

KONGU ENGINEERING COLLEGE

(Autonomous Institution Affiliated to Anna University, Chennai)

PERUNDURAI ERODE – 638 060

TAMILNADU INDIA



REGULATIONS, CURRICULUM & SYLLABI – 2024

(CHOICE BASED CREDIT SYSTEM AND
OUTCOME BASED EDUCATION)

(For the students admitted from the academic year 2024 - 2025)

BACHELOR OF TECHNOLOGY DEGREE IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

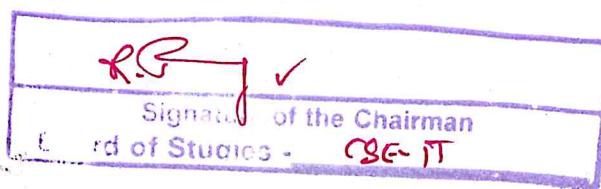


B.TECH ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING CURRICULUM – R2024
 (For the students admitted from the academic year 2024-25 onwards)

SEMESTER – I														
Course Code	Course Title	Hours / Semester						Credit	Maximum Marks			Category	Type	
		CI		LI	TW	SL	TH		CA	ESE	Total			
		L	T	P										
Theory/Theory with Practical														
24EGT11	English for Effective Communication - I	45	0	0	45	0	90	3	40	60	100	HS	C	
24MAC11	Matrices and Ordinary Differential Equations	45	7	16	52	0	120	4	50	50	100	BS	A	
24PHT11	Physics for Computer Systems	45	0	0	45	0	90	3	40	60	100	BS	C	
24CSC12	Programming in C	45	0	30	45	0	120	4	100	0	100	ES	OT	
24ITT11	Digital Logic Principles and Design	45	0	0	45	0	90	3	40	60	100	ES	A	
24TAM01	Heritage of Tamils	15	0	0	15	0	30	1	100	0	100	HS	OT	
Practical / Employability Enhancement														
24PHL11	Physics Laboratory for Computer Systems	0	0	30	0	0	30	1	60	40	100	BS		
24GCL11	Foundation Laboratory – Manufacturing,Design and Robotics	0	0	90	0	0	90	3	100	0	100	ES		
24MNT12	Quantitative Aptitude - I	20	0	0	10	0	30	0	100	0	100	MC		
24VEC11	Yoga and Values for Holistic Education	10	0	10	10	0	30	1	100	0	100	HS		
24MNT11	Student Induction Program	0	0	90	0	0	90	0	100	0	100	MC		
Total Credits to be earned									23					

CI – Classroom Instructions, LI – Laboratory Instructions, TW – Term Work, SL – Self Learning, L – Lecture, T – Tutorial, P – Practical, C – Credit, TH – Total Hours, CA – Continuous Assessment, ESE – End Semester Examination.

Type: A – Analytical, D – Design using Hardware, S – Simulation using Coding, C – Concept, OC – Online course, OT - others

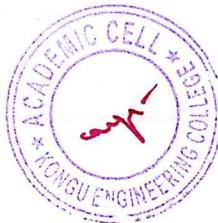
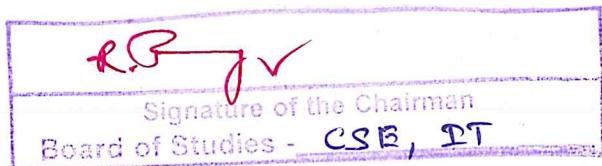


B.TECH ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING CURRICULUM – R2024
(For the students admitted from the academic year 2024-25 onwards)

SEMESTER – II														
Course Code	Course Title	Hours / Semester						Credit	Maximum Marks			Category	Type	
		CI		LI	TW	SL	TH		CA	ESE	Total			
		L	T	P										
Theory/Theory with Practical														
24EGT21	English For Effective Communication - II	45	0	0	45	0	90	3	40	60	100	HS	C	
24MAC24	Probability Theory and Inferential Statistics	45	7	16	52	0	120	4	50	50	100	BS	A	
24CYT13	Chemistry for Electronics and Computer Systems	45	0	0	45	0	90	3	40	60	100	BS	C	
24ADC21	Python Programming	45	0	30	0	45	120	4	100	0	100	ES	OT	
24ADC22	Foundations of Artificial Intelligence	45	0	30	0	45	120	4	50	50	100	PC	S	
24TAM02	Tamils and Technology	15	0	0	15	0	30	1	100	0	100	HS	OT	
Practical / Employability Enhancement														
24CYL13	Chemistry Laboratory for Electronics and Computer Systems	0	0	30	0	0	30	1	60	40	100	BS		
24GCL12	Foundation Laboratory - Electrical, IoT and Web Technologies	0	0	90	0	0	90	3	100	0	100	ES		
24MNT21	Quantitative Aptitude - II	30	0	0	0	0	30	0	100	0	100	MC		
Total Credits to be earned									23					

CI – Classroom Instructions, LI – Laboratory Instructions, TW – Term Work, SL – Self Learning, L – Lecture, T – Tutorial, P – Practical, C – Credit, TH – Total Hours, CA – Continuous Assessment, ESE – End Semester Examination

Type: A – Analytical, D – Design using Hardware, S – Simulation using Coding, C – Concept, OC – Online course, OT - others



B.TECH ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING CURRICULUM – R2024
(For the students admitted from the academic year 2024-25 onwards)

SEMESTER – III														
Course Code	Course Title	Hours / Semester						Credit	Maximum Marks			Category	Type	
		CI		LI	TW	SL	TH		CA	ESE	Total			
		L	T	P										
Theory/Theory with Practical														
24MAT32	Discrete Mathematics and Linear Algebra	45	15	0	60	0	120	4	40	60	100	BS	A	
24ADC31	Java Programming	45	0	30	45	0	120	4	100	0	100	PC	OT	
24ADT31	Computer Organization	45	15	0	60	0	120	4	40	60	100	PC	A	
24ADT32	Machine Learning	45	0	0	45	0	90	3	40	60	100	PC	A	
24ADT33	Data Structures	45	0	0	45	0	90	3	40	60	100	PC	A	
24MNT31	Environmental Science	30	0	0	0	0	30	0	100	0	100	MC	OT	
Practical / Employability Enhancement														
24ADL31	Machine Learning Laboratory	0	0	30	0	0	30	1	60	40	100	PC		
24ADL32	Data Structures Laboratory	0	0	30	0	0	30	1	100	0	100	PC		
24GEP31	Mini Project – I	0	0	30	0	0	30	1	100	0	100	EC		
Total Credits to be earned								21						

CI – Classroom Instructions, LI – Laboratory Instructions, TW – Term Work, SL – Self Learning, L – Lecture, T – Tutorial, P – Practical, C – Credit, TH – Total Hours, CA – Continuous Assessment, ESE – End Semester Examination.

Type: A – Analytical, D – Design using Hardware, S – Simulation using Coding, C – Concept, OC – Online course, OT - others


Signature of the Chairman
Board of Studies - AIML





B.Tech ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING CURRICULUM – R2024
(For the students admitted from the academic year 2024-25)

SEMESTER – IV

Course Code	Course Title	Hours / Semester						Cre dit	Maximum Marks			Category	Type	
		CI		LI	TW	SL	TH		CA	ESE	Total			
		L	T	P										
Theory/Theory with Practical														
24ADT41	Design and Analysis of Algorithms	45	15	0	60	0	120	4	40	60	100	PC	A	
24ADT42	Operating Systems	45	15	0	60	0	120	4	40	60	100	ES	C	
24ADT43	Database Management Systems	45	0	0	45	0	90	3	40	60	100	PC	A	
24ADC41	Web Technology	45	0	30	15	30	120	4	50	50	100	PC	OC	
24ALC41	Deep Learning	45	0	30	45	0	120	4	50	50	100	PC	C	
Practical / Employability Enhancement														
24ADL41	Database Management Systems Laboratory	0	0	30		0	30	1	60	40	100	PC		
24EGL41	Communication Skills Laboratory	0	0	30	0	0	30	1	100	0	100	HS		
24GCL41	Professional Skills Training I/ Industrial Training I	0	0	30	30	0	60	2	100	0	100	MC		
24GEP41	Mini Project - II	0	0	30	0	0	30	1	100	0	100	EC		
Total Credits to be earned								24						

CI – Classroom Instructions, LI – Laboratory Instructions, TW – Term Work, SL – Self Learning, L – Lecture, T – Tutorial, P – Practical, C – Credit, TH – Total Hours, CA – Continuous Assessment, ESE – End Semester Examination.

Type: A – Analytical, D – Design using Hardware, S – Simulation using Coding, C – Concept, OC – Online course, OT - others



Rejith



24EGT11 - ENGLISH FOR EFFECTIVE COMMUNICATION - I																		
(Common to all Engineering and Technology Branches)																		
Programme & Branch	All B.E/B.Tech Branches	Sem	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil	1	HS	45	0	0	45	90	3									
Preamble	This course is designed to enhance the communication skills and verbal aptitude in English language required for various workplace communication and social interactions.																	
Unit – I	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing																	
Grammar: Parts of Speech – Articles – Determiners – Verbal Aptitude: Synonyms and Antonyms – Selecting Words – Listening: Listening and Filling in Information – Speaking: Introducing Oneself – Discussion on Social Media Etiquette – Reading: Importance of Good Communication – Comprehension and Inference, Reading for facts and opinions – Building a Positive Attitude: An Excerpt from <i>You Can Win</i> – Writing: Email Etiquette – Email Writing – Responding to Emails																		
Unit – II	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing																	
Grammar: Types of Sentences – Assertive, Interrogative, Imperative and Exclamatory – Question Tags– Verbal Aptitude: Prefixes and Suffixes – Collocations – Idiomatic Expressions – Listening: Identifying main and Secondary Points – Speaking: Asking Questions – Role Play – Reading: Reading for Comprehension – Verbal and Non-Verbal Communication – Winning Strategies: An Excerpt from <i>You Can Win</i> - Writing: Descriptive Writing – Product/Process Description – Letter Writing: Formal Letters – Seeking Permission and Inviting Chief Guest																		
Unit – III	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing																	
Grammar: Tenses – Phrasal Verbs– Verbal Aptitude: Jumbled Sentences – Sentence Formation– Listening: Taking Notes from a Discussion – Speaking: Retelling an Incident – Discussing Tourist Destinations – Reading: Process of Communication–Scanning - Motivating Yourself and Others Every Day: An Excerpt from <i>You Can Win</i> – Writing: Paragraph Writing: Narrative and Compare & Contrast																		
Unit – IV	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing																	
Grammar: Prepositions – Transitional Words/Phrases – Discourse Markers – Verbal Aptitude: One Word Substitution - Sentence Completion – Listening: Listening for Specific Information – Speaking: Small Talk–Telephonic Conversations– Reading: Channels of communication – Building Positive Self-Esteem and Image: An Excerpt from <i>You Can Win</i> – Writing: Instructions – Recommendations and Suggestions																		
Unit – V	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing																	
Grammar: Subject Verb Agreement – Gerunds and Infinitives– Verbal Aptitude: Homonyms, Homophones and Homographs – Cloze Test using Verb Forms, Prepositions and Articles – Listening: Listening and Identifying Parts from a Description – Speaking: Agreeing and Disagreeing – Reading: Skimming – Reading to Summarize – Setting and Achieving your Goals: An Excerpt from <i>You Can Win</i> – Writing: Transcoding: Identifying Trends and Patterns in Graphs and Expressing with Graph Specific Vocabulary																		
TEXT BOOK:																		
1.	Sudharshana N P and Savitha C, <i>English for Technical Communication</i> , 2 nd Edition, Cambridge University Press, New Delhi, 2016.																	
REFERENCES:																		
1.	Ashraf Rizvi. <i>Effective Technical Communication</i> , 2 nd Edition, McGraw-Hill India, 2017.																	
2.	S. P. Dhanavel. <i>English and Communication Skills for Students of Science and Engineering</i> , Orient Black Swan Publishers, Hyderabad, 2009.																	
3.	Shiv Khera. <i>You Can Win: A Step-by-Step Tool for Top Achievers</i> . Bloomsbury Publishing, 2018.																	

