3
5.		Hardware And Network Trouble Shooting	2
6.		Ethical Hacking	3
7.		Web Designing	2

OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS (OE)

Sl. No.	Course Code	Course Title	L	T	P	C
1.		Fundamentals of Databases	3	0	0	3
2.		Python Programming and Frameworks	3	0	0	3
3.		Data Structures	3	0	0	3
4.		Computational Science for Engineers	3	0	0	3
5.		Java Programming	3	0	0	3
6.		Web Engineering	3	0	0	3
7.		Fundamentals of Blockchain	3	0	0	3
8.		Introduction to Artificial Intelligence	3	0	0	3
9.		Fundamentals of Internet of Things	3	0	0	3
10.		Cloud Technology	3	0	0	3

CURRICULUM BREAKDOWN STRUCTURE

Subject	AICTE suggested breakdown of credits	Total number of credits	Curriculum Content (% of total number of credits of the program)
Humanities and Social Sciences including Management (HS)	15	16	9.6
Basic Sciences (BS)	23	22	13.3
Engineering Sciences (ES)	22	19	11.5
Professional Core (PC)	54	65	39.3
Program Electives (PE)	18	18	10.9
Open Electives (OE)	15	9	5.4
Employability Enhancement Courses (EEC) – Practical Courses and Project Work	16	16	9.6
Mandatory Courses (MC)	0	2	1.2
Total	163	165	100.00

CREDIT SUMMARY

Sl. No.	Subject Area	Credits per Semester								Total Credits	AICTE Suggested Credits
		I	II	III	IV	V	VI	VII	VIII		
1	HS	4	3	1.5	4.5			3		16	15
2	BS	14	4	4						22	23
3	ES	5	10		4					19	22
4	PC			16	12	15	11	11		65	54
5	PE					3	7	8		18	18
6	OE				3	3	3			9	15
7	EEC					0	0	3	13	16	16
8	MC	1	1	0	0					2	0
TOTAL		24	18	21.5	23.5	21	21	25	13	165	163

HS – Humanities and Social Sciences including Management

BS– Basic Sciences

ES– Engineering Sciences

PC– Professional Core

PE– Professional Electives

OE– Open Electives

EEC– Employability Enhancement Courses

MC– Mandatory Courses

SEMESTER I

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23MA1T1	Calculus & Differential Equations	BS	40	60	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENTS									
2	23EN1LT2	Communicative English	HS	50	50	3	0	2	4
3	23PH1LT3	Engineering Physics	BS	50	50	3	1	2	5
4	23CY1LT4	Engineering Chemistry	BS	50	50	3	1	2	5
5	23CS1LT5	Problem Solving and C Programming	ES	50	50	3	0	4	5
MANDATORY COURSES									
6		Universal Human Values 1 – Induction Programme	MC	-	-	-	-	-	-
7	23HS1T6	Heritage of Tamil	MC	100	-	1	0	0	1
Total						16	3	10	24

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23MA1T1	CALCULUS AND DIFFERENTIAL EQUATIONS	3	1	0	4
COURSE LEARNING OUTCOMES (COs)							
After Successful completion of the course, the students should be able to				RBT Level	Topics Covered		
CO1	Apply eigen values and eigenvectors to convert quadratic form to canonical form through orthogonal diagonalization.			K3	1		
CO2	Understand the basic concepts of derivatives to estimate maxima and minima of multivariable functions.			K2	2		
CO3	Identify appropriate integral techniques to find area and volume of the given region			K3	3		
CO4	Apply various integral theorems for solving engineering problems involving cubes and parallelepipeds.			K3	4		
CO5	Solve first order Ordinary Differential Equations and apply them to certain physical situations.			K3	5		

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO2	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO3	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO4	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO5	3	3	3	3	-	-	-	1	3	2	-	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc...)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1		MATRICES						9 + 3		
Eigen values and Eigen vectors – properties (without proof) –CayleyHamilton theorem (Without proof) –Diagonalization using orthogonal transformation.										
Topic - 2		FUNCTIONS OF SEVERAL VARIABLES						9 + 3		
Partial derivatives – Total derivative –Jacobians - Taylor’s series expansion – Extreme values of functions of two variables – Lagrange’s multipliers method.										
Topic - 3		MULTIPLE INTEGRALS						9 + 3		
Double integrals– Change of order of integration – Triple integrals – Applications in area and volumes.										
Topic - 4		LINE AND SURFACE INTEGRALS						9 + 3		
Gradient, Divergence and curl– Directional Derivative – Irrotational and solenoidal vector fields – Green’s theorem – Green’s theorem in a plane – Gauss divergence theorem – Stokes theorem (excluding proof).										
Topic - 5		ORDINARY DIFFERENTIAL EQUATION						9 + 3		
Second and higher order linear differential equations with Constant coefficients – Variable coefficients – Euler Cauchy equation – Legendre’s equation – Method of variation of Parameters – Simple Applications.										
THEORY	45		TUTORIAL	15		PRACTICAL	0		TOTAL	60

BOOK REFERENCES	
1	Jain R.K and Iyengar S.R.K, “Advanced Engineering Mathematics”, 5 rd Edition, Narosa Publishing House, New Delhi, Reprint 2019.
2	Ramana B.V., “Higher Engineering Mathematics”, Tata Mcgraw Hill Publishing Company, New Delhi, 2017.
3	Kreyszig E., “Advanced Engineering Mathematics”, 10 th Edition, John Wiley Sons, 2012.(E-BOOK)
4	Glyn James., “Advanced Modern Engineering Mathematics”, Pearson Education Limited, 2018.
5	N P Bali, Manish Goyal, “A Text Book of Engineering Mathematics”, 9 rd Edition, Laxmi Publication Private Limited, 2010.
6	GrewalB.S., “Higher Engineering Mathematics”, 43 nd Edition, Khanna Publications New Delhi, 2015

OTHER REFERENCES

1	https://www.slideshare.net/mailrenuka/matrices-and-application-of-matrices
2	https://testbook.com/maths/application-of-vector#:~:text=Application%20of%20Vector%20Calculus,gravitational%20fields%2C%20and%20fluid%20flow.&text=To%20find%20the%20rate%20of,mass%20of%20a%20fluid%20flows .
3	https://youtu.be/wtuq1oSBuE
4	https://www.slideshare.net/abhinavsomani3/applications-of-maths-in-our-daily-life-41607055

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23EN1LT2	COMMUNICATIVE ENGLISH	3	0	2	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Improve communication skills and language comprehension with error-free strategies.		K2	1
CO2	Analyze the effectiveness of soft skills in different scenarios.		K3	2
CO3	Explore the fascinating world of word-stress, sentence stress and intonation.		K4	3
CO4	Enhance reading and writing skills to excel in career.		K4	4
CO5	Develop strong public speaking abilities.		K2	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO2	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO3	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO4	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO5	-	-	-	-	-	-	-	1	3	3	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc...)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	LANGUAGE INTROSPECTION								9	
<p>GRAMMAR COMPONENTS:Vocabulary Building - Word Formation–Prefixes and Suffixes– ‘Wh’ questions and Yes or No questions.</p> <p>LINGUISTIC FUNCTIONS:Short comprehension Passages –Skimming and Scanning-Developing hints</p>										
Topic - 2	SOFT SKILLS								9	
<p>GRAMMAR COMPONENTS:Sentence structures- Punctuation – Kinds of sentences - Subject-verb Agreement.</p> <p>LINGUISTIC FUNCTIONS:Introducing and Sharing Information from Newspaper including Dialogues and Conversations– Short Narrative Descriptions – Paragraph Writing – Greeting- Jumbled Sentences-</p>										
Topic - 3	CAREER GUIDANCE								9	
<p>GRAMMAR COMPONENTS:Single-word substitutes –Pronouns – Degrees of Comparison</p> <p>LINGUISTIC FUNCTIONS:Reading Comprehension – Verbal and Non-verbal Communication –Public Speaking - Describing and Classification of Different Kinds of Innovation – Narration Act. (Language through Literature)- Negotiation Skills.</p>										
Topic - 4	TECHNICAL WRITING								9	
<p>GRAMMAR COMPONENTS:Articles-ModalVerbs – Uses of Prepositions (of Time, Place, Direction and Spatial Relations)</p> <p>LINGUISTIC FUNCTIONS: Preparing Instructions and Manuals - Reporting Events and Research – Writing Recommendations – Interpreting Diagrammatic Representations, esp. Bar Graphs and Pie Charts.</p>										
Topic - 5	BUSINESS CORRESPONDENCE								9	
<p>GRAMMAR COMPONENTS: Numerical Adjectives –Phrases and Clauses- Synonyms and Antonyms- Different Tense Forms of Verbs.</p> <p>LINGUISTIC FUNCTIONS: Writing short Essays- Dialogue Writing- Technical and Business Proposals – Role play – Narrating Incidents – Extempore and persuasive speech- Conversations - Telephonic Conversations.</p>										
THEORY	45		TUTORIAL	0		PRACTICAL	0		TOTAL	45

LIST OF EXPERIMENTS

LIST OF EXPERIMENTS											
1	Self-introduction and introducing others										
2	Negotiation Skills										
3	Public Speaking										
4	Body Language										
5	Narrating incidents										
6	Telephonic Conversation										
7	Representations										
8	Technical Proposals										
THEORY		0	TUTORIAL		0	PRACTICAL		30	TOTAL		30

BOOK REFERENCES

1	Technical English 1 Paperback – 15 December 2019 by Prof. RavindraNath Tiwari (Author)
2	Developing English Language Skills-I: (NEP 2020 for the University of Delhi) by Pooja Khanna
3	Sem-I Communication Skills I Edition/Reprint: 2022 Author(s): B.v.pathak Publisher: NIRALI PRAKASHAN Product ID: 591991
4	Sem-1 Communication Skills (English) ISBN: 9788119883493 Edition/Reprint: 2023-24 Author(s): Dr.YogeshMalshette Publisher: NIRALI PRAKASHAN Product ID: 626280
5	English Language & Comprehension (Useful For Graduate Level) ISBN: 9789386791672 Edition/Reprint: 2022 Author(s): Editorial Board Publisher: UPKAR PRAKASHAN Product ID: 514358 Country of Origin: India
6	Communication Skills in English AICTE Prescribed Textbook (English) DIP122EN Paperback – Big Book, 1 January 2022 by Anjana Tiwari (Author)

OTHER REFERENCES

1	https://youtu.be/x60GHpQ8gJk?list=PLWPirh4EWFpFIElSxplDIEhRDZHkBD-0n
2	https://youtu.be/BO7j-X87rM8
3	https://youtu.be/QMIQv7yPlkI
4	https://www.youtube.com/live/zb07Wo9_2Lc?si=nnPc83pP-gFHvRfD

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23PH1LT3	ENGINEERING PHYSICS	3	1	2	5

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Utilize the conceived concepts and techniques for synthesizing novel crystals.		K2	1
CO2	Classify the extensive properties of solid materials to use it in material fabrication field.		K2	2
CO3	Understand the principles of thermodynamics and apply it in real systems.		K2	3
CO4	Analyze the properties of the Laser beam and apply it in industrial and medical field.		K3	4
CO5	Apply advanced technical methods by assessing the fibre optics.		K3	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2	-	-	1	3	2	1	2	-	-
CO2	3	2	2	2	2	-	-	1	3	2	1	2	-	-
CO3	3	2	2	1	2	-	-	1	3	2	1	2	-	-
CO4	3	2	2	2	2	-	-	1	3	2	1	2	-	-
CO5	3	2	2	1	2	-	-	1	3	2	1	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1		CRYSTAL PHYSICS							9+3	
Unit cell-Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - growth of single crystals: solution and melt growth techniques.										
Topic - 2		PROPERTIES OF MATTER							9+3	
Hooke's Law - Stress-Strain Diagram - Elastic moduli - Poisson's Ratio - Expression for bending moment of beam and depression of Cantilever - Expression for Young's modulus by Non-uniform bending and its experimental determination.										
Topic - 3		THERMAL PHYSICS							9+3	
Transfer of heat energy - thermal conduction, convection and radiation – heat conduction in solids – thermal conductivity - Lee's disc method - theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.										
Topic - 4		LASER TECHNOLOGY							9+3	
Laser characteristics -Spontaneous emission and stimulated emission-Einstein's coefficients-Pumping methods-Components of a laser -CO ₂ laser-Solid state laser(Nd:YAG)-Semiconductor diode lasers –Application of laser in science and technology.										
Topic - 5		FIBER OPTICS							9+3	
Fiber optical communication system – Structure of an optical fiber- Numerical aperture and acceptance angle- Classification of optical fibers (Materials, modes and refractive index profile)- Displacement and temperature sensor- Medical Endoscopy.										
THEORY	45		TUTORIAL	15		PRACTICAL	00		TOTAL	60
LIST OF EXPERIMENTS										
<ol style="list-style-type: none"> Determination of young's modulus by non- uniform bending. Determination of young's modulus by uniform bending. Torsional pendulum - determination of moment of inertia and rigidity modulus. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer. Determination of Wavelength, and particle size using Laser. Determination of thermal conductivity of a bad conductor using Lee's disc method. Air wedge – determination of thickness of a thin wire. Determination of acceptance angle and numerical aperture of an optical fiber. 										
THEORY	00		TUTORIAL	00		PRACTICAL	30		TOTAL	30

BOOK REFERENCES

1	Avadhanulu M N, Kshirsagar P G and Arun Murthy TVS, “A Text book of Engineering Physics”, 2 nd Edition, S Chand Publishing, New Delhi, 2022
2	Dr.G.Senthilkumar “ Engineering Physics-1” Revised & Animated Version, VRB Publishers Pvt.Ltd.,2017
3	Dr.R.Suresh“ A Text book of Engineering Physics”, 2 nd Edition, Sri Krishna Hi-tech Publishing Pvt, Ltd., Chennai,2019.
4.	Dr.P.Mani“ A Text book of Engineering Physics”,Dhanam Publications.,Chennai.,2022.
5.	Dr.M.Arumugam“ A Text book of Engineering Physics”, Anuradha Publications.,Chennai.,2020.
6.	Serway and Jewett, “Physics for Scientists and Engineers with Modern Physics”, 6th Edition, Thomson Brooks Cole, 2008

OTHER REFERENCES

1	https://nptel.ac.in/courses/115/105/115105099/
2	https://nptel.ac.in/courses/115/106/115106061/
3	https://www.youtube.com/watch?v=_JOchLyNO_w
4	https://www.journals.elsevier.com › Journals
5	https://nptel.ac.in/courses/118/104/118104008/
6	https://www.digimat.in/nptel/courses/video/122107035/L37.html

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23CY1LT4	ENGINEERING CHEMISTRY	3	1	2	5

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Apply the suitable water softening methods to avoid boiler troubles.		K3	1
CO2	Analyze the calorific value of different types of fuels.		K2	2
CO3	Choose suitable forms of energy sources for applying it in energy sectors.		K2	3
CO4	Understand the working process of spectroscopy to analyse the wavelength of electromagnetic radiations.		K3	4
CO5	Classify the types of polymers for fabrication.		K3	5
PRE-REQUISITE		NIL		

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	-	-	2	1	2	2	2	2	-	-
CO2	3	2	1	1	-	-	2	1	2	2	2	2	-	-
CO3	3	2	2	1	-	-	3	1	2	2	2	2	-	-
CO4	3	2	2	1	1	-	1	1	2	2	2	2	-	-
CO5	3	2	1	2	-	-	1	1	2	2	2	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1		WATER CHEMISTRY						9+3		
Hardness of water – Types – Units – Boiler troubles (Scale and Sludge, Priming and Foaming and Caustic Embrittlement) – Treatment of boiler feed water – Internal treatment (Phosphate, Colloidal and Calgon conditioning) and External treatment (Ion exchange process and Zeolite process) – Desalination of brackish water – Reverse Osmosis.										
Topic - 2		FUELS						9+3		
Fuels: Introduction - Classification of fuels – Coal – Analysis of coal (Proximate and Ultimate Analysis) - Carbonization - Manufacture of metallurgical coke (Otto Hoffmann method) - Petroleum – Bergius Process - Knocking - Octane number - Diesel oil - Cetane number - Natural gas - Compressed natural gas (CNG) - Liquefied petroleum gases (LPG) - Power alcohol.										
Topic - 3		BATTERIES AND FUEL CELLS						9+3		
Batteries - Types of batteries – primary battery - dry cell. Secondary battery - lead acid battery, Nickel- Cadmium battery - Lithium Batteries- Fuel cells – Hydrogen -Oxygen fuel cell. - Solar energy conversion - solar cells – Application.										
Topic - 4		SPECTROSCOPY						9+3		
Introduction – Laws of spectroscopy - Block diagram, Instrumentation, Working and application of Visible spectroscopy and Ultra Violet spectroscopy – Infrared spectroscopy – Flame photometry – Atomic adsorption spectroscopy.										
Topic - 5		ENGINEERING MATERIALS						9+3		
Polymer – Types of polymerization – Preparation, properties, uses of Nylon(6,6), Poly Vinyl Chloride (PVC). Plastics – Types - Rubbers – SBR – Nanomaterials – Synthesis and its applications of Nanomaterials. Abrasives – Classification, Properties- Manufacture of SiC.										
THEORY	45		TUTORIAL	15		PRACTICAL	0		TOTAL	60
LIST OF EXPERIMENTS										
<ol style="list-style-type: none"> 1. Estimation of total hardness in water by EDTA method. 2. Determination of viscosity coefficient of a given oil / fuel / polymer using Ostwald's viscometer. 3. Estimation of Ferrous Ammonium Sulfate (FAS) using standard potassium Dichromate solution potentiometrically. 4. Estimation of sodium / potassium present in water using photometer. 5. Synthesis of Polymers (Phenol Formaldehyde or Urea Formaldehyde Resins). 6. Conductometric estimation of Strong Acid and Weak acid from a given mixture. 7. Determination of chloride content of water sample by Argentometric method. 8. Determination of strength of given hydrochloric acid using pH meter. 										
THEORY	0		TUTORIAL	0		PRACTICAL	30		TOTAL	30

BOOK REFERENCES

1	S.S Dara and S.S. Umare 'A Textbook of Engineering Chemistry for Anna University', S.Chand Publication, 2020
2	Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019
3	"Engineering Chemistry" by Dr.A.Ravikrishna, Sri Krishna Hi Tech Publishing Company, 2021
4	"Experiments In Engineering Chemistry" – Payal B Joshi, I.K. International Publishing House. 2016
5	Group Theory and Spectroscopy by Pragati Prakashan Alka L Gupta and Mukesh Kumar Alka L Gupta and Mukeshkumar ,2021
6	Anil Kumar P.V Polymer Chemistry, First Edition -2021

OTHER REFERENCES

1	https://sctevtodisha.nic.in/wp-content/uploads/2021/03/Engineering-Chemistry-1ST-YEAR-LM.pdf
2	https://www.youtube.com/watch?v=Fyq4Q5yWDDU&list=PLyqSpQzTE6M927gXIZdVbbsyj9cmxam-b
3	https://www.youtube.com/watch?v=nh2xbyOaERw
4	https://archive.nptel.ac.in/courses/104/106/104106122/
5	https://nptel.ac.in/courses/118104008
6	https://www.britannica.com/science/water

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23CS1LT5	PROBLEM SOLVING AND C PROGRAMMING	3	0	4	5

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Understand the basic concepts to write efficient C program.		K2	1
CO2	Implement the identified looping and control statements in C program for developing applications.		K2	2
CO3	Understand the concepts of arrays and strings to develop C program with different dimensions.		K2	3
CO4	Write and implement C programs using user defined functions.		K2	4
CO5	Apply dynamic memory allocation functions for assigning memory space during execution.		K3	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	-	-	2	2	3	3	2	3	-	-
CO2	1	2	3	2	2	-	2	2	3	3	-	3	-	2
CO3	3	2	2	-	-	-	2	2	3	3	2	3	-	2
CO4	1	3	2	2	-	-	2	2	3	3	-	3	2	-
CO5	3	2	-	-	-	-	2	2	3	3	3	3	-	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	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.										
Topic - 2	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.										
Topic - 3	ARRAYS AND STRINGS							9		
Introduction to Array - Definition - Array initialization - Characteristics - One Dimensional Array - Array operations -Two dimensional arrays -Strings and String handling functions.										
Topic - 4	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.										
Topic - 5	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.										
THEORY	45		TUTORIAL	0		PRACTICAL	0		TOTAL	45

LIST OF EXPERIMENTS	
Experiment-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.
Experiment-2	Programs for demonstrating the use of different types of operators like arithmetic, logical, relational and ternary operators (Sequential and Selection structures).
Experiment-3	Programs for demonstrating repetitive control statements like ‘for’, ‘while’ and ‘do-while’ (Iterative structure).
Experiment-4	Programs for demonstrating one-dimensional and two-dimensional numeric array.
Experiment-5	Programs to demonstrate modular programming concepts using functions.
Experiment-6	Programs to implement various character and string operations with and without built-in library functions.
Experiment-7	Programs to demonstrate the use of pointers.
Experiment-8	Programs to illustrate the use of user-defined data types.
Experiment-9	Programs to implement various file management.