* includes Term Work (TW) & Assignments, Tutorials and Case Studies

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)
CO1	learn and use various aspects of English vocabulary to perform well in verbal aptitude tests of different types										
CO2	listen and understand different spoken discourses										
CO3	present ideas clearly and confidently in formal and informal conversations and discussions										
CO4	comprehend the given text and respond appropriately for technical and professional purposes										
CO5	select appropriate words , phrases and grammatical units and apply them in both spoken and written communication										

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						1		1	3	1	1		
CO2									1	3		1	
CO3									2	3	1	2	
CO4						1				3	1	2	
CO5										3		2	

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understa nding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	35	50	-	-	15	100
CAT2	-	45	35	-	-	20	100
CAT3	-	30	35	35	-	-	100
ESE	-	20	40	20	-	20	100

* ±3% may be varied (CAT 1,2& 3 – 50 marks & ESE – 100 marks)

R-W

Signature of the Chairman
Board of Studies - S&H (English)

J-Rejair



24MAC11 - MATRICES AND ORDINARY DIFFERENTIAL EQUATIONS										
(Common to all Engineering and Technology branches)										
Programme & Branch	All B.E/B.Tech Branches	Sem.	Category	L	T	P	SL*	Total	Credit	
Prerequisites	Nil	1	BS	45	7	16	52	120	4	
Preamble	To provide the skills to the students for solving different real time problems by applying matrices and ordinary differential equations.									
Unit - I	Matrices:									
Introduction – Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (without proof) – Cayley – Hamilton theorem (Statement and applications only) - Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Nature of Quadratic forms - Reduction of quadratic form to canonical form by orthogonal transformation.										
Unit - II	Ordinary Differential Equations:									
Introduction – Solution of First order differential equations: Exact differential equations – Leibnitz's Linear Equation – Bernoulli's equation – Clairaut's equation - Applications: Law of natural growth and decay.										
Unit - III	Ordinary Differential Equations of Higher Order:									
Linear differential equations of second and higher order with constant coefficients - Particular Integrals for the types: e^{ax} – $\cos ax / \sin ax$ – $x^n - e^{ax}x^n$, $e^{ax} \sin bx$ and $e^{ax} \cos bx$ – Differential Equations with variable coefficients: Euler-Cauchy's equation – Legendre's equation.										
Unit - IV	Applications of Ordinary Differential Equations:									
Method of variation of parameters – Simultaneous first order linear equations with constant coefficients – Applications of differential equations: Simple harmonic motion – Electric circuits (Differential equations and associated conditions need to be given).										
Unit - V	Laplace Transform:									
Introduction – Conditions for existence – Laplace transform of elementary functions – Basic properties – Derivatives and integrals of transforms – Transform of periodic functions - Inverse Laplace transform: Inverse Laplace transform of elementary functions – Partial fraction method – Convolution Theorem – Applications: Solution of linear ODE of second order with constant coefficients.										
LIST OF EXPERIMENTS / EXERCISES:										
1.	Introduction to MATLAB									
2.	Computation of eigen values and eigen vectors									
3.	Solving first order ordinary differential equations									
4.	Solving higher order ordinary differential equations									
5.	Solution of Simultaneous first order ODEs									
6.	Solving second order ODE by variation of parameters									
7.	Determining Laplace and inverse Laplace transform of basic functions									
8.	Solution of Second order ODE by employing Laplace transforms									
TEXT BOOK:										
1.	Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics For First Year B.E/B.Tech", Reprint Edition 2016, S.Chand and Co., New Delhi.									
REFERENCES/ MANUAL / SOFTWARE:										
1.	Kreyszig E, "Advanced Engineering Mathematics ", 10 th Edition, John Wiley, New Delhi, India, 2016.									
2.	Ramana B V, "Higher Engineering Mathematics", 1 st Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2018.									
3.	Duraisamy C., Vengataasalam S., Arun Prakash K. and Suresh M., "Engineering Mathematics - I", 2 nd Edition, Pearson India Education, New Delhi, 2018.									
4.	Grewal B.S., "Higher Engineering Mathematics" 44th Edition, Khanna Publishers, New Delhi, 2018.									
5.	Matrices and Ordinary Differential Equations Laboratory Manual.									

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)
CO1	Use the matrix algebra methods and MATLAB for solving practical problems.										
CO2	Identify the appropriate method for solving first order ordinary differential equations.										
CO3	Solve higher order linear differential equations with constant and variable coefficients.										
CO4	Apply the concept of ordinary differential equations for modeling and finding solutions to engineering problems.										
CO5	Apply Laplace Transform to solve complex engineering problems.										

Mapping of COs with POs and PSOs

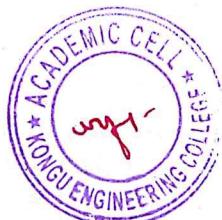
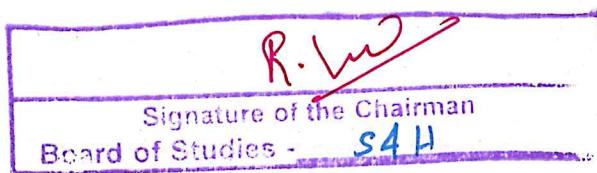
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2		3								
CO2	3	3	2		3								
CO3	3	3	2		3								
CO4	3	3	2		3								
CO5	3	3	3		3								

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		40	60				100
CAT2		40	60				100
CAT3		30	70				100
ESE		30	70				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)



24PHT11 - PHYSICS FOR COMPUTER SYSTEMS										
(Common to CSE, IT, CSD, AIDS & AIML branches)										
Programme& Branch	BE/B.Tech - CSE, IT, CSD, AIDS and AIML branches	Sem.	Category	L	T	P	SL*	Total	Credit	
Prerequisites	Nil	1	BS	45	0	0	45	90	3	
Preamble	This course aims to impart the knowledge on crystal physics, quantum physics, acoustics, ultrasonics, laser, fiber optics, and semiconductors. It also describes the applications of aforementioned topics in computer systems.									
Unit – I	Crystal Physics: Classification of solids – Space lattice – Unit cell – Crystal structure – Bravais lattice – Single and polycrystalline materials – Lattice planes – Miller indices – Interplanar spacing in cubic crystal – Number of atoms per unit cell – Atomic radius – Coordination number – Atomic packing factor – Body centered cubic– Face centered cubic – Hexagonal close packed crystal structure – Crystal imperfections: line, surface and volume imperfections.									
Unit – II	Quantum Physics and Applications: Blackbody radiation – Planck's theory – Compton scattering – Matter waves – Properties – Heisenberg uncertainty principle – Schrodinger's time-independent and time-dependent wave equations – Physical significance of wave function – Particle in a one-dimensional box.									
Unit – III	Acoustics and Ultrasonics: Classification of sound – Characteristics of sound – Reverberation and reverberation time – Growth and decay of sound – Sabine's formula for reverberation time – Determination of sound absorption coefficient – Factors affecting acoustics of buildings and their remedies – Ultrasonics – Properties of ultrasonic waves – Generation of ultrasonic waves – Magnetostrictive generator and Piezoelectric generator – Non-destructive testing – Flaw detection.									
Unit – IV	Laser and Fiber optics: Stimulated absorption – Spontaneous emission – Stimulated emission – Einstein's coefficients and their relations – Population inversion – Pumping – CO ₂ laser – Holography – Fiber optics – Numerical aperture and acceptance angle – Classification of optical fibers based on refractive index, modes and materials – Fiber optic communication system – Temperature and displacement sensors.									
Unit – V	Semiconducting Materials: Intrinsic semiconductor – Carrier concentration – Fermi level – Variation of conductivity with temperature – Determination of band gap – Extrinsic semiconductors – Carrier concentration in n-type and p-type semiconductors – Hall effect – Determination of Hall coefficient – Applications – Solar cell: Principle, construction and working.									
TEXT BOOK:										
1.	Katiyar A.K, Pandey C.K, "Engineering Physics: Theory and Practical", 2 nd Edition, Wiley, 2015 (Unit I, II).									
2.	Tamilarasan K and Prabu K, "Physics for Engineering I", 1 st Edition, McGraw Hill Education Pvt. Ltd., New Delhi, 2023 (Unit III, IV, V).									
REFERENCES:										
1.	Avadhanulu M.N, Kshirsagar P.G and Arun Murthy T.V.S, "A Textbook of Engineering Physics", 11 th Edition, S Chand, 2021.									
2.	Malik H.K and Singh A.K., "Engineering Physics", 2 nd Edition McGraw-Hill Education, New Delhi, 2022.									

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES:											BT Mapped (Highest Level)	
On completion of the course, the students will be able to												
CO1	analyze seven crystal systems, interplanar spacing in cubic lattice, BCC, FCC, HCP crystal systems and the types of crystal imperfections and their impacts.											Analyzing (K4)
CO2	investigate the concepts of quantum mechanics to describe Planck's theory, Compton effect and the behavior of electrons in a metal by solving Schrodinger's wave equations.											Analyzing (K4)
CO3	explore the concepts of growth and decay of sound energy in a hall to compute Sabine's formula and to recognize the requirements of acoustically good buildings and also to describe the production of ultrasonic wave and testing of materials by non-destructive method.											Analyzing (K4)
CO4	examine the concepts of stimulated emission of radiation to explain the working and the applications of laser in engineering and technology. To apply the principle of propagation of light through optical fiber to compute acceptance angle and numerical aperture and also to explain fiber optic communication system and the working of fiber optic sensors.											Analyzing (K4)
CO5	Inspect the concept of density of states to compute the carrier concentration and band gap of intrinsic semiconductors and to compute the carrier concentration of extrinsic semiconductors, and also to explain the phenomenon related to Hall Effect and the working of solar cell.											Analyzing (K4)

Mapping of COs with POs and PSOs

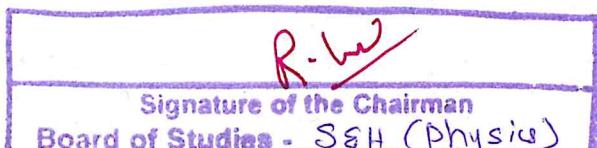
COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2					1	1		1		
CO2	3	2	2					1	1		1		
CO3	3	2	2					1	1		1		
CO4	3	2	2					1	1		1		
CO5	3	2	2					1	1		1		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		40	50	10			100
CAT2		40	50	10			100
CAT3		40	50	10			100
ESE		40	50	10			100

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



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24CSC12- PROGRAMMING IN C																				
(Common to CSE, IT, CSD, AIDS & AIML branches)																				
Programme & Branch	B BE/B.Tech - CSE, IT, CSD, AIDS and AIML branches	Sem	Category	L	T	P	SL*	Total	Credit											
Prerequisites	Nil	1	ES	45	0	30	45	120	4											
Preamble	The course aims to provide exposure to problem-solving through programming. It introduces all the fundamental concepts of C Programming. This course provides adequate knowledge to solve problems in various domains																			
Unit – I	Introduction to C and Control Statements																			
The structure of a C program - Data - Variables – Declaring, assigning, and printing variables – Data Types – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions – Input/Output statements, - Control Structure: Decision-making statements																				
Unit – II	Arrays																			
Control Structure: Repetitive statements – for loop, while loop, and do-while loop-Arrays: Declaring and initializing 1D array – Two-dimensional arrays –Array Operations and Manipulations.																				
Unit – III	Strings and Pointers																			
Strings: Basics, declaring and initializing strings – string handling functions: standard and user-defined functions – character-oriented functions, Two-dimensional array of strings																				
Pointers: Memory access and pointers, pointer basics, declaring, initializing, and dereferencing a pointer, parameter passing mechanisms, operations on pointers																				
Unit – IV	Functions																			
Functions: Basics, The anatomy of a function – Types of functions based on arguments and return types – Passing 1D and 2D arrays as arguments to functions – Calling function from another function – recursive functions -Variable scope and lifetime - Storage classes- Pre-processor directives: #define: macros with and without arguments																				
Unit – V	User Defined data types																			
Structure basics –declaring and defining a structure – nested structures –Union-typedef– File Handling: Introduction – File operations: File opening and closing files – reading and writing data to files																				
LIST OF EXPERIMENTS / EXERCISES:																				
1	Programs for demonstrating the use of different types of operators like arithmetic, logical, relational, and ternary operators (Sequential structures)																			
2	Programs to illustrate the different formatting options for input and output																			
3	Programs using decision-making statements like 'if', 'else if', 'switch', and conditional, unconditional 'goto' (Selective structures)																			
4	Programs for demonstrating repetitive control statements like 'for', 'while', and 'do-while' (Iterative structures)																			
5	Programs for demonstrating one- and two dimensional arrays																			
6	Programs to implement various character and string operations with and without built-in library functions.																			
7	Programs to demonstrate the use of pointers																			
8	Programs to demonstrate modular programming concepts using built-in and user-defined functions																			
9	Programs to illustrate the use of user-defined data types																			
10	Programs to implement file handling																			

*includes Term Work(TW) & Online / Certification course hours

TEXT BOOKS													
1.	Sumitabha Das, Computer Fundamentals and C Programming, 1st Edition, McGraw Hill, 2018												
REFERENCES/ MANUAL / SOFTWARE:													
1.	Yashavant Kanetkar, "LetusC", 16 th , BPB publications, 2018.												
2.	Reema Thareja, "Programming in C", 2nd Edition, Oxford University Press, New Delhi, 2018												
3.	E. Balagurusamy, "Programming in ANSI C", seventh edition, McGraw Hill Education, 2017.												
4	https://nptel.ac.in/courses/106/105/106105171/												
COURSE OUTCOMES: On completion of the course, the students will be able to													
CO1	make use of control and iterative statements to develop simple applications												
CO2	develop simple C programs using the concepts of arrays and modular programming												
CO3	demonstrate the concepts of strings and pointers												
CO4	apply user-defined data types to solve given problems												
CO5	implement functions and structures with pointer												
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	1				1	1	1	3	1
CO2	3	2	2	2	1				1	1	1	3	1
CO3	3	2	2	2	1				1	1	1	3	1
CO4	3	2	2	2	1				1	1	1	3	1
CO5	3	2	2	2	1				1	1	1	3	1
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