Experiment-10	Program Using Dynamic memory allocation functions.									
THEORY	0		TUTORIAL	0		PRACTICAL	0		TOTAL	60

BOOK REFERENCES	
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.
3	YashavantKanetkar, "Let us C", 16th Edition, BPB Publications, 2018.
4.	C programming for problem solving. Paperback – Import, 9 October 2020 by Sukhendra Singh (Author), Hemant Jain (Author)
5.	Let Us C: Authentic guide to C programming language - 19th Edition Paperback – 15 December 2022 by YashavantKanetkar (Author)

OTHER 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, ISBN10: 9780132492645, ISBN-13: 978- 013249264.
3	ReemaThareja., "Programming in C ", 2nd Edition, Oxford University Press, New Delhi, 2018.
4	Balagurusamy E., "Programming in ANSI C", 7th Edition, McGraw Hill Education, 2017.

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23HS1T6	HERITAGE OF TAMILS	1	0	0	1

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Understand the extensive literature of Tamil and its classical nature.		K2	1
CO2	Understand the heritage of sculpture, painting and musical instruments of ancient people.		K2	2
CO3	Review on folk and material arts of Tamil people.		K2	3
CO4	Realization of thinai concepts trade and victory of chozha dynasty.		K2	4
CO5	Understand the contribution of tamils in Indian freedom struggle, self esteem movement and siddha medicine.		K2	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	LANGUAGE AND LITERATURE							3		
Language Families in India – Dravidan Languages – Tamil as a Classical Language – Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature- Management Principles in Thirukural – Tamil Epics and Impact of Buddhism and Jainism in Tamil Land – Bakthi Literature Azhwars and Nayanmars – Forms of Minor Poetry – Development of Modern Literature in Tamil- Contribution of Bharathiyar and Bharathidhasan										
Topic - 2	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, Villages deities, Thiruvalluvar Statue at Kanyakumari, Making of Musical instruments – Mirudhangam , Parai, Veenai , Yash and Nadhaswaram – Role of Temples in Social and Economic Life of Tamils										
Topic - 3	FOLK AND MARTIAL ARTS							3		
Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance – Sports and Games of Tamils										
Topic - 4	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										
Topic - 5	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 and Manuscripts – Print History of Tamil Books										
THEORY	15		TUTORIAL	0		PRACTICAL	0		TOTAL	15

BOOK REFERENCES	
1	தமிழகவரலாறு-மக்களும்பண்பாடும்கேகேபிள்ளை(வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்)
2	கணினித்தமிழ்- முனைவர்.இல.சுந்தரம்(விகடன்பிரசுரம்)
3	கீழடிவைகைநதிகரையில்சங்ககாலநகரநாகரிகம்தொல்லியல்துறைவெளியீடு
4	Social Life of Tamils(Dr.K.K.Pillai) A joint publication of TNTB and ESC and RMRL – (in print)
5	Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) Published by International Institute of Tamil Studies.
6	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) Published by International Institute of Tamil Studies.

SEMESTER II

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23EN2T1	Technical English	HS	40	60	3	0	0	3
2	23HS2T2	Environmental Sciences	MC	100	0	3	0	0	0
3	23HS2T3	Tamils And Technology	MC	100	0	1	0	0	1
4	23MA2T4	Algebra and Number Theory	BS	40	60	3	1	0	4
THEORY COURSE WITH LABORATORY COMPONENTS									
5	23CS2LT1	Python Programming	ES	50	50	3	0	4	5
6	23EE2LT2	Basics of Electrical and Electronics Engineering	ES	50	50	3	0	4	5
Total						16	1	8	18

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	23EN2T1	TECHNICAL ENGLISH	3	0	0	3

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Learn about personality development to enhance interactions.		K2	1
CO2	Improve skills by cultivating self-confidence.		K4	2
CO3	Increase social abilities by mastering communication.		K2	3
CO4	Reveal true personality for stronger interactions.		K6	4
CO5	Develop the ability to speak confidently in any situation		K6	5

PRE-REQUISITE	COMMUNICATIVE ENGLISH
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO2	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO3	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO4	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO5	-	-	-	-	-	-	-	1	3	3	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc...)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1								9		
<p>GRAMMAR COMPONENTS: One Word Substitutes • Homophones • Homonyms • Words often Confused • Pairs of Words</p> <p>LINGUISTIC FUNCTIONS: - Paragraph Construction • Dialogue Writing • Introduction to Presentation • Communication • Importance of Communication • Tweets • Texting and SMS language • Note Making</p>										
Topic - 2								9		
<p>GRAMMAR COMPONENTS: Error Analysis • Concord • Collocations – Fixed and Semi Fixed Expressions.</p> <p>LINGUISTIC FUNCTIONS: Telephoning Skills • Leadership and Team Management • Qualities of a Good Leader • Leadership Styles • Decision Making • Problem Solving • Technical Report Writing</p>										
Topic - 3								9		
<p>GRAMMAR COMPONENTS: Direct Indirect Speech • Active Passive Voice • Conditional Sentences</p> <p>LINGUISTIC FUNCTIONS: Group Discussions • Purpose (Intellectual “ability, Creativity, Approach to a problem, Solving, Tolerance, Qualities of a leader) • Group Behavior • Analyzing Performance • Reading Comprehension Memo • Notices/Circulars Agenda and Minutes of a Meeting.</p>										
Topic - 4								9		
<p>GRAMMAR COMPONENTS: Misspelled words • Spot the errors • Vocabulary Development • Guessing Meanings of Words.</p> <p>LINGUISTIC FUNCTIONS: Interviews: Types of Interviews • Preparing Resumes & CV • Covering Letter • Brainstorming.</p>										
Topic - 5								9		
<p>LINGUISTIC FUNCTIONS: Mock Presentation • Viewing a model group discussion and reviewing the performance of each participant • Casual Conversation • Participating in a Group Discussion • Speeches for special Occasions.</p>										
THEORY	45		TUTORIAL	0		PRACTICAL	0		TOTAL	45

BOOK REFERENCES	
1	Technical English, Paperback – 15 December 2019 by <u>Prof.RavindraNath Tiwari</u> (Author)
2	Developing English Language Skills-I: (NEP 2020 for the University of Delhi) by Pooja Khanna
3	Teaching Communicative English By <u>Dr.N.BadhriPh.D(Eng.),Ph.D(Edn.)</u> , 2021.
4	Communicative English By S. KannanPadmasani , 2019.
5	Technical English – II by Prof. RavindraNath Tiwari,2020.
6	Intercultural Pragmatics, Edited by IstvanKecskes, State University of New York, Albany Publisher: Cambridge University Press, Online publication date: September 2022, Print publication year: 2022, Online ISBN: 9781108884303, DOI: https://doi.org/10.1017/9781108884303

OTHER REFERENCES

1	https://youtu.be/RkOb-IjkBbw
2	https://youtu.be/8SyZWgzLQSo
3	https://youtu.be/0E9deF06NUU
4	https://youtu.be/CAU2zx2Ri_M?si=jWLn7ZGegmKwO8li
5	https://youtube.com/playlist?list=PLyViUDdoFYKypuYyhNF2ZC9xEUE8zDmzx&si=uYKTb1eZGCWwDVon

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	23HS2T2	ENVIRONMENTAL SCIENCES	3	0	0	0

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Understand the scientific inquiry in the field of ecosystems for future life.		K2	1
CO2	Identify the different methods of conservation of biodiversity by analysing the factors that contribute the threat to extinction.		K2	2
CO3	Enumerate the control plan for environmental pollution problems by identifying and quantifying it's magnitude and intensity		K2	3
CO4	Understand systematically the natural resources and identify the resource management.		K2	4
CO5	Solve current environmental problems by practising the adoption of sustainability in society and industry		K2	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	2	1	2	3	2	3	2	-	2	-	-
CO2	1	-	-	2	-	2	3	2	3	2	-	2	-	-
CO3	1	-	-	2	-	2	3	2	3	2	-	2	-	-
CO4	1	-	-	2	-	2	3	2	3	2	-	2	-	-
CO5	1	2	2	3	-	2	3	2	3	2	-	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	ENVIRONMENT AND ECOSYSTEMS							9 + 3		
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs – Introduction, types, characteristic features, structure and function of the forest ecosystem and aquatic ecosystems (ponds, river and marine). Activity: Study of the ecosystem structure in Cauvery River.										
Topic - 2	BIODIVERSITY							9 + 3		
Introduction to biodiversity - definition: genetic, species and ecosystem diversity –values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity– endangered and endemic species of India – In-situ and ex- situ conservation of biodiversity. Activity: Study of common plants, insects, birds.										
Topic - 3	ENVIRONMENTAL POLLUTION							9 + 3		
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Thermal pollution (d) Noise pollution – solid waste management: causes, effects and control measures of municipal solid wastes – Hazardous and biomedical waste management -pollution case studies. Activity: Study of air and water pollution in industry										
Topic - 4	NATURAL RESOURCES							9 + 3		
Forest resources: over-exploitation, deforestation, – Water resources: Rain water harvesting-watershed management - utilization of surface and ground water, conflicts over water, dams-benefits and problems Food resources: effects of modern agriculture, fertilizer-pesticide problems - Principles of Green Chemistry- Case studies Activity: Tree plantation and maintenance within the campus										
Topic - 5	SUSTAINABILITY AND POPULATION							9 + 3		
From unsustainable to sustainable development – Environmental Impact Assessment (EIA) –environmental ethics: Issues and possible solutions – climate change, acid rain, ozone layer depletion, and case studies – Environment Protection Act 1986 – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act - Environment and Human Health – Value Education – HIV / AIDS – Women and Child Welfare. Activity: Small group meetings about environment and human health in local area peoples and making poster and short films about HIV / AIDS – women and child welfare.										
THEORY	45		TUTORIAL	0		PRACTICAL	0		TOTAL	45

BOOK REFERENCES	
1	ErachBharucha, “Environmental Studies for Undergraduate Courses”, Third Edition, Orient Blackswan Pvt Ltd (8 March 2021).
2	Rajagopalan, R, ‘Environmental Studies-From Crisis to Cure’, Oxford University Press, 2015.
3	Benny Joseph, “Environmental Science and Engineering”, Tata McGraw-Hill Education, New Delhi, 2017.
4	e-book: https://www.iisd.org/system/files/2021-04/still-one-earth-natural-resources.pdf

5	e-book: https://www.researchgate.net/publication/11065962_Population_growth_rate_and_its_determinants_An_overview
6	e-book : https://northinlet.sc.edu/wp-content/uploads/2022/03/Biodiversity-book.pdf

OTHER REFERENCES	
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1	https://www.youtube.com/watch?v=LjFt7rlCU84&t=6s
2	https://archive.nptel.ac.in/courses/120/108/120108004/
3	https://archive.nptel.ac.in/courses/120/108/120108002/
4	https://archive.nptel.ac.in/courses/103/107/103107215/
5	https://archive.nptel.ac.in/courses/127/106/127106004/
6	https://archive.nptel.ac.in/courses/123/105/123105001/

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	23HS2T6	TAMILS AND TECHNOLOGY	1	0	0	1

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Understand the weaving ceramic technology of ancient Tamil people nature.		K2	1
CO2	Understand the construction technology, building materials in Sangam period and case studies.		K2	2
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence.		K2	3
CO4	Realize the agriculture methods, irrigation technology and pearl driving.		K2	4
CO5	Understand the knowledge of scientific tamil and tamil computing.		K2	5

PRE-REQUISITE	Heritage of Tamils
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	WEAVING AND CERAMIC TECHNOLOGY							3		
Weaving Industry during Sangam Age-Ceramic technology-Black and Red Ware Potteries(BRW)-Graffiti on Potteries										
Topic - 2	DESIGN AND CONSTRUCTION TECHNOLOGY							3		
Designing and Structural construction House & Designs in household materials during Sangam Age-Building materials and Hero stones of Sangam Age-Details of Stage Constructions in Silappathikaram-Sculptures and Temples of Mamallapuram-Great Temples of Cholas and other worship places-Temples of Nayaka Period-Type study (Madurai Meenakshi Temple)-ThirumalaiNayakarMahal-Chetti Nadu Houses,Indo-Saracenic architecture at Madras during British Period										
Topic - 3	MANUFACTURING TECHNOLOGY							3		
Art of Ship Building-Metallurgical studies-Iron industry- Iron smelting steel- Copper and gold-Coins are source of history- Minting of Coins-Beads making- industries Stone beads- Glass beads- Terracotta beads- Shell beats/bone beats- Archeological evidences-Gem stone types described in Silappathigaram										
Topic - 4	AGRICULTURE AND IRRIGATION TECHNOLOGY							3		
Dam ,Tank, ponds, sluice, Significance of KumizhiThoompu 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										
Topic - 5	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										
THEORY	15		TUTORIAL	0		PRACTICAL	0		TOTAL	15

BOOK REFERENCES	
1	தமிழகவரலாறு –மக்களும்பண்பாடும்கேகேபிள்ளை (வெளியீடு : தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்)
2	கணினித்தமிழ் – முனைவர். இல. சந்திரம் (விகடன்பிரசுரம்)
3	கீழடிவைகைநதிகரையில்சங்ககாலநகரநாகரிகம்தொல்லியல்துறைவெளியீடு
4	Social Life of Tamils(Dr.K.K.Pillai) A joint publication of TNTB and ESC and RMRL – (in print)
5	Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) Published by International Institute of Tamil Studies.
6	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) Published by International Institute of Tamil Studies.

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	23HS2T6	தமிழரும் தொழில் நுட்பமும்	1	0	0	1

பாடம் கற்றதின் விளைவுகள்				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பானை வனைதல் தொழில்நுட்பம் குறித்த கற்றுணர்தல்.		K2	1
CO2	சங்ககாலத் தமிழர்களின் கட்டட தொழில்நுட்பம், கட்டுமான பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்து புரிதல்.		K2	2
CO3	சங்ககாலத் தமிழர்களின் உலோகத்தொழில் ,நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றி அறிதல்.		K2	3
CO4	சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் பற்றி புரிதல்.		K2	4
CO5	நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்து புரிந்து கொள்ளலும் மற்றும் பயன்படுத்துதலும்.		K2	5

PRE-REQUISITE	தமிழர் மரபு
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
INDIRECT	1	Course Exit Survey

பாடத்திட்டங்கள்										
அலகு 1		நெசவுமற்றும்பானைத்தொழில்நுட்பம்						3		
சங்ககாலத்தில்நெசவுத்தொழில் - பானைத்தொழில்நுட்பம் - கருப்புசிவப்புபாண்டங்கள்- பாண்டங்களில்கீறல்குறியீடுகள்.										
அலகு 2		வடிவமைப்புமற்றும்கட்டிடத்தொழில்நுட்பம்						3		
சங்ககாலத்தில்வடிவமைப்புமற்றும்கட்டுமானங்கள்மற்றும்சங்ககாலத்தில்வீட்டுபொருட்களின்வடிவமைப்பு - சங்ககாலத்தில்கட்டுமானபொருட்களும்நடுக்கல்லும்சிலப்பதிகாரத்தில்மேடை அமைப்புபற்றியவிவரங்கள் -மாமல்லபுரசிற்பங்களும்கோவில்களும் - சோழர்காலத்துபெருங்கோயில்கள்மற்றும்பிறவழிபாட்டுத்தலங்கள் - நாயக்கர்காலகோயில்கள்- மாதிரிகட்டமைப்புகள்பற்றிஅறிதல் - மதுரைமீனாட்சிஅம்மன்ஆலயம்மற்றும்திருமலைநாயக்கர்மஹால் - செட்டிநாடுவீடுகள்- பிரிட்டிஷ்காலத்தில்சென்னையில்இந்தோசாரோசெமிகட்டிடக்கலை										
அலகு 3		உற்பத்தித்தொழில்நுட்பம்						3		
கப்பல்கட்டும்கலை - உலோகவியல் - இரும்புத்தொழிற்சாலை - இரும்பைஉருகுதல், எக்கு - வரலாற்றுச்சான்றுகளாகசெம்புமற்றும்தங்கநாணயங்கள் - நாணயங்கள்அச்சடித்தல் - மணிஉருவாக்கும்தொழிற்சாலைகள் - கல்மணிகள் - கண்ணாடிமணிகள் - சுடுமண்மணிகள் - சங்குமணிகள்- எலும்புத்துண்டுகள்- தொல்லியல்சான்றுகள் - சிலப்பதிகாரத்தில்மணிகளின்வகைகள்.										
அலகு 4		வேளாண்மைமற்றும்நீர்ப்பாசனத்தொழில்நுட்பம்						3		
அணை, ஏரி, குளங்கள் ,மதகு - சோழர்காலக்குமிழித்தூம்பின்முக்கியத்துவம் - கால்நடைபராமரிப்பு - கால்நடைகளுக்காகவடிவமைக்கப்பட்டகிணறுகள் - வேளாண்மைமற்றும்வேளாண்மைசார்ந்தசெயல்பாடுகள் - கடல்சார்அறிவு - மீன்வளம் - முத்துமற்றும்முத்துக்குளித்தல் - பெருங்கடல்குறித்தபண்டையஅறிவு - அறிவுசார்சமூகம்.										
அலகு 5		அறிவியல்தமிழ்மற்றும்கணினித்தமிழ்						3		
அறிவியல்தமிழின்வளர்ச்சி - கணினித்தமிழ்வளர்ச்சி - தமிழ்நூல்களையின்பதிப்புசெய்தல் - தமிழ்மென்பொருட்கள்உருவாக்கம் - தமிழ்இணையகல்விக்கழகம் - தமிழ்மின்நூலகம் - இணையத்தில்தமிழ்அகராதிகள் - சொற்குவைத்திட்டம்.										
THEORY	1		TUTORIAL	0		PRACTICAL	0		TOTAL	15
	5									

BOOK REFERENCES

1	தமிழகவரலாறு –மக்களும்பண்பாடும்கேகேபிள்ளை (வெளியீடு : தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்)
2	கணினித்தமிழ் – முனைவர். இல. சந்திரம் (விகடன்பிரசுரம்)
3	கீழடிவைகைநதிகரையில்சங்ககாலநகரநாகரிகம்தொல்லியல்துறைவெளியீடு
4	Social Life of Tamils(Dr.K.K.Pillai) A joint publication of TNTB and ESC and RMRL – (in print)
5	Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) Published by International Institute of Tamil Studies.
6	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) Published by International Institute of Tamil Studies.

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E.,CSE &B.TECH IT & AIDS	23MA2T4	ALGEBRA AND NUMBER THEORY	3	1	0	4

COURSE LEARNING OUTCOMES (COs)

After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand the fundamental concepts of vector algebra and their role in modern mathematics.	K2	1
CO2	Apply orthogonalization method to solve the problems on linear transformation.	K3	2
CO3	Determine the accurate and efficient use of advanced algebraic techniques.	K2	3
CO4	Use Chinese remainder theorem to solve a system two or more simultaneous linear congruences.	K3	4
CO5	Apply classical theorems to solve multiplicative functions.	K3	5

PRE-REQUISITE

CALCULUS AND DIFFERENTIAL EQUATIONS

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO2	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO3	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO4	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO5	3	3	3	3	-	-	-	1	3	2	-	2	-	-

COURSE ASSESSMENT METHODS

DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc...)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	VECTOR SPACES								9 + 3	
Vector spaces-Subspaces-Linear combinations and linear system of equations-Linear dependence and independence-Bases and dimensions										
Topic - 2	LINEAR TRANSFORMATION AND INNER PRODUCT SPACES								9 + 3	
Linear transformation-Null spaces and ranges-Dimension theorem-Matrix representation of a linear transformation-Inner product-Norms-Gram Schimidtorthogonalization process										
Topic - 3	DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS								9 + 3	
Division algorithm – Base - b representations – Number patterns – Prime and composite numbers – GCD– Euclidean algorithm – Fundamental theorem of arithmetic – LCM										
Topic - 4	DIOPHANTINE EQUATIONS AND CONGRUENCES								9 + 3	
Linear Diophantine equations – Congruence’s – Linear Congruence’s - Applications: divisibility tests -Modular exponentiation-Chinese remainder theorem – 2 x 2 linear systems.										
Topic - 5	CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS								9 + 3	
Wilson’s theorem – Fermat’s little theorem – Euler’s theorem – Euler’s Phi functions – Tau and Sigma functions.										
THEORY	45		TUTORIAL	15		PRACTICAL	0		TOTAL	60

BOOK REFERENCES	
1	Ramana B.V., “Higher Engineering Mathematics”, Tata Mcgraw Hill Publishing Company, New Delhi, 2008.
2	“Algebraic Number Theory”, Second Edition, Richard A.Mollin, 2011.(E-Book)
3	J.H.van Lint, “Introduction to Coding Theory”, Third Edition, Springer.
4	David M,Burton, “Elementary Number Theory”, Sixth Edition, Tata Mcgraw Hill, 2011.
5	Martin Erickson & Anthony Vazzana, “Introduction to Number Theory”, Chapman & Hall/CRC, 2007.
6	“Algebraic Number Theory”, J.S. Milne, Version 3.08 July 19, 2020.(E-Book)