	✓
Signature of the Chairman	
Board of Studies - CSE	



P. Kalaimani
P. Kalaimani

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24ITT11-DIGITAL LOGIC PRINCIPLES AND DESIGN (Common to IT,AIML,AIDS branches)										
Programme & Branch	B.Tech., Information Technology, Artificial Intelligence and Machine Learning & Artificial Intelligence and Data science	Sem.	Category	L	T	P	SL*	Total	Credit	
Prerequisites	Nil	1	ES	45	0	0	45	90	3	
Preamble	This course enables the students to acquire the knowledge of binary logic, Boolean algebra, Boolean function its forms and their minimization methods and implementation using logic gates. Also, this course covers the analysis and synthesis of various combinational, clocked sequential circuits, shift registers and various types of counters.									
Unit - I	Number Systems and Boolean Algebra Number Systems - Complements – Signed Binary Numbers –Binary Codes – Binary Logic - Boolean Algebra: Definitions – Basic and Axiomatic –Theorems of Boolean Algebra – Boolean functions: Realization of functions using Logic gates – case study.									
Unit - II	Gate Level Minimization Canonical and Standard Forms of Boolean functions – Minimization of functions using Karnaugh Map – Don't-Care Conditions – NAND and NOR Implementation– Exclusive-OR function – case study.									
Unit - III	Combinational Logic Analysis procedure – Design procedure – Half Adder – Full Adder - Half Subtractor – Full Subtractor – Binary Adder-Subtractor – Code Converters - Magnitude Comparator – Decoders – Encoders – Multiplexers – Demultiplexers – Boolean Functions implementation using Multiplexers and Decoders– case study.									
Unit - IV	Sequential Logic Introduction – Flip-flops – Triggering – Analysis of clocked sequential circuits: State Equations – State Table – State Diagram– State Reduction and Assignment– Mealy and Moore machines and their circuit design procedure– case study.									
Unit - V	Register, Counter and Programmable Logic Shift Registers: SISO- SIPO- PISO-PIPO–Universal Shift register– Synchronous Counters: Binary Counter – up-down Binary Counter – BCD Counter – modulo-N Counter – Programmable Logic devices: PROM – PLA – PAL– case study.									
TEXT BOOK:										
1.	Morris Mano M., MichealD.Ciletti,"Digital Design: With an Introduction to the Verilog HDL,VHDL, and System Verilog", 6 th Edition, Pearson Education, Noida, 2020.									
REFERENCES/ MANUAL / SOFTWARE:										
1.	Charles H. Roth, "Fundamentals of Logic Design", 6th Edition, Thomson Learning, UK, 2013.									
2.	Thomas L. Floyd, "Digital Fundamentals", 10 Edition, Pearson Education, New Delhi , 2011.									

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)
CO1	summarize the different number systems and binary codes and apply Boolean algebra to minimize the Boolean functions										
CO2	organize the Boolean functions in various forms, demonstrate their minimization using Map technique and show their implementation using universal logic gates.										
CO3	build various combinational logic circuits like adders, subtractors, comparator, code converters, decoders, encoders, multiplexers and demultiplexers and make use of their applications										
CO4	construct sequential logic circuits with various Flip flops										
CO5	identify various types of shift registers, build various types of synchronous counters and illustrate the applications of programmable logic devices										

Mapping of COs with POs and PSOs

COs/POs/ PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3	3	2
CO2	3	2	1	1		3	3	3	2	2	3	3	2
CO3	3	2	1	1		3	3	3	2	2	3	3	2
CO4	3	2	1	1		3	3	3	2	2	3	3	2
CO5	3	2	1	1		3	3	3	2	2	3	3	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		50	50				100
CAT2		40	60				100
CAT3		40	60				100
ESE		40	60				100

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)


Signature of the Chairman
Board of Studies - IT



24TAM01- HERITAGE OF TAMILS																	
(Common to All Engineering and Technology Branches)																	
Programme & Branch	All B.E/B.Tech Branches	Sem.	Category	L	T	P	SL*	Total	Credit								
Prerequisites	NIL	1	HS	15	0	0	15	30	1								
Preamble	The objective of this course is to impart knowledge about Tamil language, literature, paintings, sculptures, folk arts, heroic games, doctrines, contribution of Tamils to Indian culture.																
UNIT I	Language and Literature								3								
Language families in india - dravidian languages – tamil as a classical language - classical literature in tamil – secular nature of sangam literature – distributive justice in sangam literature - management principles in thirukural - tamil epics and impact of buddhism & Jainism in tamil land - Bakthi literature azhwars and nayanmars - forms of minor poetry - development of modern literature in tamil - contribution of bharathiya and bharathidhasan.																	
UNIT II	Heritage - Rock Art Paintings to Modern Art – Sculpture								3								
Hero stone to modern sculpture - bronze icons - tribes and their handicrafts - art of temple car making - massive terracotta sculptures, village deities, Thiruvalluvar statue at Kanyakumari, making of musical instruments - mridhangam, parai, veenai, yazh and nadhaswaram - role of temples in social and economic life of tamils.																	
UNIT III	Folk and Martial Arts								3								
Therukoothu – karagattam - villu pattu - kaniyan koothu – oyillattam - leather puppetry – silambattam – valari - tiger dance - sports and games of tamils.																	
UNIT IV	Thinai Concept of Tamils								3								
Flora and fauna of tamils & aham and puram concept from tholkappiyam and sangam literature - aram concept of tamils - education and literacy during sangam age - ancient cities and ports of sangam age - export and import during sangam age - overseas conquest of cholas.																	
UNIT V	Contribution of Tamils to Indian National Movement and Indian Culture								3								
Contribution of tamils to Indian freedom struggle - the cultural influence of tamils over the other parts of India – self-respect movement - role of Siddha medicine in indigenous systems of medicine – inscriptions & manuscripts – print history of Tamil books.																	
TEXT BOOK:																	
1.	S.Muthuramalingam, M.Saravanakumar, Heritage of Tamils, Yes Dee Publishing Pvt Ltd, 2023, for Units I,II,III,IV,V.																
REFERENCES:																	
1.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukarasu) (Published by : International Institute of Tamil Studies).																
2.	The Contribution of Tamil of the Tamils to Indian Culture(Dr.M.Valarmathi)(Published by International Institute of Tamil Studies).																
3.	Keeladi – ‘Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu).																

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES:		BT Mapped (Highest Level)
படிப்பை முடித்தவுடன், மாணவர்கள்		
CO1	explain valuable concepts in language and literature of tamils.	Understanding (K2)
CO2	illustrate about the tamils sculpture and their paintings.	Understanding (K2)
CO3	summarize about the tamils folk and martial arts.	Understanding (K2)
CO4	explain the thinai concept of tamils.	Understanding (K2)
CO5	explain the contribution of Tamils to the Indian National Movement and Indian culture.	Understanding (K2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						2	3	2	2		3		
CO2						2	3	2	2		3		
CO3						2	3	2	2		3		
CO4						2	3	2	2		3		
CO5						2	3	2	2		3		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

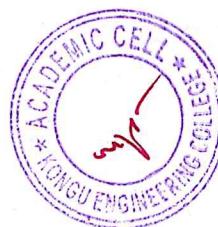
ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	40	60					100
CAT2	40	60					100
CAT3	40	60					100
ESE				NA			

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks)

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Signature of the Chairman
Board of Studies - S & H (Chemistry)



24TAM01-தமிழர் மரபு											
(Common to All Engineering and Technology Branches)											
Programme & Branch	All B.E/B.Tech Branches	Sem.	Category	L	T	P	SL*	Total	Credit		
Prerequisites	NIL	1	HS	15	0	0	15	30	1		
Preamble	தமிழர்களின் மொழி, இலக்கியம், ஓவியங்கள், சிற்பக்கலைகள், நாட்டுப்புறக் கலைகள், வீர வினாயாட்டுக்கள், தினைக் கோட்பாடுகள், இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பைப் பற்றிய அறிவை வழங்குவதே இந்த பாடத்தின் நோக்கமாகும்.										
அலகு - I	மொழி மற்றும் இலக்கியம்										3
இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற் தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.											
அலகு - II	மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை										3
நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஜம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.											
அலகு - III	நாட்டுப்புறக் கலைகள் மற்றும் வீர வினாயாட்டுக்கள்										3
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் வினாயாட்டுகள்.											
அலகு - IV	தமிழர்களின் தினைக் கோட்பாடுகள்										3
தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்கக்காலத்தில் தமிழகத்தில் எழுத்தறிவும் கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.											
அலகு - V	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு										3
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறபகுதிகளில் தமிழ் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.											
TEXT BOOK:											
1.	ஆ. பூபாலன், தமிழர் மரபு, VRB Publishers Pvt Ltd, 2022,அலகு I,II,III,IV,V.										
REFERENCES:											
1.	தமிழக வரலாறு- மக்களும் பண்பாடும்- கே கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்)										
2.	கணினித்தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)										
3.	சீழை - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம். (தொல்லியல் துறை வெளியீடு)										
4.	பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)										

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES:			BT Mapped (Highest Level)
படிப்பை முடித்தவுடன், மாணவர்கள்			
CO1	தமிழ் மொழி மற்றும் இலக்கியத்தில் மதிப்புமிக்க கருத்துக்களை விளக்க முடியும்.	Understanding (K2)	
CO2	தமிழர்களின் சிற்பம் மற்றும் அவர்களின் ஒவியங்கள் பற்றி விளக்க முடியும்.	Understanding (K2)	
CO3	தமிழர்களின் நாட்டுப்புற மற்றும் தற்காப்புக் கலைகளைப் பற்றி சுருக்கமாகக் கூற முடியும்.	Understanding (K2)	
CO4	தமிழர்களின் திணைக் கோட்பாடுகளைப் பற்றி விளக்க முடியும்.	Understanding (K2)	
CO5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு பற்றி விளக்க முடியும்.	Understanding (K2)	

Mapping of COs with POs and PSOs

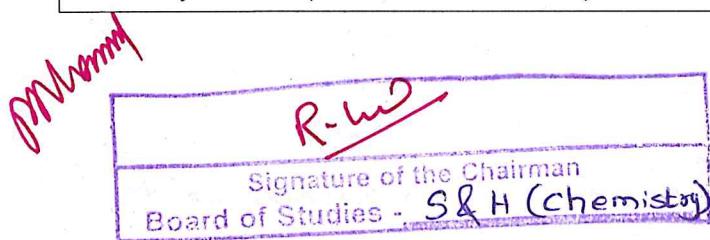
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						2	3	2	2		3		
CO2						2	3	2	2		3		
CO3						2	3	2	2		3		
CO4						2	3	2	2		3		
CO5						2	3	2	2		3		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	40	60					100
CAT2	40	60					100
CAT3	40	60					100
ESE	NA						

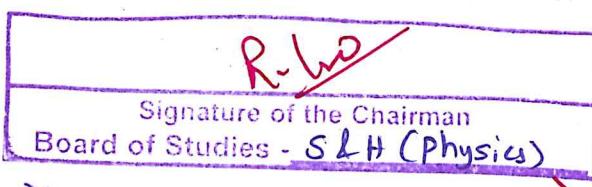
* ±3% may be varied (CAT 1, 2 & 3 – 50 marks)



24PHL11 - PHYSICS LABORATORY FOR COMPUTER SYSTEMS													
(Common to CSE, IT, CSD, AIDS & AIML branches)													
Programme& Branch	BE/B.Tech - CSE, IT, CSD, AIDS and AIML branches			Sem.	Category	L	T	P	SL*	TOT	Credit		
Prerequisites	Nil			1	BS	0	0	30	0	30	1		
Preamble	This course aims to impart hands on training in the determination of the physical parameters such as AC frequency, compressibility of a liquid, wavelength of laser, particle size, acceptance angle and numerical aperture of an optical fiber, specific resistance, band gap, thickness of a thin film and knowledge on the working of p-n diode and UJT, and also to impart skills on writing coding / developing project / product related to societal requirement.												
LIST OF EXPERIMENTS / EXERCISES:													
1.	Determination of the frequency of alternating current using electrically vibrating tuning fork (Melde's apparatus).												
2.	Determination of the wavelength of the given semiconductor laser.												
3.	Determination of the particle size of the given powder using laser.												
4.	Determination of the acceptance angle and numerical aperture of the given optical fiber.												
5.	Observation of the I-V characteristics of a p-n junction diode.												
6.	Observation of the I-V characteristics of a uni junction transistor.												
7.	Determination of the specific resistance of the given metallic wire using Carey Foster's bridge.												
8.	Determination of the band gap of a given semiconducting material using post-office box.												
9.	Determination of the thickness of a thin film using air-wedge arrangement.												
10.	Writing coding for any one of the above experiments / developing a project / a product.												
REFERENCES/ MANUAL /SOFTWARE:													
1.	Laboratory Manual												
COURSE OUTCOMES: On completion of the course, the students will be able to													
CO1	determine the frequency of an alternating current, the wavelength of a semiconductor laser and the particle size of a powder material,										BT Mapped (Highest Level)		
CO2	determine the acceptance angle and numerical aperture of an optical fiber, the I-V characteristics of a p-n diode and the I-V characteristics of a UJT.										Analyzing (K4), Precision (S3)		
CO3	determine the specific resistance of a metallic wire, the band gap of semiconducting materials, the thickness of a thin film and develop a coding / project / product.										Analyzing (K4), Precision (S3)		
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	3				3	1		2		
CO2	3	2	2	3				3	1		2		
CO3	3	2	2	3				3	1		2		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