OTHER REFERENCES	
1	https://youtu.be/Qm_OS-8COwU
2	https://youtu.be/KOkuTXrv5Gg
3	https://youtu.be/ru7mWZJIRQg

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. CSE , B.TECH. IT, B.TECH AI&DS	23CS2LT1	PYTHON PROGRAMMING	3	0	4	5

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Understand the basics of Python Programming constructs.		K2	1
CO2	Explain the implementation of all strings functions.		K2	2
CO3	Apply most appropriate programming constructs and features to solve the problems with list, tuples and dictionaries.		K3	3
CO4	Explain the programming skills for the use of the logical constructs of language using function and files.		K2	4
CO5	Demonstrate significant experience with the Python program development environment.		K2	5

PRE-REQUISITE		NIL													
CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)															
COs	Programme Learning Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	2	3	-	-	-	2	2	3	3	2	3	-	-	
CO2	1	2	3	2	2	-	2	2	3	3	-	3	-	2	
CO3	3	2	2	-	-	-	2	2	3	3	2	3	-	2	
CO4	1	3	2	2	-	-	2	2	3	3	-	3	2	-	
CO5	3	2	-	-	-	-	2	2	3	3	3	3	-	2	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	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.										
Topic - 2	STRINGS							9		
Strings and Characters: Creating – Length – Indexing – Slicing – Repeating – Concatenation – Comparing - Removing Spaces - Finding Sub Strings - Counting Substrings in a String - Strings are Immutable - Replacing a String with another String - Splitting and Joining Strings - Changing Case of a String - Checking Starting and Ending of a String - Formatting the Strings.										
Topic - 3	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.										
Topic - 4	ARRAYS ,FUNCTIONS AND FILES							9		
Arrays: One Dimensional arrays - Multi Dimensional arrays - 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.										
Topic - 5	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.										
THEORY	45		TUTORIAL	0		PRACTICAL	0		TOTAL	45

COURSE CONTENT	
Experiment-1	Programs for demonstrating the use of different types of operators.
Experiment-2	Programs for demonstrating control statements.
Experiment-3	Programs to implement various string operations.
Experiment-4	Programs for demonstrating the following i. Lists ii. Tuples iii. Dictionaries.
Experiment-5	Programs to demonstrate concepts using functions.
Experiment-6	Implement user defined functions using python.
Experiment-7	Programs to implement applications using File handling.

Experiment-8	Programs to demonstrate modules.									
Experiment-9	Create programs to solve problems using various data structures in python.									
Experiment-10	Perform data manipulation using NumPy.									
THEORY	0		TUTORIAL	0		PRACTICAL	60		TOTAL	60

BOOK REFERENCES	
1	Dr. R. Nageswara Rao, “Core Python Programming”, Dreamtech Press, 2021 Edition.
2	Jake Vander Plas, —”Python Data Science Handbook Essential Tools for Working with Datal”, 1st Edition O’Reilly Publishers, 2016 for Unit V.
3	Head-First Python, 2 nd Edition, Paul Barry (O’Reily, 2016)

OTHER REFERENCES	
1	Kenneth A. Lambert, “Fundamentals of Python: First Programs”, Cengage Learning, 2018.
2	Wesley J. Chun, “Core Python Programming”, Pearson Education, 2013.

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. CSE, B.Tech IT, B.Tech AI&DS	23EE2LT2	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	4	5

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Apply the knowledge of basic circuit laws; analyze the DC and AC circuits using mesh and nodal analysis.		K3	1
CO2	Illustrate the knowledge in constructional details and working principles of DC and AC machines.		K2	2
CO3	Analyze the characteristics of different electronic devices such as Diodes and Transistors.		K4	3
CO4	Demonstrate the various number systems and simplify the logical expressions using Boolean functions.		K2	4
CO5	Build the concepts of Fundamentals of Electrical and Electronic Instruments.		K3	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3									3	3	1
CO2	3	2	2									3	3	3
CO3	3	3	3									2	3	2
CO4	3	3	3									2	2	0
CO5	3	2	2									3	2	1

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	ELECTRICAL CIRCUITS							9		
DC Circuits: Ohm's Law - Kirchoff's Laws –Independent and Dependent Sources – Nodal Analysis, Mesh analysis with Independent sources only (Steady state) AC Circuits: Waveforms – Average and RMS Value - Power and Power factor – Single and Three Phase Balanced Circuits.										
Topic - 2	ELECTRICAL MACHINES							9		
Construction, Working Principle and Applications of DC Generators, DC Motors, Single Phase Transformer, Single Phase Induction Motor.										
Topic - 3	ANALOG ELECTRONICS							9		
Introduction - Characteristics of PN Junction Diode and Zener Diode – Half wave and Full wave Rectifiers –Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.										
Topic - 4	DIGITAL ELECTRONICS							9		
Binary Number System – Boolean Algebra theorems– Digital circuits - Introduction to sequential Circuits– Flip-Flops – Registers and Counters – A/D and D/A Conversion.										
Topic - 5	MEASUREMENTS AND INSTRUMENTATION							9		
Functional elements of an instrument - Standards and Calibration - Operating Principle of Moving Coil and Moving Iron meters - Energy Meter - CT and PT - DSO - Data acquisition.										
THEORY	45		TUTORIAL	0		PRACTICAL	0		TOTAL	45

LIST OF EXPERIMENTS	
Experiment-1	Experimental verification of Ohm's law.
Experiment-2	Experimental verification of Kirchoff's Voltage and Current laws.
Experiment-3	Open circuit and Load characteristics of DC Shunt generator.
Experiment-4	Load test on DC Shunt motor.
Experiment-5	Load test on DC Series motor.
Experiment-6	Open circuit and Short circuit tests on single phase transformer.
Experiment-7	Load test on single-phase induction motor.
Experiment-8	Characteristics of Semi conductor diode and Zener diode.
Experiment-9	Measurement of ripple factor in Half wave and full wave rectifiers.
Experiment-10	Characteristics of a NPN Transistor under CE, CC and CB configurations.

Experiment-11	Study of logic gates AND, OR, NOT and EX-OR gates.									
Experiment-12	Implementation of Boolean Functions, Adder/ Subtractor circuits.									
Experiment-13	Measurement of energy using single phase energy meter.									
Experiment-14	Study of DC and AC motor starters.									
THEORY	0		TUTORIAL	0		PRACTICAL	60		TOTAL	60

BOOK REFERENCES

1	Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw-Hill, New Delhi, 2001.
2	D.P. Kothari and I.J. Nagrath, 'Electric Machines', McGraw Hill Publishing Company Ltd, 2002.
3	Balbir Kumar, Shail.B.Jain, "Electronic Devices and Circuits" PHI learning private limited, 2nd edition 2014.
4	M. Morris Mano, 'Digital Design with an introduction to the VHDL', Pearson Education, 2013.
5	A.K.Shawney, "A Course in Electrical and Electronics Measurements & Instrumentation", Dhanpat Rai & Co. 2020.

OTHER REFERENCES

1	https://youtu.be/-F7UJxGpkqw?si=q4k_ThrcTOCl5yj3
2	https://youtu.be/KwctEJaYers?si=4IOCFtNiWjLBy2FA
3	https://youtu.be/EdUAecpYVWQ?si=tWhNn-0Hb2srXtuN
4	https://youtu.be/2xXErGeeb_Q?si=vwd_nhujjo7Wt1Va
5	https://youtu.be/HY39LA6H-Lo?si=n38kcYulidSmIbM9

SEMESTER III

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23HS3T1	Constitution of India	MC	100	-	3	0	0	0
2	23AD3T2	Fundamentals of Operating Systems	PC	40	60	3	1	0	4
3	23MA3T3	Statistical Analysis	BS	40	60	3	1	0	4
THEORY COURSE WITH LABORATORY COMPONENTS									
4	23CS3LT1	Data Structures	PC	50	50	2	0	4	4
5	23AD3LT2	Foundations of Artificial Intelligence	PC	50	50	2	0	4	4
6	23AD3LT3	Object Oriented Programming with Java	PC	50	50	2	0	4	4
LABORATORY COMPONENTS									
7	23EN3L1	Interpersonal Communication Skills Laboratory - I	HS	60	40	0	0	3	1.5
Total						15	2	15	21.5

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.TECH AIDS	23AD3T2	FUNDAMENTALS OF OPERATING SYSTEMS	3	1	0	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Infer the important computer system resources and the role of operating system.		K2	1
CO2	Apply the various CPU scheduling algorithms and synchronization.		K2	2
CO3	Construct with handling deadlock mechanisms.		K3	3
CO4	Identify the various page replacement algorithms.		K3	4
CO5	Develop the file system structure and disk scheduling algorithms.		K3	5

PRE-REQUISITE	Nil
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	-	-	2	2	3	3	2	3	-	-
CO2	1	2	3	2	2	-	2	2	3	3	-	3	-	2
CO3	3	2	2	-	-	-	2	2	3	3	2	3	-	2
CO4	1	3	2	2	-	-	2	2	3	3	-	3	2	-
CO5	3	2	-	-	-	-	2	2	3	3	3	3	-	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc...)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	OPERATING SYSTEM OVERVIEW								9+3	
Computer System Overview - Memory Hierarchy - Cache Memory - Interrupts - Operating system overview - Objectives and functions - System Calls - System Programs - System Boot .										
Topic - 2	PROCESS MANAGEMENT								9+3	
Process concepts - Process Scheduling: short term, long term, medium term - CPU Scheduling algorithms: Pre-emptive, Non pre-emptive scheduling, FCFS, SJF, SRTF, Priority, Round Robin -Inter Process Communications: Message Passing Shared Memory, Critical Sections, Mutual Exclusion and Synchronization: Classical problems for synchronization - Peterson's solution-Semaphore - Mutex .										
Topic - 3	DEADLOCK MANAGEMENT								9+3	
Principles of Deadlock - Necessary conditions - Deadlock Detection - Resource allocation Graph - Deadlock Avoidance - Banker's algorithm - Deadlock Prevention - Deadlock Recovery										
Topic - 4	MEMORY MANAGEMENT								9+3	
Main Memory - Contiguous allocation - Fixed Partitioning - Virtual Memory - Paging Segmentation - Swapping - Demand paging - Page Replacement Algorithms.										
Topic - 5	STORAGE MANAGEMENT								9+3	
File System Structure - Allocation Methods - Free Space Management - Disk Structure - Disk Scheduling Algorithms - Swap Space Management - Case study - Linux System.										
THEORY	45		TUTORIAL	15		PRACTICAL	0		TOTAL	60