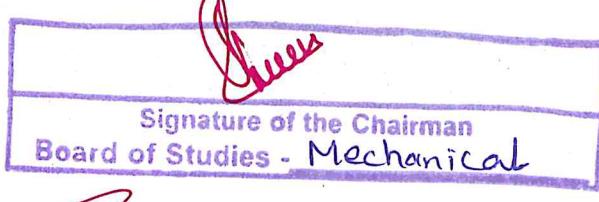
*includes Term Work (TW) & Online / Certification course hours



CDC

24GCL11 – FOUNDATION LABORATORY - MANUFACTURING, DESIGN AND ROBOTICS (Common to all BE/BTech branches)													
Programme & Branch		All BE/BTech Branches			Sem.	Category	L	T	P	SL*	Total	Credit	
Prerequisites		Nil			1/2	ES	0	0	90	0	90	3	
Preamble		This course provides the hands-on experience to develop a prototype model with the basic knowledge of Computer-aided Design, Manufacturing Processes, 3D Printing Technology, Robotics and Embedded Control.											
LIST OF EXPERIMENTS / EXERCISES:													
PART A – Manufacturing Laboratory (30 Hours)													
1	Selection of product, free hand sketching and detailing												
2	Construction of model using Arc/TIG/MIG/Gas/Spot welding operations												
3	Enhancing the model with sheet metal												
4	Creating the parts of the model using lathe												
5	Creating the parts of the model using milling and drilling machines												
PART B – Product Design and Development Laboratory (30 Hours)													
1	Free hand sketching and detailing of the component												
2	3D part modelling of the component using CAD software												
3	Engineering Analysis of the component model												
4	Generate the component using 3D printer												
PART C – Robotics Laboratory (30 Hours)													
1	Design of electronic circuit and its debugging												
2	Assembly and interfacing of sensors, actuators and wireless communion modules with audrino UNO												
3	Development of embedded programming and interfacing for motion control and obstacle avoidance												
4	Demonstration and testing of robot in static environment												
REFERENCES/ MANUAL /SOFTWARE:													
1	Foundation Engineering Laboratory Manual												
2	SOLID WORKS 2022 Software												
COURSE OUTCOMES: On completion of the course, the students will be able to													
CO1	develop the prototype model using mechanical operations like welding, forming and machining processes												
CO2	sketch 3D model and develop the prototype using 3D printer												
CO3	design and develop the autonomous robot for real-time applications												
Mapping of COs with POs and PSOs													
COs/POs /PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2				3	2		2		
CO2	3	3	3	3				3	2		2		
CO3	3	3	3	2				3	2		2		

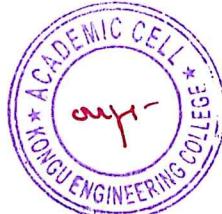
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy



24MNT12 - QUANTITATIVE APTITUDE - I																							
(Common to all Engineering and Technology branches)																							
Programme & Branch	All B.E/B.Tech Branches			Sem.	Category	L	T	P	SL*	Total	Credit												
Prerequisites	Basic Mathematical skills			1	MC	20	0	0	10	30	0												
Preamble	To impart problem solving skills and enhance analytical skills.																						
Unit - I	Number system and Equations: 6																						
Number systems: Classification of numbers – Rules of divisibility – BODMAS Rule – HCF and LCM – Decimal fractions – Simplification – Problems.																							
Equations: Solving equations with one variable – Solving simultaneous linear equations with two variables – Applications of simultaneous linear equations – Problems on ages – Simple problems.																							
Unit - II	Ratio, Proportion and Percentage: 6																						
Ratio and Proportion: Third, Fourth and mean proportional – Comparison of ratios – Compound ratio – Duplicate ratio – Sub duplicate ratio – Triplicate ratio – Sub triplicate ratio – Chain rule – Simple problems.																							
Percentages: Basic Concepts – Problems on percentages – Problems on population – Problems on depreciation.																							
Unit - III	Profit and Loss, Interest: 8																						
Profit and Loss: Basic concepts – Cost price – Selling price – Profit and Loss – Simple problems.																							
Simple and Compound interest: Concepts – Percentage of interest – Difference between simple interest and compound interest – Simple problems.																							
TEXT BOOK:																							
1.	Dr R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", Revised Edition, S.Chand and company limited, 2022.																						
REFERENCES/ MANUAL / SOFTWARE:																							
1.	Abhijit Guha,"Quantitative Aptitude for Competitive Examination", 7 th Edition, McGraw Hill Education, India, 2020.																						
2.	https://www.indiabix.com/aptitude/questions-and-answers																						
3.	https://www.geeksforgeeks.org/aptitude-questions-and-answers																						
COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)												
CO1	Solve equations with one and two variables.										Applying (K3)												
CO2	Solve ratio, proportion and percentage problems.										Applying (K3)												
CO3	Solve profit and loss, simple interest and compound interest problems.										Applying (K3)												
Mapping of COs with POs and PSOs																							
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2										
CO1	2	2																					
CO2	2	2																					
CO3	3	3																					
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy																							
ASSESSMENT PATTERN - THEORY																							
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %										
CAT1			30		70								100										
CAT2			30		70								100										
CAT3			30		70								100										
* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)																							
*includes Term Work (TW) & Online / Certification course hours																							

R.W

Signature of the Chairman
Board of Studies - S4H



COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	realize the importance of yoga in physical health.	Applying (K3)
CO2	realize the importance of yoga in mental health.	Applying (K3)
CO3	realize the role of yoga in personality development and diet.	Applying (K3)
CO4	do the loosening practices, Asanas and realize its benefits.	Applying (K3)
CO5	do the practice of Pranayama, meditation and realize its benefits	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						3		2	1		
CO2						3		2			
CO3						3		3			
CO4						3		2	3		
CO5						3		3			

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	-	-	-	-	-	-
CAT2	-	-	-	-	-	-	-
CAT3	20	30	50	-	-	-	100
ESE	-	-	-	-	-	-	-

* ±3% may be varied (CAT3 – 100 marks)



24EGT21 - ENGLISH FOR EFFECTIVE COMMUNICATION - II																		
(Common to all Engineering and Technology branches)																		
Programme & Branch	All B.E/B.Tech Branches	Sem	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil	2	HS	45	0	0	45	90	3									
Preamble	This course aims at up skilling the learners to listen, speak, read, and write as well as to facilitate the students in practicing the language skills to acquire verbal and communicative proficiency in professional and academic contexts.																	
sUnit – I	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing								9									
Grammar: Simple, Compound, and Complex Sentences – Verbal Aptitude: Odd Words – Paired words – Listening: Listening to a Match Commentary and Filling in a Table – Listening to TED talks - Speaking: Apologizing – Talking about Manners and Etiquette – Reading: Scanning a Text, Power Point Presentations – The Best Way to Start a New Habit : An Excerpt from <i>Atomic Habits</i> Writing: Business Letters: Enquiry and Complaint																		
Unit – II	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing								9									
Grammar: Direct and Indirect Speech – Verbal Aptitude: Words often Confused – Verbal Analogy – Listening: Listening to a Lecture and Sorting Information – Career Related Conversation – Speaking: Group Discussion – Speaking about Career Choices and Professional Skills – Reading: Reading for Local and Global Comprehension – How to Find and Fix the Causes of Your Bad Habits: An Excerpt from <i>Atomic Habits</i> - Writing: Job Application: Cover Letter and Resume – Student Portfolio																		
Unit – III	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing								9									
Grammar: Active and Passive Voice – Verbal Aptitude: Error Spotting – Sentence Improvement – Abbreviations and Acronyms – Listening: Listening to Podcast Interviews and News/Motivational Speeches – Speaking: Presenting a Point of View – Giving Opinions about Podcast – Reading: Reading a Procedure – Cross Cultural Communication - How to Make Good Habits Inevitable and Bad Habits Impossible: An Excerpt from <i>Atomic Habits</i> – Writing: Types of Essays: Argumentative and Opinion based Essays																		
Unit – IV	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing								9									
Grammar: If/Conditional Clause – Modals Verbs – Conversational Devices - Verbal Aptitude: Sentence Correction – Sentence Selection – Listening: Listening and Filling a Mind Map – Listening to Interviews, Celebrity talks – Speaking: Giving Advice and Suggestions – Interviewing Classmates - Reading: Reading for Information, Researching for Supporting Evidence – Technical Communication: Modes of Technology-based Communication – How to Stick with Good Habits Every Day : An Excerpt from <i>Atomic Habits</i> Writing: Dialogue Writing – Writing Reviews: Product and Documentary films/Web Series																		
Unit – V	Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing								9									
Grammar: Common Errors in Tenses – Verb - Preposition combinations – Verbal Aptitude: Coding and Decoding – Listening: Listening for key points – Speeches of New Inventions – Speaking: Asking for and Giving Permission – Talking about Gadgets, Inventions and Technology – Reading: Categorizing Information – Technical Communication: Effective use of Technology-based Communication – The Goldilocks Rule: How to Stay Motivated in Life and Work: An Excerpt from <i>Atomic Habits</i> – Writing: Report Writing: IV Report and Case Study Report																		
TEXT BOOK:																		
1.	Sudharshana N P and Savitha C, <i>English for Technical Communication</i> , 2 nd Edition, Cambridge University Press, New Delhi, 2016.																	
REFERENCES:																		
1.	Ashraf Rizvi. Effective Technical Communication, 2 nd Edition, McGraw-Hill India, 2017.																	
2.	S. P. Dhanavel. English and Communication Skills for Students of Science and Engineering, Orient Black Swan Publishers, Hyderabad, 2009.																	
3.	James Clear. <i>Atomic Habits</i> By James Clear. Dharman, 2023.																	

* includes Term Work (TW) & Assignments, Tutorials and Case Studies

COURSE OUTCOMES:											BT Mapped (Highest Level)	
On completion of the course, the students will be able to												
CO1	construct contextual and functional grammar to enhance the linguistic competence											Applying (K3)
CO2	listen, comprehend and infer implied meanings of the given text											Applying (K3)
CO3	speak clearly to develop competence to participate in oral discourses such as discussions / meetings / interviews and deliver presentations											Creating (K6)
CO4	critically read various texts by understanding contextual meanings and respond appropriately											Understanding (K2)
CO5	Analyze different genres of writing and making precise non-technical and technical documents											Analyzing (K4)

Mapping of COs with POs and PSOs

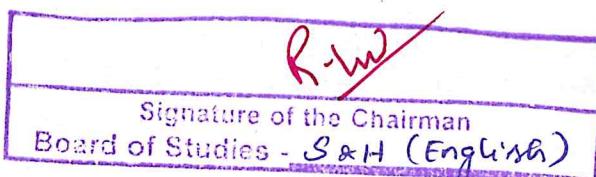
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						1		1	3	1	1		
CO2								2	3		1		
CO3								2	3	1	2		
CO4						1			3	1	2		
CO5									3		2		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understand ing (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	30	70	-	-	-	100
CAT2	-	30	35	-	-	35	100
CAT3	-	20	45	35	-	-	100
ESE	-	20	55	10	-	15	100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)



J. Rajai



24MAC24 – PROBABILITY THEORY AND INFERRENTIAL STATISTICS									
(Common to AIDS and AIML branches)									
Programme & Branch	B.Tech - Artificial Intelligence and Data Science B.Tech - Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	2	BS	45	7	16	52	120	4
Preamble	To impart knowledge and problem solving capability in probability and statistical concepts necessary for handling real time applications in Artificial intelligence.								
Unit – I	Probability and Random Variables:								
Unit – II	Standard Probability Distributions:								
Unit – III	Two Dimensional Random Variables:								
Unit – IV	Testing of Hypothesis:								
Unit – V	Design of Experiments:								
LIST OF EXPERIMENTS / EXERCISES:									
1.	Introduction to R studio.								
2.	Identifying probability involving discrete and continuous random variables.								
3.	Computation of probability using Binomial, Poisson and Normal distributions.								
4.	Finding the Marginal and conditional distributions of two-dimensional random variable.								
5.	Computation of correlation coefficient for the given data.								
6.	Testing significance of means by student's t – test.								
7.	Testing the independence of attributes by Chi-square test.								
8.	Analyze whether the difference in means is statistically significant by completely randomized design.								
TEXT BOOK:									
1.	Douglas C.Montgomery, George C.Runger, "Applied Statistics and Probability for Engineers", 7 th Edition, John Wiley & Sons, Inc, USA, 2018.								
REFERENCES/ MANUAL / SOFTWARE:									
1.	William Mendenhall, Robert J. Beaver and Barbara M. Beaver, "Introduction to Probability and Statistics", 14 th Edition, Cengage Learning, USA, 2013.								
2.	Jay L. Devore., "Probability and Statistics for Engineering and the Sciences", 9 th Edition, Cengage Learning, USA, 2016								
3.	Johnson. R.A., Miller. I and Freund. J., "Miller and Freund's Probability and Statistics for Engineers", 9 th Edition, Pearson Education, India, 2018.								
4.	S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 12 th Edition, Sultan Chand & Sons, New Delhi, 2022.								
5.	Probability Theory and Inferential Statistics Laboratory Manual.								

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES:											BT Mapped (Highest Level)
On completion of the course, the students will be able to											
CO1	Interpret the concept of random variables and know the basics of R studio										
CO2	Apply the standard probability distributions in engineering problems.										
CO3	Apply the concepts of two dimensional random variables and regression in intelligent systems.										
CO4	Apply statistical tests for solving engineering problems involving small and large samples.										
CO5	Apply the concepts of analysis of variance to experimental data.										

Mapping of COs with POs and PSOs

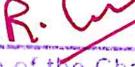
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	1		3								
CO2	3	3	2		3								
CO3	3	3	2	3	3								
CO4	3	3	3	3	3								
CO5	3	3	3	3	3								

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		30	70				100
CAT2		30	70				100
CAT3		30	70				100
ESE		30	70				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)


Signature of the Chairman
Board of Studies - 



24CYT13 - CHEMISTRY FOR ELECTRONICS AND COMPUTER SYSTEMS																	
(Common to EEE, EIE, ECE, CSE, CSD, IT, AIDS & AIML branches)																	
Programme & Branch	B.E - EEE, EIE, ECE, CSE, CSD, B.Tech - IT, AIDS & AIML branches	Sem.#	Category	L	T	P	SL*	Total	Credit								
Prerequisites	Nil	1 / 2	BS	45	0	0	45	90	3								
Preamble	This course aims to emphasize the engineering students to realize the importance of water technology, energy storage devices, organic electronic materials, fabrication of PCBs, insulating materials and the need for e-waste management. It aims to impart the fundamentals of chemistry towards innovations in engineering and also for societal applications.																
Unit – I	WATER TECHNOLOGY								9								
Introduction - types of water - hardness of water- expression of hardness - units of hardness –water quality parameters-estimation of hardness of water by EDTA method – determination of alkalinity - DO, BOD and COD (Definition and Significance only) - disadvantages of using hard water in industry: scale, sludge and boiler corrosion - softening of water: Internal treatment process - carbonate and calgon conditioning - External treatment method - demineralization process and reverse osmosis.																	
Unit – II	ENERGY STORAGE DEVICES								9								
Batteries: Introduction - discharging and charging of battery - characteristics of battery - types of batteries – primary battery: silver button cell - secondary battery: Ni-Cd battery -modern battery: lithium-ion battery - choice of batteries for electric vehicles. Fuel Cells: Introduction - Importance and classification of fuel cells - description, principle, components and working of fuel cells: alkaline fuel cell, phosphoric acid fuel cell and direct methanol fuel cell - comparison of batteries with fuel cells.																	
Unit – III	ORGANIC ELECTRONIC MATERIALS								9								
Organic Electronic Materials: Introduction – types of organic semiconducting materials – comparison of organic with inorganic semiconducting materials – organic light emitting diodes – construction and working mechanism – comparison of LCD vs OLED. Fabrication of PCB: Introduction – electroplating (copper) process - electroless plating (nickel) process – printed circuit board (PCB) fabrication.																	
Unit – IV	INSULATING MATERIALS								9								
Introduction - requirements - classification (solid, liquid & gas) - preparation, properties and applications of solid inorganic insulator: ceramic materials - solid organic insulator: epoxy resin - liquid insulator: transformer oil - gas insulator: SF ₆ - electrical resistivity - factors influencing electrical resistivity of materials - composition, properties and applications of high resistivity materials: Nichrome - polymers as electrical insulator.																	
Unit – V	E-WASTE AND ITS MANAGEMENT								9								
Introduction - E- Waste definition - sources of e-waste – hazardous substances in e-waste - effects of e-waste on environment and human health - need for e-waste management - waste minimization techniques for managing e-waste – chemistry of recycling of e-waste (magnetic separation, eddy current, density separation - recovery of metals using acid leaching process) - disposal treatment methods of e- waste - Incineration, pyrolysis, land fill - global scenario of e-waste – e-waste in India- case studies.																	
TEXT BOOK:																	
1.	Roussak , O.V. Gesser, H. D. " Applied Chemistry: A Textbook for Engineers and Technologists", 2 nd Edition ,Springer, 2013, for Unit I, II.																
2.	Palanisamy P.N., Manikandan P., Geetha A., Manjula Rani K., Kowshalya V.N., "Chemistry for Engineering", Revised Edition, Pearson Education, New Delhi, 2024,for Units III, IV, V.																
REFERENCES:																	
1.	Payal B. Joshi, Shashank Deep, "Engineering Chemistry", Oxford University Press, New Delhi, 2019.																
2.	Shuichiro Ogawa, "Organic Electronics Materials and Devices", 1 st Edition, Springer, 2015.																

*includes Term Work(TW) & Online / Certification course hours

1st sem for EEE, EIE, ECE & 2nd sem for CSE, CSD, IT, AIDS & AIML

COURSE OUTCOMES:											BT Mapped (Highest Level)	
On completion of the course, the students will be able to												
CO1	analyze the water quality parameters for suitability of industrial and domestic applications.											Analysing (K4)
CO2	examine the chemistry of energy storing devices and meeting the future prospectus of energy storage.											Analysing (K4)
CO3	simplify the working mechanism of organic electronic materials and apply the concept of plating techniques in PCBs fabrication.											Analysing (K4)
CO4	identify the suitable insulating materials for industrial applications.											Analysing (K4)
CO5	categorize the e-waste and reduce its impacts on future environment.											Analysing (K4)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1		1							
CO2	3	2	1	1									
CO3	3	2	1	1									
CO4	3	2	1	1									
CO5	3	2	3	1		2	1						

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		40	50	10			100
CAT2		40	50	10			100
CAT3		40	50	10			100
ESE		40	50	10			100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Bhavya

	<i>R.Ind</i>
Signature of the Chairman Board of Studies - <i>Selvi</i>	





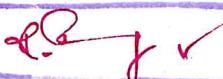
24ADC21 - PYTHON PROGRAMMING																		
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)																		
Programme & Branch	B.Tech – Artificial Intelligence and Data Science & B.Tech – Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil	2	ES	45	0	30	45	120	4									
Preamble	This course provides practical exposure to basic concepts of Python Programming including object- oriented programming, GUI and Web programming.																	
Unit – I	Introduction:																	
Basic Concepts: Keywords, identifiers and variables- Data types – type casting – user input – operators – Flow control statements Calendars and clocks.																		
Unit – II	Functions and Data Structures:																	
Functions: Basics –function arguments – modules – Recursion – Special functions. Lists: Creating, traversing and slicing –functions – nested lists. Tuples: Creating, initializing and accessing – tuple functions – swapping tuples, unpacking tuples – Dictionaries: Basics of Creating, initializing and accessing – dictionary functions and methods.																		
Unit – III	Object Oriented Programming:																	
Concepts of OOP – OOP concepts for Python – Built in Attributes and methods – polymorphism – operator overloading – Inheritance and Namespace – Method types – Exceptions: Built-in and User defined exceptions.																		
Unit – IV	Strings, Files and Regular Expressions:																	
Strings: Built-in methods for string manipulation – Modules and Packages: import statement – creating user defined modules and packages. Files: File operations – Reading and Writing a file. Regular Expressions: match, search, sub, find all and finite functions.																		
Unit – V	Databases and Web Frameworks:																	
Databases: Database operations – Web Frameworks: Web servers – Introduction to web server frameworks - Creating and running a flask application.																		
LIST OF EXPERIMENTS / EXERCISES:																		
1.	Demonstrate the use of control structures																	
2.	Demonstrate tuple, list and dictionary operations																	
3.	Demonstrate the use of constructors																	
4.	Implement different types of inheritance																	
5.	Demonstrate the usage of exception handling																	
6.	Explore string manipulation functions																	
7.	Use file concepts to perform operations																	
8.	Perform validation of inputs using Regular Expressions																	
9.	Develop a web application using Flask																	
*includes Term Work(TW) & Online / Certification course hours																		
TEXT BOOK:																		
1.	Anurag Gupta, G P Biswas. "Python Programming", 1 st Edition, McGraw Hill Education, 2020 for Units I,II,III,IV.																	
2.	https://www.javatpoint.com/flask-app-routing for Unit V.																	



REFERENCES/ MANUAL / SOFTWARE:													
1.	Bill Lubanovic, "Introducing Python Modern Computing in Simple Packages", 2 nd Edition, O'Reilly Media, 2019.												
2.	Samuel Dauzon, Aidas Bendoraitis and Arun Ravindran. "Django: Web Development with Python", 1 st Edition, Packt Publisher, 2017.												
3.	Software: Python												
4.	Laboratory Manual												
COURSE OUTCOMES: On completion of the course, the students will be able to													
CO1	demonstrate the use of input, output and flow control function in python										BT Mapped (Highest Level)		
CO2	design and develop Python Programs using core data structures like Lists, Tuples and Dictionaries.										Applying (K3), Precision(S3)		
CO3	implement the concepts of object-oriented programming using Python.										Applying (K3), Precision(S3)		
CO4	develop python programs using File Operations and searching pattern using regular expressions.										Applying (K3), Precision(S3)		
CO5	implement web applications related to Databases using flask and Web Services.										Applying (K3), Precision(S3)		
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2								3	2
CO2	3	2	2	2								3	3
CO3	3	2	2	2								3	3
CO4	3	2	2	2								3	3
CO5	3	2	2	2	2							3	3

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

Portal : Code Tantra


 Signature of the Chairman
 Board of Studies - CSE , DT

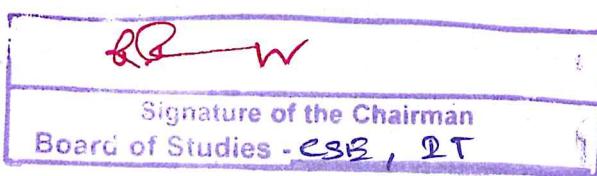

 Academic Cell
 ★ KONGU ENGINEERING COLLEGE ★




24ADC22 - FOUNDATIONS OF ARTIFICIAL INTELLIGENCE																		
(Common to Artificial Intelligence and Data Science and Artificial Intelligence and Machine Learning branches)																		
Programme & Branch	B.Tech – Artificial Intelligence and Data Science & B.Tech – Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil	2	PC	45	0	30	45	120	4									
Preamble	This course imparts knowledge on data science and its relationship with other fields. It focuses on data processing and visualization. It also aims to provide knowledge on regression, classification and feature engineering techniques..																	
Unit – I	Fundamentals of Data Science																	
Introduction to Artificial Intelligence - Machine Learning - Data Science and its Relationships – Data Science: Applications – Relationship with other fields – Relationship between data science and information science – Computational Thinking – Skills – Tools. Data: Types of data – Data Collection – Data Preprocessing.																		
Unit – II	Data Processing and Visualization																	
Numpy: Declaration – Reshaping - Operations. Matplotlib: Scatterplot – Lineplot – Piechart - Bar Graph - Histogram. Pandas: Dataframe - Summary - accessing rows and columns - conditional access of data- adding and deleting columns.																		
Unit – III	Regression																	
Introduction to Regression – Regression Models – Linear Regression Model and Machine Learning – Evaluating Model Quality using different metrics – Insurance cost prediction problem.																		
Unit – IV	Feature Engineering																	
Feature Engineering – Insurance cost modelling problem – Reasons for Model Errors – Rectification of Model Errors – Overfitting and Underfitting – Deriving Data to Train the Model – Train/Test Split on the Insurance Problem.																		
Unit – V	Classification																	
Introduction to Classification – Approach followed by Classification Algorithms – A Visual Representation of Logistic Regression – Evaluating Classification Model Accuracy – Classification with Logistic Regression – Introduction to Confusion Matrix – Hands-on with Confusion Matrix- Importance of Class wise Accuracy.																		
LIST OF EXPERIMENTS / EXERCISES:																		
1.	Perform operations using Numpy																	
2.	Perform visualization using Matplotlib																	
3.	Perform operations using Pandas																	
4.	Perform linear regression on datasets																	
5.	Perform feature engineering for the given dataset																	
6.	Perform logistic regression on datasets																	
7.	Programs to illustrate confusion matrix																	
*includes Term Work(TW) & Online / Certification course hours																		
TEXT BOOK:																		
1.	Chirag Shah, "A hands on introduction to Data Science", Cambridge University Press, First edition, 2020 for Unit 1.																	
2.	Sujit Bhattacharyya, Subhrajit Bhattacharyya, "Practical Handbook of Machine Learning", Career Launcher Infrastructure Pvt Ltd and G.K. Publications Pvt Ltd, First Edition, 2021 for Unit 2,3,4,5.																	