BOOK REFERENCES	
1	"Operating System Concepts" by Abraham Silberschatz, Greg Gagne, and Peter B. Galvin 10th edition in 2018.
2	"Modern Operating Systems" by Andrew S. Tanenbaum and Herbert Bos 4th edition .
3	"Operating Systems: Three Easy Pieces" by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau 1st edition.
4	"Operating Systems: Internals and Design Principles" by William Stallings 9th edition in 2017.
5	"Operating Systems: Principles and Practice" by Thomas Anderson and Michael Dahlin 2nd edition.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=mXw9ruZaxzQ
2	https://www.youtube.com/watch?v=AM3QRBnbqp8
3	https://www.youtube.com/watch?v=vBURt97EkA
4	https://www.youtube.com/playlist?list=PLBlnK6fEyqRiVhbXDGLXDk_OQAeuVcp2O
5	https://www.youtube.com/watch?v=WJ-UaAaumNA

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.Tech. AIDS	23MA3T3	STATISTICAL ANALYSIS	3	1	0	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Apply various sampling methods to solve core engineering problems		K3	1
CO2	Justify the concept of testing of hypothesis for small and large samples and interpret the results.		K5	2
CO3	Analyse the correlation and regression techniques and explore variable relationships		K4	3
CO4	Classify the principles of design of experiments and perform analysis of variance.		K2	4
CO5	Sketch control charts and criticize on the process control.		K5	5

PRE-REQUISITE	CALCULUS AND DIFFERENTIAL EQUATIONS, ALGEBRA AND NUMBER THEORY
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)															
COs	Programme Learning Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	
CO 1	3	3	3	3	-	-	-	1	3	2	-	2	-	-	
CO 2	3	3	3	3	-	-	-	1	3	2	-	2	-	-	
CO 3	3	3	3	3	-	-	-	1	3	2	-	2	-	-	
CO 4	3	3	3	3	-	-	-	1	3	2	-	2	-	-	
CO 5	3	3	3	3	-	-	-	1	3	2	-	2	-	-	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc...)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	SAMPLING								9 + 3	
Sampling distributions – Estimation of parameters – Statistical hypothesis – Large sample tests for single mean – small sample test –t, F distributions – Tests for goodness of fit										
Topic - 2	TESTING OF HYPOTHESIS								9 + 3	
Large sample tests based on Normal distribution for difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion – Contingency table (test for independent) – Goodness of fit.										
Topic - 3	CORRELATION AND REGRESSION								9 + 3	
Estimation using the regression line – Correlation analysis – Limitations, errors, and caveats of using regression and correlation analysis										
Topic - 4	DESIGN OF EXPERIMENTS								9 + 3	
One way and two way classifications – Completely randomized design – Randomized block design – Latin square design.										
Topic - 5	STATISTICAL QUALITY CONTROL								9 + 3	
Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits – Acceptance sampling.										
THEORY	45		TUTORIAL	15		PRACTICAL	0		TOTAL	60

BOOK REFERENCES	
1	Jain .R.K and IyengarS.R.K,”Advanced Engineering Mathematics”,3rd Edition, Narosa Publishing House, New Delhi , Reprint 2009
2	Ramana B.V., “Higher Engineering Mathematics”,TataMcgraw Hill Publishing Company, New Delhi, 2008
3	N P Bali, Manish Goyal, “A Text Book of Engineering Mathematics”, 3 rd Edition, Laxmi Publication Private Limited, 2009.
4	McGraw –Hill “Statistical Methods”, Combined Edition (Volumes I & II) , N G DAS
5	Introduction to “Probability and Statistics for Engineers and Scientists”, Third Edition SHELDON M. ROSS
6	Taha, H.A., “Operations Research”, 8 th Edition, Pearson India Education Services, Delhi, 2009.

OTHER REFERENCES

1	https://youtu.be/tp_MdKz3fC8
2	https://youtu.be/InVTILPF2e8

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.TECH AIDS	23AD3LT2	DATA STRUCTURES	2	0	4	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Develop the abstract data types for linear data structures		K3	1
CO2	Apply the appropriate linear data structures to solve problems		K3	2
CO3	Infer the use of appropriate tree data structures in problem solving		K2	3
CO4	Choose appropriate Graph representations and solve real-world applications.		K3	4
CO5	Analyze the various sorting and searching algorithms.		K4	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)											PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	3	-	-	-	3	-	-	-	2	1	3
CO2	3	-	3	-	-	2	-	3	-	2	-	2	-	-
CO3	3	3	-	1	3	-	3	3	-	-	2	2	-	3
CO4	3	-	-	-	-	3	1	3	-	2	-	2	3	-
CO5	3	1	-	-	1	-	-	3	-	-	-	2	-	1

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	LINEAR DATA STRUCTURES – LIST								6	
Algorithm analysis-What to analyze-running time calculations-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 Manipulation – All operations (Insertion, Deletion, Merge, Traversal).										
Topic - 2	LINEAR DATA STRUCTURES – STACKS, QUEUES								6	
Stack ADT – Stack Model - Implementations: Array and Linked list - Applications - Balancing symbols - Evaluating arithmetic expressions - Conversion of Infix to postfix expression- Queue ADT – Queue Model - Implementations: Array and Linked list - Circular Queue – Priority Queue - deQueue – applications of queues.										
Topic - 3	NON LINEAR DATA STRUCTURES – TREES								6	
Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree – Priority Queues – Applications of priority queues.										
Topic - 4	NON LINEAR DATA STRUCTURES - GRAPHS								6	
Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs										
Topic - 5	SEARCHING, SORTING AND HASHING TECHNIQUES								6	
Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.										
THEORY	30		TUTORIAL	0		PRACTICAL	0		TOTAL	30

COURSE CONTENT										
Experiment-1	Implementation of Array Manipulation									
Experiment-2	Implementation of String manipulations									
Experiment-3	Implementation of Manipulating two dimensional arrays using pointer									
Experiment-4	Implementation of Array implementation of List, Stack and Queue ADTs									
Experiment-5	Implementation of Linked list implementation of List, Stack and Queue ADTs.									
Experiment-6	Implementation of Graph representation and Traversal algorithms.									
Experiment-7	Implementation of Binary Trees and operations of Binary Trees.									
Experiment-8	Implementation of AVL Trees									
Experiment-9	Implementation of Heaps using Priority Queues									
Experiment-10	Implement searching and sorting algorithms. Analyze and compare the time taken for various algorithms with best, average and worst case inputs.									
THEORY	0		TUTORIAL	0		PRACTICAL	60		TOTAL	60

BOOK REFERENCES	
1	"Data Structures and Algorithm Analysis in Java" by Mark Allen Weiss - The 4th edition
2	"Data Structures and Algorithms in Python" by Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser - The 3rd edition
3	"Algorithms" by Robert Sedgewick and Kevin Wayne 4th edition 2022.
4	"Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein - The 3rd edition of this book was published in 2009
5	"Data Structures and Algorithms Made Easy" by NarasimhaKarumanchi. This book is popular for its simplified explanations and extensive coverage of data structures and algorithms. It's suitable for beginners and intermediate-level readers.

OTHER REFERENCES	
1	https://www.youtube.com/playlist?list=PL5fCG6TOVhr6qwdzBKKioxPkqbzCY9lZ_
2	https://www.youtube.com/watch?v=zg9ih6SVACc
3	https://www.youtube.com/watch?v=5_5oE5lgrhw
4	https://www.youtube.com/watch?v=rZ41y93P2Qo
5	https://www.youtube.com/watch?v=MtVZAXepMPM

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.TECH AIDS	23AD3LT3	FOUNDATIONS OF ARTIFICIAL INTELLIGENCE	2	0	4	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Summarize the fundamental knowledge of modern probability theory and standard distributions		K2	1
CO2	Categorize the probability models and function of random variables based on one- and two-dimensional random variables.		K4	2
CO3	Identify the concept of testing the hypothesis in real life problems		K3	3
CO4	Inspect the analysis of variance for real life problems.		K4	4
CO5	Apply the statistical quality control in engineering and management problems		K3	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	2	1	3	2	2	2	-	-
CO2	-	2	3	1	2	-	-	-	1	3	-	-	-	2
CO3	3	-	3	-	-	-	2	-	3	3	2	1	-	3
CO4	2	-	2	2	-	-	2	2	3	2	-	-	3	-
CO5	3	2	2	-	-	-	3	2	-	3	3	1	-	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT			
Topic - 1	ARTIFICIAL INTELLIGENCE AND INTELLIGENT AGENTS		6
Introduction to AI – Foundations of Artificial Intelligence - Intelligent Agents – Agents and Environments - Concept of rationality – Nature of environments – Structure of agents - Problem solving agents – Example Problems - Search Algorithms – Uninformed Search Strategies			
Topic - 2	PROBLEM SOLVING		6
Heuristic search strategies – heuristic functions- Game Playing – Mini-max Algorithm - Optimal decisions in games – Alpha-beta search –Monte-Carlo search for Games - Constraint satisfaction problems – Constraint propagation – Backtracking search for CSP – Local search for CSP – Structure of CSP			
Topic - 3	LOGICAL AGENTS		6
Knowledge-based agents – Logic - Propositional logic – Propositional theorem proving – Propositional model checking – Agents based on propositional logic. First-Order Logic – Syntax and semantics – Using First-Order Logic - Knowledge representation and engineering			
Topic - 4	KNOWLEDGE REPRESENTATION AND PLANNING		6
Ontological engineering – Categories and objects – Events – Mental objects and modal logic – Reasoning systems for categories – Reasoning with default information Classical planning – Algorithms for classical planning – Heuristics for planning – Hierarchical planning – nondeterministic domains – Time, schedule, and resources - Analysis			
Topic - 5	LEARNING AND EXPERT SYSTEMS		6
Forms of Learning – Developing Machine Learning systems – Statistical Learning - Deep Learning: Simple feed-forward network - Neural Networks – Reinforcement Learning: Learning from rewards – Passive and active Reinforcement learning.			
THEORY	30	TUTORIAL	15
		PRACTICAL	0
		TOTAL	30

COURSE CONTENT	
Experiment-1	Implement classic machine learning algorithms such as linear regression, logistic regression, k-nearest neighbors, decision trees, or naive Bayes from scratch.
Experiment-2	Implement a simple neural network with feedforward propagation and backpropagation using libraries like TensorFlow or PyTorch.
Experiment-3	Implement a basic CNN for image classification tasks using popular frameworks like TensorFlow or PyTorch.
Experiment-4	Implement a basic RNN or LSTM for sequential data processing tasks such as text generation or sentiment analysis.
Experiment-5	Implement a basic GAN architecture for generating synthetic data.
Experiment-6	Implement text classification, sentiment analysis, or named entity recognition using libraries like NLTK or spaCy.
Experiment-7	Implement Q-learning or deep Q-networks (DQN) for simple game environments like CartPole or GridWorld.
Experiment-8	Implement a simple autoencoder for dimensionality reduction or data denoising tasks.