REFERENCES/ MANUAL / SOFTWARE:													
1.	Arthur K. Kordon "Applying Data Science: How to Create Value with Artificial Intelligence". Springer Nature, Switzerland, 1st Edition, 2020.												
2.	Avrim Blum, John Hopcroft and Ravindran Kannan. "Foundations of Data Science". Cambridge University Press, 1st Edition, England, 2020.												
3.	Software: Python												
4.	Laboratory Manual												
COURSE OUTCOMES:													
On completion of the course, the students will be able to												BT Mapped (Highest Level)	
CO1	adapt the data science for finding solution for given problems											Applying (K3) Precision(S3)	
CO2	perform data processing and data visualization of real world data											Applying (K3) Precision(S3)	
CO3	use regression models to solve problems											Applying (K3) Precision(S3)	
CO4	apply feature engineering techniques and estimate model errors											Applying (K3) Precision(S3)	
CO5	use logistic regression to solve problems											Applying (K3) Precision(S3)	
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2								1	3	2
CO2	3	2	3	1	1						1	3	2
CO3	3	2	3	1	1						1	3	2
CO4	3	2	3	1	1						1	3	2
CO5	3	2	3	1	1						1	3	2
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	-	40	60				100						
CAT2	-	40	60				100						
CAT3	-	40	60				100						
ESE	-	40	60				100						
* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)													



Rajal

24TAM02 - TAMILS AND TECHNOLOGY

(Common to All Engineering and Technology Branches)

Programme & Branch	All BE/BTech Branches	Sem.	Category	L	T	P	SL*	TOT	Credit
Prerequisites	Nil	2	HS	15	0	0	15	30	1

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

TEXT BOOK:

1. Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
2. Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).

REFERENCES:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்), உலகத் தமிழராய்ச்சி நிறுவனம், சென்னை, 2002
2. கணினித்தமிழ் முனைவர் இல. சுந்தரம், விகடன் பிரசரம், 2016
3. சீழை வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (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).
7. Keeladi – 'Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
8. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by : The Author)
9. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu)
10. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)	
CO1 explain weaving and ceramic technology in tamil culture and tamil society.											Understanding (K2)	
CO2 Illustrate about the design and construction technology.											Understanding (K2)	
CO3 summarize about the manufacturing technology.											Understanding (K2)	
CO4 explain the agriculture and irrigation technology.											Understanding (K2)	
CO5 explain the significance of tamil in scientific and computing.											Understanding (K2)	

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						3		3	2	2			
CO2						3		3	2	2			
CO3						3		3	2	2			
CO4						3		3	2	2			
CO5						3		3	2	2			

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	40	60					100
CAT2	40	60					100
CAT3	40	60					100
ESE	NA						

* ±3% may be varied (CAT 1,2,3 – 50 marks)

R-W
Signature of the Chairman
Board of Studies - S & H (Physics)

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Programme & Branch	All BE/BTech Branches	Sem.	Category	L	T	P	SL*	TOT	Credit
Prerequisites	Nil	2	HS	15	0	0	15	30	1
முன்னுரை	தமிழ் கலாச்சாரத்தோடு ஒன்றிய தொழில் நுட்பங்களைப் பற்றிப் படுத்துவதற்காக								
அலகு - I	நெசவு மற்றும் பானை தொழில்நுட்பம்								3
சங்க காலத்தில் நெசவு தொழில் - பானைத் தொழில்நுட்பம் கருப்பு சிவப்பு பாண்டங்கள் - பாண்டகளில் கீறல் குறியீடுகள்									
அலகு - II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்								3
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச்சிற்பங்களும், கோவில்களும் - சோழர் காலத்து பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரிகட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டில் காலத்தில் சென்னை இந்தோ-சாரோசெனிக் கட்டிடத்தைக் கலை.									
அலகு - III	உற்பத்தித் தொழில்நுட்பம்								3
கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள் - கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.									
அலகு - IV	வேளாண்மை மற்றும் நிர்ப்பாசனத் தொழில்நுட்பம்								3
அணை, ஏரி, குளங்கள், மதகு - சோழர்கால குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.									
அலகு - V	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்								3
அறிவியல் தமிழின் வளர்ச்சி - கணினித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத் திட்டம்.									

TEXT BOOK:

- தமிழக வரலாறு - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை, 2002
- கணினித்தமிழ் முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2016

REFERENCES:

- கீழடிவைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
- பொருநை-ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
- Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
- Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
- Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
- The Contribution of the Tamil to Indian Culture (Dr.M.Valarmathi) (Published by International Institute of Tamil Studies).
- Keeladi – Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
- Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
- Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu)
- Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES:			BT Mapped (Highest Level)
படிப்பை முடித்தவுடன், மாணவர்கள்			
CO1	தமிழ் கலாச்சாரம் மற்றும் தமிழ் சமூகத்தினுடைய நெசவு மற்றும் பானை தொழில்நுட்பம் பற்றி விளக்க முடியும்.		Understanding (K2)
CO2	தமிழர்களின் வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்ப ஆற்றல் பற்றி விளக்க முடியும்.		Understanding (K2)
CO3	தமிழர்களின் உற்பத்தித் தொழில்நுட்பம் பற்றி சுருக்கமாகக் கூற முடியும்.		Understanding (K2)
CO4	தமிழர்களின் வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் பற்றி விளக்க முடியும்.		Understanding (K2)
CO5	தமிழர்களின் அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் பற்றி விளக்க முடியும்.		Understanding (K2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						3		3	2	2			
CO2						3		3	2	2			
CO3						3		3	2	2			
CO4						3		3	2	2			
CO5						3		3	2	2			

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	40	60					100
CAT2	40	60					100
CAT3	40	60					100
ESE	NA						

* ±3% may be varied (CAT 1,2,3 – 50 marks)

R.W
Signature of the Chairman
Board of Studies - S & H (Physics)
[Handwritten signature]



24CYL13 – CHEMISTRY LABORATORY FOR ELECTRONICS AND COMPUTER SYSTEMS

(Common to EEE, EIE, ECE, CSE, CSD, IT, AIDS & AIML branches)

Programme & Branch	B.E & EEE, EIE, ECE, CSE, CSD, B.Tech & IT, AIDS & AIML branches	Sem.#	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	1 / 2	BS	0	0	30	0	30	1

Preamble This course aims to impart the basic concepts of volumetric, conductometric, spectrophotometric and pHmetry experiments for the estimation of given samples and thereby, to improve the analytical skills. This course also aims to impart the knowledge on hardness, DO, COD, alkalinity, Fe^{2+} , Cu^{2+} and Cr^{6+} in computer systems.

LIST OF EXPERIMENTS / EXERCISES:

1. Assessment of the given water sample for the suitability of drinking / industrial purpose by estimating the carbonate, non-carbonate and total hardness by EDTA method.
2. Estimation of type and amount of alkalinity present in the given river/bore well water sample.
3. Perform Winkler's method for the determination of dissolved oxygen in the given wastewater sample.
4. Determination of COD in the given water sample.
5. Estimation of strength and amount of acid in a given solution using pH meter.
6. Determination of strength and amount of mixture of acids present in the given solution using Conductivity meter.
7. Determination of concentration of Nickel by Spectrophotometric method.
8. Estimation of copper content from discarded PCB's by Iodometric method.
9. Determination of iron present in the given sample by permanganometric method.
10. Volumetric estimation of chromium from electroplating sludge using permanganometric method.
11. Electroplating process (Demonstration).
12. Report preparation -based on the data received from the analysed water quality parameters (Demonstration).

REFERENCES/ MANUAL /SOFTWARE:

1. Palanisamy P.N., Manikandan P., Geetha A. and Manjula Rani K., "Chemistry Laboratory Manual", 1 st Edition, Rajaganapathy Publishers, Erode, 2024.

COURSE OUTCOMES:

On completion of the course, the students will be able to

**BT Mapped
(Highest Level)**

CO1	estimate the amount of hardness, alkalinity, DO and COD present in the given sample.	Analyzing (K4), Precision (S3)
CO2	interpret the experimental results obtained from conductivity meter and pH meter.	Analyzing (K4), Precision (S3)
CO3	demonstrate the determination of Nickel by Spectrophotometer, Copper by Iodometry, Iron and Chromium by Permanganometry.	Analyzing (K4), Precision (S3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	2		2	1						
CO2	2	2	3	2		2	1						
CO3	2	2	3	2		2	1						

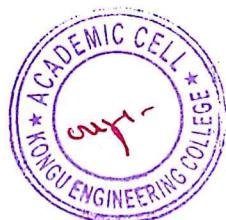
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

*includes Term Work(TW) & Online / Certification course hours

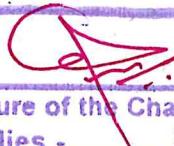
1st sem for EEE, EIE, ECE & 2nd sem for CSE, CSD, IT, AIDS & AIML

R.W

Signature of the Chairman
End of Studies - 2024



24GCL12 - FOUNDATION LABORATORY – ELECTRICAL, IOT AND WEB TECHNOLOGIES																						
(Common to all BE/BTech branches)																						
Programme & Branch		All BE/BTech Branches			Sem.	Category	L	T	P	SL*	Total	Credit										
Prerequisites		Nil			1/2	ES	0	0	90	0	90	3										
Preamble		This course is designed to provide a foundational knowledge on engineering with hands-on experience on the house wiring, Internet of Things and Web Technologies.																				
LIST OF EXPERIMENTS / EXERCISES:																						
PART A – Electrical Installation (30 Hours)																						
1.	Determination of load currents and select suitable components for Protection																					
2.	Develop a wiring circuit for incandescent lamp and fluorescent lamp using Simple and Staircase Wiring																					
3.	Develop and Investigate wiring circuits for Calling Bell System and Dimmable Light																					
4.	Create wiring circuit for single phase motor																					
5.	Development of IOT based energy monitoring and control																					
6.	Measurement and analysis of electrical parameters for Photovoltaic Solar Panel																					
PART B – Internet of Things (30 Hours)																						
1.	Design a Single layer PCB layout designing																					
2.	Fabricate Single layer PCB printing																					
3.	Assembling, soldering and desoldering practice on single layer PCB																					
4.	Sensor and actuator interfacing with internet enabled microcontroller																					
5.	Sensor and actuator calibration																					
6.	Integration of microcontroller based system with Cloud platform																					
PART C – Web Technologies (30 Hours)																						
1.	Design a simple web page using basic HTML tags and CSS properties																					
2.	Design a responsive webpage using Bootstrap framework																					
3.	Design a webpage for signup and login validation form using Javascript and PHP																					
4.	Create a database connectivity using PHP, MySQL and host the website in the server.																					
REFERENCES/ MANUAL /SOFTWARE:																						
1.	Laboratory Manual																					
2.	Eric T.Freeman,Elisabeth Robson, "Head First JavaScript Programming A Brain-Friendly Guide", 1st Edition, O'Reilly , 2014.																					
3.	Eric T.Freeman,Elisabeth Robson, "Head First HTML and CSS",2nd Edition, O'Reilly , 2012																					
4.	Lynn Beighley,"Head First SQL",1st Edition, O'Reilly,2007.																					
COURSE OUTCOMES:																						
On completion of the course, the students will be able to																						
CO1	Design electrical wiring circuits for buildings based on their requirement										BT Mapped (Highest Level)											
CO2	Develop IoT based solutions and PCB for real world use cases.										Applying(K3), Precision (S3)											
CO3	Design and host an interactive dynamic website.										Applying(K3), Precision (S3)											
Mapping of COs with POs and PSOs																						
COs/POs /PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2									
CO1	3	3	3	2	3			1	3	2	2	2										
CO2	3	3	3	2	3			1	3	2	2	2										
CO3	3	2	1	1				3	3	2	2	3										
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy																						

 Signature of the Chairman	
Board of Studies - EEE	



24MNT21 - QUANTITATIVE APTITUDE - II																								
(Common to all Engineering and Technology branches)																								
Programme & Branch		All B.E/B.Tech Branches			Sem.	Category	L	T	P	SL*	Total	Credit												
Prerequisites	Basic Mathematical skills			2	MC	20	0	0	10	30	0													
Preamble	To impart problem solving skills and enhance analytical skills.																							
Unit – I	Averages, Alligations, Time and Work:																							
Averages, Alligations or Mixtures: Concepts – Definition – Formula – Simple problems on averages – Alligation or Mixture rule – Applications – Problems.																								
Time and Work: Concepts – Work and wages – Pipes and Cisterns – Simple problems.																								
Unit – II	Time and Distance:																							
Time and Distance: Time, speed and distance – Conversions – Average speed – Relative speed – Problems on boats and streams – Upstream and downstream – Simple problems.																								
Unit – III	Permutation and Combination, Probability:																							
Permutation and Combination: Concepts – Simple problems.																								
Probability: Basic Concepts – Applications – Simple problems.																								
TEXT BOOK:																								
1.	Dr.R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", Revised Edition, S.Chand and company limited, 2022.																							
REFERENCES/ MANUAL / SOFTWARE:																								
1.	Abhijit Guha,"Quantitative Aptitude for Competitive Examination", 7 th Edition, McGraw Hill Education, India, 2020.																							
2.	https://www.indiabix.com/aptitude/questions-and-answers																							
3.	https://www.geeksforgeeks.org/aptitude-questions-and-answers																							
COURSE OUTCOMES: On completion of the course, the students will be able to										BT Mapped (Highest Level)														
CO1	Solve averages, alligations or mixtures, time and work problems.										Applying (K3)													
CO2	Solve the problems on time and distance, upstream and downstream oriented applications problems.										Applying (K3)													
CO3	Solve problems involving permutation, combination and probability concepts.										Applying (K3)													
Mapping of COs with POs and PSOs																								
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2											
CO1	2	2																						
CO2	2	3																						
CO3	3	2																						
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy																								
ASSESSMENT PATTERN - THEORY																								
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %																	
CAT1		30	70				100																	
CAT2		30	70				100																	
CAT3		30	70				100																	
* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)																								