Experiment-9	Implement inference algorithms for Bayesian networks such as variable elimination or Gibbs sampling.									
Experiment-10	Implement a genetic algorithm for solving optimization problems like the knapsack problem or traveling salesman problem.									
THEORY	0		TUTORIAL	0		PRACTICAL	60		TOTAL	60

BOOK REFERENCES	
1	"Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig - fourth edition, was released in 2020.
2	"Artificial Intelligence: Structures and Strategies for Complex Problem Solving" by George F. Luger - 6th Edition 2018.
3	"Artificial Intelligence: Foundations of Computational Agents" by David L. Poole and Alan K. Mackworth - 2nd Edition 2017.
4	"Artificial Intelligence: A Guide to Intelligent Systems" by Michael Negnevitsky- 3rd Edition
5	"Artificial Intelligence: A Philosophical Introduction" by Jack Copeland - 2nd Edition 2018

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=ONzEBrsZ2jA
2	https://www.youtube.com/watch?v=2R2Fxrq_eEIA
3	https://www.youtube.com/watch?v=9IpscYw7BnY
4	https://www.youtube.com/watch?v=EG8eDEGIDGQ
5	https://www.youtube.com/watch?v=K5IgvclblDg

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.Tech AI&DS	23CS3LT1	OBJECT ORIENTED PROGRAMMING WITH JAVA	2	0	4	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Explain the object-oriented programming concepts, and apply them in solving problems		K2	1
CO2	Apply the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.		K3	2
CO3	Illustrate the implementation of packages and interfaces		K2	3
CO4	Infer the concepts of exception handling and multithreading.		K2	4
CO5	Outline the design of Graphical User Interface using applets and swing controls.		K2	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	3	2					3			2		2	2
CO2			2				2			2				3
CO3		2				3		2			1			
CO4	3	3			2					1		3	2	2
CO5			2				2		3					

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1		INTRODUCTION TO OOPS CONCEPTS AND CLASSES						6		
Introduction to OOP– Java Fundamentals - Data Types, Variables, and Arrays Operators - Control Statements – Classes – Methods –Constructors- Garbage Collection.										
Topic - 2		STRINGS, INHERITANCE, INTERFACES, AND PACKAGES						6		
Strings: introduction to Strings, String operations, Inheritance:- Types of Inheritance, Method overriding, Final keyword. Packages and Interfaces										
Topic - 3		EXCEPTION HANDLING & MULTI-THREADING						6		
Exception Handling: Fundamentals, Types of exception handling, Multi-threading: Thread Class, creating multiple threads, life cycle of thread, thread properties										
Topic - 4		I/O STREAMS AND COLLECTION FRAME WORK CLASSES						6		
I/O Streams: Byte Stream Classes and Character Stream Classes. Collection Framework : Hierarchy of collection framework, Array List, Linked List, Vector, Stack, Queue, Priority Queue, Hash Set, Linked Hash Set, Tree Set										
Topic - 5		SWINGS						6		
Swing – Introduction, limitations of AWT, MVC architecture, components, containers, Event Handling- Handling mouse and keyboard events										
THEORY	30		TUTORIAL	0		PRACTICAL	0		TOTAL	30

LIST OF EXPERIMENTS										
1	Write a program to find the factorial of a given number.									
2	Write a program to print numbers in sorting order.									
3	Write a program on illustration of use of packages									
4	Write a program on illustration of use of string operations in java									
5	Write a program to implement interfaces.									
6	Write a program that implements a stack ADT that converts infix expression into postfix expression.									
7	Write a program to read a file and displays the file on the screen within line number before each line.									
8	Write a program to copy contents of a file into another file using File streams.									
9	Write a program for handling Array Index Out of Bounds Exception and Divide-by-zero Exception.									
10	Write a program for custom exception creation.									
11	Write a program on multi-threading showing how CPU time is shared among all the threads.									
12	Write a program for Producer-Consumer problem using threads.									
THEORY	0		TUTORIAL	0		PRACTICAL	60		TOTAL	60

BOOK REFERENCES

1	Object Oriented Programming with Java Laboratory Manual, Al-Ameen Publications, 2020
2.	"Java Programming: From Problem Analysis to Program Design" by D. S. Malik - 6th Edition 2017.
3.	"Java Foundations: Introduction to Program Design and Data Structures" by John Lewis and Peter DePasquale - 5th Edition 2019
4.	"Big Java: Early Objects" by Cay S. Horstmann 7th Edition 2017.
5.	E. Balaguruswamy, "Programming with Java", Sixth Edition, TMH, 2019.

OTHER REFERENCES

1	https://www.w3resource.com/java-exercises/
2	https://www.csie.ntu.edu.tw/~d00922011/java/320/java.html
3	https://www.youtube.com/watch?v=j0lBrYSIYaU
4	https://www.youtube.com/watch?v=Gvm2Sg1rZek
5	https://www.youtube.com/watch?v=JeznW_7DlB0

SEMESTER IV

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23HS4T1	Universal Human Values 2: Understanding Harmony	HS	100	-	2	1	0	3
2	23AD4T2	Introduction to Data Science	PC	40	60	3	1	0	4
3	23AD4T3	Fundamentals of Software Engineering	PC	40	60	3	1	0	4
4		Open Elective - I	OE	40	60	3	0	0	3
THEORY COURSE WITH LABORATORY COMPONENTS									
5	23CS4LT1	Database Management Systems	PC	50	50	2	0	4	4
6	23AD4LT2	Computer Networks & Applications	ES	50	50	2	0	4	4
LABORATORY COMPONENTS									
7	23EN4L1	Interpersonal Communication Skills Laboratory - II	HS	60	40	0	0	3	1.5
Total						15	3	11	23.5

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.TECH AIDS	23AD4T2	INTRODUCTION TO DATA SCIENCE	3	1	0	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Inspect the fundamentals of data science		K4	1
CO2	Organize and implement libraries for data science.		K3	2
CO3	Apply and implement basic classification algorithms.		K3	3
CO4	Solve clustering and outlier detection approaches.		K3	4
CO5	Inference and interpret data using visualization		K4	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	-	-	2	2	3	3	2	3	-	-
CO2	1	2	3	2	2	-	2	2	3	3	-	3	-	2
CO3	3	2	2	-	-	-	2	2	3	3	2	3	-	2
CO4	1	3	2	2	-	-	2	2	3	3	-	3	2	-
CO5	3	2	-	-	-	-	2	2	3	3	3	3	-	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc...)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	INTRODUCTION						9+3			
Overview of Data Science-History and Evolution of Data Science-Importance and Applications of Data Science-Basic Terminology: Data, Information, Knowledge Role of Data Scientist.										
Topic - 2	DATA ACQUISITION AND DATA CLEANING						9+3			
Data Collection Methods: Surveys, Web Scraping, APIs, Databases-Data Formats: CSV, JSON, XML-Data Cleaning Techniques: Handling Missing Values, Outlier Detection and Removal, Data Transformation-Data Integration and Preparation										
Topic - 4	DATA ANALYSIS AND VISUALIZATION						9+3			
Exploratory Data Analysis (EDA)-Descriptive Statistics-Data Visualization Techniques: Charts, Graphs, Plots-Visualization Tools: Matplotlib, Seaborn, Plotly Interpretation of Visualizations										
Topic - 4	MACHINE LEARNING FUNDAMENTALS						9+3			
Introduction to Machine Learning-Supervised Learning, Unsupervised Learning, And Semi-supervised Learning-Model Evaluation and Validation-Regression Analysis-Classification Algorithms: Decision Trees, Random Forest, Support Vector Machines										
Topic - 5	DIMENSIONALITY REDUCTION TECHNIQUES						9+3			
Dimensionality Reduction Techniques: PCA, t-SNE-Clustering Algorithms: K-Means, Hierarchical Clustering-Natural Language Processing (NLP)-Introduction to Deep Learning-Ethical and Legal Issues in Data Science										
THEORY	45		TUTORIAL	15		PRACTICAL	0		TOTAL	60

BOOK REFERENCES	
1	"Python for Data Science For Dummies"by John Paul Mueller and Luca Massaron- 1st Edition
2	"Data Science from Scratch: First Principles with Python" by Joel Grus - 2nd Edition 2019
3	"Practical Statistics for Data Scientists: 50 Essential Concepts" by Peter Bruce and Andrew Bruce - 1st Edition 2017.
4	"Data Science for Dummies" by Lillian Pierson -2nd Edition 2020
5	"Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett 1st Edition.

OTHER REFERENCES	
1	https://youtu.be/KxryzSO1Fjs?si=7JDwuQVOSZBXaljk
2	https://www.youtube.com/watch?v=7WRIYJFG7YI
3	https://www.tutorialspoint.com/data_science/index.htm
4	https://www.geeksforgeeks.org/introduction-to-data-science/
5	https://www.javatpoint.com/data-science

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.TECH AIDS	23AD4T3	FUNDAMENTALS OF SOFTWARE ENGINEERING	3	1	0	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Analyze and identify a suitable software development life cycle model for an application		K4	1
CO2	Develop software requirements specification and cost estimation for an application		K3	2
CO3	Dissect the software design concepts and principles to develop a high quality software		K4	3
CO4	Apply the testing methods to identify errors during software development		K3	4
CO5	Identify the activities that improve the quality of the software.		K3	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2			3	2					3	2	2
CO2			2			3	2	3				3		3
CO3		2							3	2		3		
CO4	3	3			2	1	1				3	3	2	2
CO5			2									3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc...)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1		SOFTWARE PROCESS MODELS						9+3		
The Nature of Software-Software Process Models-Waterfall Model-Incremental Process Models- Evolutionary Process Models- Prototyping-Spiral Model-Concurrent Model-Introduction to Agile Process										
Topic - 2		REQUIREMENTENGINEERING AND ESTIMATION						9+3		
Requirements Engineering - Establishing the Groundwork - Eliciting Requirements - Building the Requirements Model - Requirements Analysis - Metrics in the Process and Project Domains - Software Measurements - Metrics for Software Quality - Software Project Estimation - Decomposition Techniques - Empirical Estimation Models - The Make/Buy Decision.										
Topic - 3		DESIGN CONCEPTS AND PRINCIPLES						9+3		
The Design Concepts - The Design Model - Architectural Design - User Interface Design: Interface Analysis - Interface Design Steps - Risk Management - Software Engineering Practice - Core Principles - Coding Principles and Concepts.										
Topic - 4		TESTING TACTICS						9+3		
Software Testing Fundamentals - Internal and External Views of Testing - White-Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing - Unit Testing - Integration Testing - Validation Testing - System Testing - The Art of Debugging.										
Topic - 5		QUALITY MANAGEMENT						9+3		
Software Quality Assurance - Software Reviews - Formal Technical Reviews - Informal Reviews - Software Reliability - Software Configuration Management - The SCM Process - The Clean room Strategy - Software Reengineering Process Model - Reverse Engineering - Forward Engineering										
THEORY	45		TUTORIAL	15		PRACTICAL	0		TOTAL	60

BOOK REFERENCES	
1.	"Software Engineering: A Practitioner's Approach" by Roger S. Pressman and Bruce Maxim- 9th Edition 2019.
2.	"Fundamentals of Software Engineering" by CarloGhezzi, Mehdi Jazayeri, and Dino Mandrioli 2nd Edition.
3.	"Fundamentals of Software Engineering and Software Systems Development"byShu Yin and Nan Zhang - 1st Edition 2020.
4.	"Software Engineering: The Development Process"by Richard H. Thayer and Mark Christensen- 8th Edition 2018.
5.	"Software Engineering: A Hands-On Approach" by Roger S. Pressman, Bruce Maxim, and Arthur Carstens - 3rd Edition 2019.