*includes Term Work (TW) & Online / Certification course hour

 Signature of the Chairman	
Board of Studies - S4H	



24MAT32 – DISCRETE MATHEMATICS AND LINEAR ALGEBRA																		
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)																		
Programme & Branch	B.Tech - Artificial Intelligence and Data Science & B.Tech - Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil	3	BS	45	15	0	60	120	4									
Preamble	To provide in-depth knowledge in various concepts of linear algebra, mathematical logic and relations, which serve as a foundation for machine learning and data science and also develop skills to apply algebraic structures in coding theory.																	
Unit – I	Mathematical Logic:																	
Propositional Calculus: Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions – Theory of Inference – Rules of inference – Arguments – Validity of arguments.																		
Predicate Calculus: Predicates – Statement function – Variables – Quantifiers – Universe of discourse – Theory of inference for Predicate calculus – Rules of universal specification and generalization – Rules of Existential specification and generalization.																		
Unit – II	Relations:																	
Cartesian product of sets – Relations on sets – Types of relations and their properties – Matrix representation of a relation - Graph of a relation – Equivalence relation – Partial ordered relation – Poset – Hasse diagram – Lattices – Properties of lattices.																		
Unit – III	Group Theory:																	
Groups and Subgroups (Definitions only) – Homomorphism – Cosets – Lagrange's theorem — Coding Theory – Group codes – Basic notions of error correction – Error recovery in group codes (Excluding theorems in coding theory).																		
Unit – IV	Vector spaces																	
Vector spaces – Subspaces – Linear combinations and Span – Linear independence – Bases and dimension – Row space, Column space and Null Space – Rank and nullity.																		
Unit – V	Inner Product Spaces:																	
Inner products – Inner Product Spaces – Angle and Orthogonality in inner product spaces – Orthonormal vectors – Gram Schmidt orthonormalization process – QR decomposition.																		
TEXT BOOK:																		
1.	Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics", Reprint Edition, Tata McGraw Hill Publishing Company, New Delhi, 2022 for Units I, II, III.																	
2.	Howard Anton, Chris Rorres, "Elementary Linear Algebra", 11 th Edition, John Wiley & Sons, 2019 for Units IV, V.																	
REFERENCES:																		
1.	Kenneth H. Rosen, Kamala Krithivasan, "Discrete Mathematics and its Applications", 8 th Edition, McGraw Hill Education Private Limited, New Delhi, 2023.																	
2.	Gilbert Strang, "Introduction to Linear Algebra", 4 th Edition, Wellesley-Cambridge Press, Wellesley, USA, 2016.																	
3.	David C. Lay, Steven R. Lay, Judith McDonald, "Linear Algebra and Its Applications", 5 th Edition, Pearson Education Limited, England, 2016.																	

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES:											BT Mapped (Highest Level)
On completion of the course, the students will be able to											
CO1	Apply propositional and predicate logic to validate the arguments.										
CO2	Understand various types of relations which has applications in cryptography and combinatorial optimization.										
CO3	Apply the concepts of group structures in coding theory.										
CO4	Illustrate the concept of vector spaces commonly used in intelligent systems.										
CO5	Apply the concepts of inner product spaces in orthogonalization and decomposition in data reduction.										

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1								1	
CO2	3	2	1									2	
CO3	3	2	1	2								2	
CO4	3	2	1									1	
CO5	3	3	3	3								3	

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		40	60				100
CAT2		40	60				100
CAT3		50	50				100
ESE		40	60				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)


Signature of the Chairman
Chairman of Studies - S 4 H





24ADC31 - JAVA PROGRAMMING																		
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)																		
Programme & Branch	B.Tech. Artificial Intelligence and Data Science B.Tech. Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil	3	PC	45	0	30	45	120	4									
Preamble	This course concisely introduces Java programming, including inheritance, interfaces, exception handling, threads, generics and collections																	
Unit - I	Introduction to OOP and Java																	
Overview of OOP – Object-oriented programming paradigms – Features of Object- Oriented Programming – Java Buzz words – Overview of Java–Data Types, Variables and Arrays – Operators – Control Statements- Strings: Basic String class, methods and String Buffer Class																		
Unit - II	Classes and Objects																	
Classes: Class Fundamentals–objects–Assigning Object Reference Variables – Introducing Methods – Constructors – this keyword – Garbage Collection – Stack Class. Overloading Methods – Objects as Parameters – Argument Passing – Returning Objects – Recursion – Access Control–Static – Nested and Inner Classes – Command-Line Arguments – Variable Length Arguments																		
Unit - III	Inheritance, Packages and Interfaces																	
Inheritance: Basics – Super keyword -Multilevel Hierarchy–Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces.																		
Unit - IV	Exception Handling, Multithreading and I/O																	
Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User-defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication- Suspending–Resuming, and Stopping Threads –Multithreading - I/O Basics																		
Unit - V	String Handling, Generics, Collections																	
Generics: Introduction – Example – Parameters – General Form – Generic Methods, Constructors and Interfaces. Collection frameworks: Overview – Collection Classes – Collection Interfaces.																		
List of Exercises / Experiments:																		
1.	Simple Java programs using operators, arrays and strings.																	
2.	Simple Java programs using control statements																	
3.	Demonstrate the concepts of inheritance & polymorphism.																	
4.	Develop an application using interfaces by accessing superclass constructors and methods.																	
5.	Develop an employee payroll application using packages.																	
6.	Implement exception handling and creation of user-defined exceptions.																	
7.	Implement a program to demonstrate multithreading and inter-thread communication.																	
8.	Perform file operations.																	
9.	Develop applications to demonstrate the features of generics classes and interfaces.																	
10.	Implement the concepts of collection frameworks.																	
TEXT BOOK:																		
1.	Herbert Schildt., "Java: The Complete Reference", 12th Edition, McGraw Hill Education, 2022.																	
REFERENCES/MANUAL/SOFTWARE:																		
1.	Cay S.Horstmann, "Core Java Volume 1 - Fundamentals", 12 th Edition, Prentice Hall, 2024																	
2.	E Balagurusamy, " Programming with Java",7th Edition, Mc Graw Hill Publication,2023																	
3.	Software: JDK, Eclipse IDE, MySQL																	
4	Laboratory Manual																	

*Includes Term Work (TW) & Online / Certification course hours



COURSE OUTCOMES

COURSE OUTCOMES:		BT Mapped (Highest Level)
On completion of the course, the students will be able to		
CO1	apply fundamental programming concepts to solve diverse problems	Applying (K3) Precision(S3)
CO2	develop solutions to various problems by employing object-oriented programming principles, utilizing classes and objects	Applying (K3) Precision(S3)
CO3	make use of programming features like inheritance, package usage, and interface implementation across various applications.	Applying (K3) Precision(S3)
CO4	develop robust Java applications by effectively utilizing I/O packages, implementing exception-handling mechanisms, and managing concurrency with threads	Applying (K3) Precision(S3)
CO5	effectively utilize collection frameworks to manage and manipulate data in software applications	Applying (K3) Precision(S3)

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	2			2			2	3	2
CO2	3	2	2	2	2			2			2	3	2
CO3	3	2	2	2	2			2			2	3	2
CO4	3	2	2	2	2			2			2	3	2
CO5	3	2	2	2	2			2			2	3	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

Portal: Code Tantra

<i>Raj</i>
Signature of the Chairman
Board of Studies - CSE, IT



Raj



24ADT31 - COMPUTER ORGANIZATION																		
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)																		
Programme & Branch	B.Tech. Artificial Intelligence and Data Science & B.Tech. Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil	3	ES	45	15	0	60	120	4									
Preamble	This course provides knowledge on basics of computer organization, introduces various arithmetic operations and discusses the performance issues of processor, memory and I/O units.																	
Unit – I	Basic Structure of Computers and Machine Instructions:																	
Functional Units – Basic Operational Concepts – Number Representation and Arithmetic Operations – Performance – Memory Locations and Addresses – Memory Operations – Instruction and Instruction Sequencing – Addressing Modes – CISC Instruction Sets.																		
Unit – II	Arithmetic Unit:																	
Addition and Subtraction of Signed Numbers – Design of Fast Adders – Multiplication of Unsigned Numbers – Multiplication of Signed Numbers – Fast Multiplication – Integer Division																		
Unit – III	Processing Unit:																	
Fundamental Concepts – Instruction Fetch and Execution Steps – Control Signals - Hardwired control – Pipelining : Pipelining – Basic concepts – Pipeline Organization – Pipelining Issues - Data Dependencies – Memory Delay – Branch Delay																		
Unit – IV	Memory System:																	
Basic Concepts – Semiconductor RAM Memories – Read-Only Memories – Direct Memory Access – Memory Hierarchy –Cache Memories : Mapping Functions –Virtual Memory – Secondary Storage : Magnetic Hard Disks.																		
Unit – V	I/O Organization:																	
Accessing I/O Devices – Interrupts – Enabling and Disabling Interrupts – Handling Multiple Devices – Bus Structure – Bus Operation – Arbitration – Interface Circuits – Interconnection Standards: USB.																		
TEXT BOOK:																		
1. Carl Hamacher, ZvonkoVranesic, SafwatZaky and NaraigManjikian, "Computer Organization and Embedded Systems", 6 th Edition, McGraw Hill International Edition, 2023..																		
REFERENCES:																		
1. Patterson David, A. and Hennessy John L., "Computer Organization and Design: The Hardware / Software-Interface", 5 th Edition, Harcourt Asia, Morgan Kaufmann, Singapore, 2014.																		
2. Stallings William, "Computer Organization and Architecture: Designing for Performance", 9 th Edition, Pearson Education, New Delhi, 2012.																		
3. M. Morris Mano, " Computer System Architecture", 3 rd Edition, Pearson Education, New Delhi, 2012.																		

*Includes Term Work(TW) & Online / Certification course hours



COURSE OUTCOMES:											BT Mapped (Highest Level)
On completion of the course, the students will be able to											
CO1	apply the basic structure, arithmetic, and memory operations of a digital computer, along with addressing modes, to solve computational problems effectively.										
CO2	ability to design, Implementation and Analysis of data path for instruction execution.										
CO3	design a data path for a simple processor and compare the various techniques related to simultaneous execution of multiple instructions from a program.										
CO4	organize the computer memory to speed up the performance and facilitate the transfer of data between the computer's central processing unit and the external devices.										
CO5	Make use of different I/O devices and standard I/O interfaces and identify the various types of interrupts in I/O transfer.										

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3									3	2
CO2	3	3	2									3	2
CO3	3	2	3									3	3
CO4	3	2	3									3	3
CO5	3	2	2									3	3

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		50	50				100
CAT2		50	50				100
CAT3		50	50				100
ESE		50	50				100

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)


Signature of the Chairman Board of Studies - CSE, IT




Rajal



24ADT32 - MACHINE LEARNING																		
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)																		
Programme & Branch	B.Tech. Artificial Intelligence and Data Science & B.Tech. Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil	3	PC	45	0	0	45	90	3									
Preamble	The course provides the concepts and algorithms in machine learning and the methods to apply them in real time problems.																	
Unit – I	Introduction to Machine Learning																	
Need for Machine Learning – Machine Learning in relation to other fields – Types of Machine Learning – Challenges of Machine Learning – Machine Learning Process and Applications – Data – Data Analytics –Descriptive Statistics– Univariate, Bivariate and Multivariate Data – Feature Engineering – Dimensionality Reduction techniques																		
Unit – II	Similarity based Learning and Regression Analysis																	
Introduction to Similarity based Learning – Nearest Neighbor Learning – Weighted K-Nearest Neighbor Algorithm – Nearest Centroid Classifier – Locally weighted Regression – Introduction to Regression – Linearity, Correlation and Causation – Linear Regression – Validation Methods for Regression - Multiple Linear Regression.																		
Unit – III	Decision Tree Learning																	
Decision Tree learning Model – Decision Tree Induction Algorithms: ID3 Tree Construction – C4.5 Construction – Classification and Regression Trees Construction – Regression Trees – Validating and Pruning of Decision Trees.																		
Unit – IV	Bayesian Learning and Support Vector Machines																	
Probability based Learning – Bayes Theorem Fundamentals – Classification using Bayes Model: Naive Bayes Algorithm, Brute Force Bayes Algorithm, Bayes Optimal Classifier, Gibbs Algorithm – Other Naïve Bayes Classifiers – Introduction to Support Vector Machine – Optimal Hyperplane – Functional and Geometric Margin																		
Unit – V	Ensemble Learning, Clustering Algorithms and Reinforcement Learning																	
Introduction – Parallel Ensemble Models – Incremental Ensemble Models – Sequential Ensemble Models –Introduction to Clustering Approaches – Proximity Measures – Hierarchical Clustering Algorithms –Partitional Clustering Algorithm– Overview of Reinforcement Learning – Reinforcement Learning as Machine Learning – Components – Markov Decision Process.																		
TEXT BOOK:																		
1.	S.Sridhar, M.Vijayalakshmi, "Machine Learning", 1st Edition, Oxford University Press, 2021.																	
REFERENCES:																		
1.	David Forsyth, "Applied Machine Learning", Springer, 2019.																	
2.	Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das , "Machine Learning",1st edition, Pearson Education, 2019																	
3.	ShaiShalev-Shwartz and Shai Ben-David, "Understanding Machine Learning: From Theory to Algorithms", 1 st Edition, Cambridge University Press, USA, 2014.																	