OTHER REFERENCES

1	https://www.tutorialspoint.com/software_engineering/index.htm
2	https://www.geeksforgeeks.org/software-engineering-introduction-to-software-engineering/
3	https://www.youtube.com/watch?v=Lh3LcWxsQyg&list=PLgCkhV6SEeQmECqGecwsQGsoke1-xAcdt
4	https://www.youtube.com/watch?v=8jH07r6135o&list=PL_pbwdIyffslgxMVyXhnHiSn_EWTvx1G-
5	https://www.youtube.com/watch?v=G4CeR6J1-4k&pp=ygUkRnVuZGFtZW50YWxzIG9mIFNvZnR3YXJlIEVuz2luZWVyaW5n

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.TECH AIDS	23CS4LT1	DATABASE MANAGEMENT SYSTEMS	2	0	4	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Explain the basic concepts of the database management systems		K2	1
CO2	Examine SQL queries to create, manipulate and control the database		K4	2
CO3	Apply normalization technique to design database		K3	3
CO4	Analyse database transactions using ACID properties		K4	4
CO5	Compare the various storage and optimization techniques		K4	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)											PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1		-	-	-	-	-	-	-	-	2	3	2
CO2	3	2	2	-	-	-	-	-	-	-	-	2	3	3
CO3	3	3	2	-	-	-	-	-	-	-	-	2	3	3
CO4	3	3	2	-	-	-	-	-	-	-	-	2	3	3
CO5	2	1	-	-	3	-	-	-	-	-	-	2	3	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	INTRODUCTION TO RELATIONAL DATABASE								6	
What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management, Database Schema and Diagram Relational Algebra — ER Diagrams — Entities. Attributes, Relationships, Constraints, Keys — Extended ER features										
Topic - 2	STRUCTURED QUERY LANGUAGE								6	
Basics of SQL, DDL, DML, DCL, TCL — creation, alteration, defining constraints — Functions — aggregate functions, Built-in functions — Views — Joins — Procedure										
Topic - 3	DATABASE DESIGN								6	
Relational database model: Logical view of data, keys, integrity rules. Functional dependencies - Normalization - Normal forms based on primary keys (1 NF, 2NF, 3NF, BCNF, 4NF, 5NF) - Triggers – Cursor										
Topic - 4	TRANSACTION MANAGEMENT								6	
Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.										
Topic - 5	IMPLEMENTATION TECHNIQUES AND NoSQL DATABASE								6	
Indexing and Hashing - Si- tree Index Files - B Tree Index Files - Query Processing and optimization - Introduction to NoSQL Databases - Types of NOSQL Databases- CAP theorem - NoSQLVs SQL - Limitations of NoSQL - Basics of MONGODB										
THEORY	30		TUTORIAL	0		PRACTICAL	0		TOTAL	30

LIST OF EXPERIMENTS										
1	Conceptual Database design using E-R model — case study									
2	Implementation of SQL commands DDL, DCL, TCL									
3	Queries to demonstrate implementation of various integrity and key constraints									
4	Practice on various DML commands to write a query to interact with database									
5	Practice on and aggregate functions and views									
6	Implement joins, nested queries and stored procedures									
7	Practice on procedural extensions (Functions, Cursors, Triggers)									
8	Document Database creation using MongoDB									
9	Creation of database objects: Synonyms, Sequences, Views, Indexes and save point									
10	Create an Employee database to set various constraints									
THEORY	0		TUTORIAL	0		PRACTICAL	60		TOTAL	60

BOOK REFERENCES

1	"Database System Concepts" by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan (7th Edition, 2019).
2.	"SQL Performance Explained" by Markus Winand (latest edition: 2nd Edition, 2018).
3.	"Modern Database Management" by Jeffrey A. Hoffer, Ramesh Venkataraman, and HeikkiTopi (latest edition: 13th Edition, 2018).
4.	"Database Systems: Design, Implementation, and Management" by Carlos Coronel, Steven Morris, and Peter Rob (latest edition: 13th Edition, 2019).
5.	"SQL Queries for Mere Mortals: A Hands-On Guide to Data Manipulation in SQL" by John L. Viescas and Michael J. Hernandez (latest edition: 4th Edition, 2018).

OTHER REFERENCES

1	https://www.youtube.com/watch?v=6Iu45VZGQDk
2	https://www.youtube.com/watch?v=mqprM5YUdpk
3	https://www.youtube.com/watch?v=c5HAWKX-suM
4	https://www.youtube.com/watch?v=IDpB9zF8LBw
5	https://www.youtube.com/playlist?list=PL71FE85723FD414D7

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.Tech AI&DS	23AD4LT2	COMPUTER NETWORKS & APPLICATIONS	2	0	4	4

COURSE LEARNING OUTCOMES (COs)				
After Successful completion of the course, the students should be able to			RBT Level	Topics Covered
CO1	Interpret the importance of layering, addressing and annotate the protocol stack of OSI and TCP/IP model		K2	1
CO2	Inspect MAC protocols (Ethernet, Token Ring and Wi-Fi) supported by Data Link layer to ensure hop-to-hop reliable communication.		K4	2
CO3	Make use of IP addressing and routing protocols to find shortest route to achieve reliable network-layer data transmission.		K3	3
CO4	Classify the transport layer protocols and explain the congestion control or congestion avoidance techniques to ensure quality of service		K4	4
CO5	Analyze the functions and services provided by the application layer protocols (HTTP, SMTP and DNS).		K4	5

PRE-REQUISITE	NIL
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CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)											PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2			1			3	3		3		
CO2	3	2				1			3	3		3		
CO3	3	2	2			1			3	3		3		
CO4	3	2	2			1			3	3		3		
CO5	3	2	2			1			3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests (Theory Component)
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1		INTRODUCTION						6		
Overview of Computer Networks-History and Evolution of Networking-Network Topologies-OSI and TCP/IP Models-Network Devices: Routers, Switches, Hubs, Modems-Network Protocols: TCP, UDP, IP, HTTP, FTP										
Topic - 2		NETWORK COMMUNICATION AND TRANSMISSION						6		
Data Transmission: Serial vs. Parallel, Analog vs. Digital-Transmission Media: Copper, Fiber Optic, Wireless-Error Detection and Correction										
Topic - 3		LAN						6		
Ethernet Standards and Protocols-LAN Technologies: Ethernet, Wi-Fi-LAN Topologies: Bus, Ring, Star-LAN Switching and Bridging-VLANs (Virtual LANs)										
Topic - 4		WAN						6		
Ethernet Standards and Protocols-LAN Technologies: Ethernet, Wi-Fi-LAN Topologies: Bus, Ring, Star-LAN Switching and Bridging-VLANs (Virtual LANs)-LAN Security: MAC Filtering, Port Security										
Topic - 5		NETWORK MANAGEMENT AND SECURITY						6		
Network Management Protocols: SNMP, ICMP-Network Monitoring and Troubleshooting-Network Security Fundamentals: Authentication, Encryption, Access Control-Security Protocols: SSL/TLS, IPsec.										
THEORY	30		TUTORIAL	0		PRACTICAL	0		TOTAL	30

LIST OF EXPERIMENTS	
1	Study of Network simulator 2 (NS2).
2	Implementation of Various Topologies using NS2 Simulator.
3	Bit Stuffing and CRC computation
4	Program to simulate Stop & Wait protocol
5	Implementation of Sliding Window Protocol
6	Program to simulate Distance Vector Routing algorithm
7	Socket program to implement echo client and echo server using TCP
8	Socket program to contact a given DNS server to resolve a given host name using UDP
9	Case Study using Cisco Packet Tracer. Establishing a Local Area Network (LAN): The main objective is to set up a Local Area Network, concepts involved in this network are IP addressing and the Address Resolution Protocol (ARP). The required equipment's are 192.168.1.1, 192.168.1.2, 192.168.1.3, Host A, Host B, Host C, Switch/HUB, three PC's equipped with at least one NIC, one HUB or Switch and the necessary cables. Once the physical LAN is set up the hosts need to be configured using the ipconfig command. To verify communication among the machines the ping command is used. Next, to manipulate

	the routing tables at the hosts to understand how machines know where to send packets. Since the ipconfig command places a default route into the routing tables this route must be deleted to 'blind fold' the machine. The ping command is used again to show that communication is no longer available. To re-establish communication the routes are put back into the routing table one host at a time. Communication is once again verified using the ping command.						
10	Establish a LAN in Cisco Packet Tracer and perform traffic analysis for FTP using Traffic Generator.						
THEORY	0	TUTORIAL	0	PRACTICAL	60	TOTAL	60

BOOK REFERENCES	
1	"Computer Networking: Principles, Protocols and Practice" by Olivier Bonaventure - 2nd Edition 2017.
2.	"Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross - 7th Edition 2016
3.	"Computer Networks: A Systems Approach" by Larry L. Peterson and Bruce S. Davie 6th Edition 2017
4.	"Data Communications and Networking" by Behrouz A. Forouzan - 6th Edition 2019
5.	"Computer Networks: A Top-Down Approach" by James F. Kurose and Keith W. Ross- 8th Edition 2020

OTHER REFERENCES	
1	https://www.geeksforgeeks.org/computer-network-tutorials/
2	https://www.tutorialspoint.com/data_communication_computer_network/index.htm
3	https://www.youtube.com/watch?v=btUMi2kiCXw&pp=ygUgQ29tcHV0ZXIgtmV0d29ya3MgJiBBcHBsaWNhdGlvbN%3D
4	https://www.youtube.com/watch?v=MGTMrVM1kxQ&pp=ygUgQ29tcHV0ZXIgtmV0d29ya3MgJiBBcHBsaWNhdGlvbN%3D
5	https://www.adelaide.edu.au/course-outlines/002328/1/sem-1/