*Includes Term Work (TW) & Online / Certification course hours



COURSE OUTCOMES:											BT Mapped (Highest Level)
On completion of the course, the students will be able to											
CO1	extrapolate basic concepts of machine learning data and apply feature engineering										
CO2	apply similarity based learning and regression analysis for sample datasets										
CO3	apply ID3, C4.5 and CART algorithms for constructing, validating and pruning decision tree										
CO4	apply bayesian learning and support vector machine models for sample datasets										
CO5	demonstrate ensemble learning, clustering algorithms and reinforcement learning										

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	2	2					2	3	2
CO2	3	2	2	2	2	2					2	3	2
CO3	3	2	2	2	2	2					2	3	2
CO4	3	2	2	2	2	2					2	3	2
CO5	3	2	2	2	2	2					2	3	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		40	60				100
CAT2		40	60				100
CAT3		40	60				100
ESE		40	60				100

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)

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Board of Studies - CSE, IT





24ADT33- DATA STRUCTURES																		
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)																		
Programme & Branch	B.Tech. Artificial Intelligence and Data Science & B.Tech. Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil	3	PC	45	0	0	45	90	3									
Preamble	The course focuses on the basic concepts and applications of linear data structures and nonlinear data structures																	
Unit - I	List:																	
Data Structures – Abstract Data Types (ADT)–List ADT and Array Implementation – Linked List – Doubly Linked List – Circular Linked List – Applications of Linked Lists.																		
Unit - II	Stack and Queue:																	
Stack ADT – Array and Linked List implementation of Stacks – Applications of Stacks – Queue ADT – Array and Linked List implementation of Queue – Circular Queue – Applications of Queue.																		
Unit - III	Trees:																	
Preliminaries: Implementation of trees –Tree Traversals – Binary trees: Implementation– Expression trees – The Search Tree ADT – Binary Search Trees: Construction – Searching – Insertion – Deletion – Find Min – Find Max – AVL trees: Rotation – Insertion – Deletion.																		
Unit - IV	Graphs:																	
Definitions – Representation of Graphs – Types of Graph – Depth-first traversal – Breadth-first traversal – Topological Sort – Applications of DFS: Bi-connectivity – Euler circuits – Finding Strongly Connected Components – Applications of BFS: Bipartite graph – Graph Coloring																		
Unit - V	Searching, Sorting and Hashing:																	
Searching: Linear search – Binary Search – Sorting: Bubble sort – Shell sort – Bucket sort – Hashing: Hash Functions – Separate Chaining – Open Addressing: Linear Probing – Quadratic Probing – Double Hashing – Rehashing – Extendible Hashing.																		
TEXT BOOK:																		
1.	Weiss M. A., "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, London, 2019.																	
REFERENCES:																		
1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, McGraw Hill, 2009.																	
2.	Narasimha Karumanchi, "Data Structures and Algorithms Made Easy", Career Monk Publications, 2016.																	

*Includes Term Work (TW) & Online / Certification course hours



COURSE OUTCOMES:		BT Mapped (Highest Level)
On completion of the course, the students will be able to		
CO1	solve problems using various implementations of linked list.	Applying (K3)
CO2	make use of ADTs like stack and queue for solving real world problems.	Applying (K3)
CO3	implement the tree structure and its operations.	Applying (K3)
CO4	apply appropriate graph algorithms for computing problems.	Applying (K3)
CO5	demonstrate the concept of sorting, searching and hashing techniques.	Applying (K3)

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2			2					2	3	2
CO2	3	2	2			2					2	3	2
CO3	3	2	2			2					2	3	2
CO4	3	2	2			2					2	3	2
CO5	3	2	2			2					2	3	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		50	50				100
CAT2		40	60				100
CAT3		40	60				100
ESE		40	60				100

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)

<i>R.P. ✓</i>
Signature of the Chairman Board of Studies - CSE, IT



David

24MNT31 - ENVIRONMENTAL SCIENCE																				
(Common to All Engineering and Technology Branches)																				
Programme & Branch	All B.E/B.Tech Branches	Sem.	Category	L	T	P	SL*	Total	Credit											
Prerequisites	Nil	3 / 6	MC	30	0	0	0	30	0											
Preamble	This course provides an approach to understand the various natural resources, ecosystem, bio-diversity, pollution control & monitoring methods for sustainable life and also to provide knowledge and to create awareness for engineering students on social issues and the environment.																			
Unit – I	Environmental Studies and Natural Resources																			
Introduction to Environmental Science – uses, over-exploitation and conservation of forest, water, mineral, food, energy and land resources – case studies.																				
Unit – II	Ecosystem and Biodiversity																			
Ecosystems: concept and components of an ecosystem - structural and functional features – Functional attributes (Food chain and Food web only). Biodiversity: Introduction – Classification – Bio geographical classification of India- Values of biodiversity – Threats and Conservation of biodiversity - case studies.																				
Unit – III	Environmental Pollution																			
Environmental Pollution: Definition – causes, effects and control measures of: (a) Air pollution - Climate change, global warming, acid rain, ozone layer depletion (b) Water pollution (c) Soil pollution - Role of an individual in prevention of pollution - case studies.																				
Unit – IV	Environment Quality Standards and Monitoring																			
Ambient air quality standards - Water quality parameters and standards: Turbidity, pH, Suspended solids, hardness, residual chlorine, sulfates, phosphates, iron and manganese, DO, BOD, COD (definition, specifications and limits only) - Introduction to EIA – objectives and process of EIA - environment protection act – air (prevention and control of pollution) act – water (prevention and control of pollution) act- case studies																				
Unit – V	Social Issues and the Environment																			
From Unsustainable to Sustainable development - three pillars of sustainability- factors affecting environmental sustainability- approaches for sustainable development- Social issues: Urban problem related to energy - population growth and explosion - issues related to resettlement and rehabilitation, E-waste recycling - role of IT in environment and human health - case studies.																				
TEXT BOOK:																				
1.	Anubha Kaushik, and Kaushik C.P., "Environmental Science and Engineering", 6th Multicolour Edition, New Age International Pvt. Ltd., New Delhi, 2023.																			
REFERENCES:																				
1.	Palanisamy P.N., Manikandan P., Geetha A., Manjula Rani K., Kowshalya V.N., "Chemistry for Engineering", Revised Edition , Pearson Education, New Delhi, 2024.																			
2.	ErachBharucha, —Textbook of Environmental Studies for Undergraduate Courses, University Grants Commission, Universities Press India Private Limited, Hyderabad, 2005.																			

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES:										BT Mapped (Highest Level)	
On completion of the course, the students will be able to											
CO1	illustrate the various natural resources and role of individual for its conservation										Understanding (K2)
CO2	elaborate the features of ecosystem and biodiversity to find the need for conservation.										Understanding (K2)
CO3	manipulate the sources, effects and control methods of various environmental pollution.										Applying (K3)
CO4	make use of the knowledge of Quality standards, EIA and environmental legislation laws to monitor the environment.										Applying (K3)
CO5	utilize the knowledge of various social issues and impact of population explosion on environment towards sustainability.										Understanding (K2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	3			2	1						
CO2	2	1	3			2	1						
CO3	2	2	3			2	1						
CO4	2	2	3			2	1						
CO5	2	1	3			2	1						

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	25	40	35				100
CAT2	25	40	35				100
CAT3	25	40	35				100
ESE				NA			

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks)

Parommy

	<i>R. Unni</i>
Signature of the Chairman Board of Studies - <i>Sacit</i>	

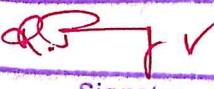


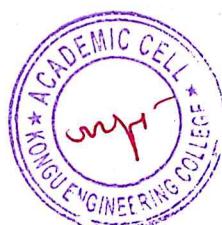


24ADL31 -MACHINE LEARNING LABORATORY																				
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)																				
Programme & Branch	B.Tech. Artificial Intelligence and Data Science & B.Tech. Artificial Intelligence and Machine Learning			Sem.	Category	L	T	P	SL*	Total	Credit									
Prerequisites	Nil		3	PC	0	0	30	0	30	1										
Preamble	The course focuses on the algorithms in machine learning and the methods to apply them in real time problems.																			
LIST OF EXPERIMENTS / EXERCISES:																				
1.	Create a sample dataset and explore statistical operations using Pandas and visualize the results through plots.																			
2.	Apply preprocessing techniques for sample dataset.																			
3.	Perform dimensionality reduction using PCA and SVD.																			
4.	Implement K-Nearest Neighbor Algorithm.																			
5.	Implement linear regression and multiple linear regression algorithms.																			
6.	Implement and demonstrate decision tree based ID3 algorithm.																			
7.	Implement Naïve Bayes algorithm.																			
8.	Implement Support Vector Machine algorithm.																			
9.	Implement and compare the working of Random Forest classifier with Adaboost model.																			
10.	Implement K-Means clustering algorithm.																			
REFERENCES/ MANUAL /SOFTWARE:																				
1.	Laboratory Manual																			
2.	Software : Python																			
COURSE OUTCOMES:																				
On completion of the course, the students will be able to											BT Mapped (Highest Level)									
CO1	create dataset and explore statistical operations										Applying (K3) Precision (S3)									
CO2	implement supervised learning algorithms with sample dataset										Applying (K3) Precision (S3)									
CO3	apply ensemble and clustering methods for sample dataset										Applying (K3) Precision (S3)									
Mapping of Cos with POs and PSOs																				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2							
CO1	3	2	2	2	1	1			2	1	1	3	2							
CO2	3	2	2	2	1	1			2	1	1	3	2							
CO3	3	2	2	2	1	1			2	1	1	3	2							

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

*Includes Term Work (TW) & Online / Certification course hours


Signature of the Chairman
Board of Studies - CSE, IT







24ADL32-DATA STRUCTURES LABORATORY

(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)

Programme & Branch	B.Tech. Artificial Intelligence and Data Science & B.Tech. Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	3	PC	0	0	30	0	30	1

Preamble	The course focuses on developing applications using the concepts of Linear and Non-linear Data Structures.
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LIST OF EXPERIMENTS / EXERCISES:

1. Implementation of singly linked list and its operations
2. Implementation of doubly linked list and its operations
3. Implementation of stack and its operations
4. Infix to postfix conversion using stack ADT
5. Evaluating postfix expression using stack ADT
6. Implementation of queue and its operations
7. Implementation of binary search tree traversals
8. Implementation of graph traversal techniques
9. Implementation of linear and binary search algorithms
10. Implementation of sorting algorithms

REFERENCES/ MANUAL /SOFTWARE:

1. Operating System : Windows/Linux
2. Software : C / Java
3. Laboratory Manual

COURSE OUTCOMES:

On completion of the course, the students will be able to

BT Mapped (Highest Level)

CO1	implement linear and non linear data structures to solve the given problem	Applying (K3) Precision (S3)
CO2	use a data structure to implement another data structure	Applying (K3) Precision (S3)
CO3	implement searching and sorting operations for a given problem	Applying (K3) Precision (S3)

Mapping of Cos with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	3			2	2	2	3	3	2
CO2	3	2	2	2	3			2	2	2	3	3	2
CO3	3	2	2	2	3			2	2	2	3	3	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

*Includes Term Work (TW) & Online / Certification course hours

B.Tech Artificial Intelligence and Data Science - R2024.
Signature of the Chairman
Board of Studies - CSE, IT



24ADT41 - DESIGN AND ANALYSIS OF ALGORITHMS									
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)									
Programme & Branch	B.Tech – Artificial Intelligence and Data Science & B.Tech. Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	4	PC	45	15	0	60	120	4
Preamble	This course focuses on various algorithm design techniques and methods for analyzing the performance of algorithms.								
Unit – I	Introduction: Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms – Empirical analysis of algorithm – Algorithm visualization.								9+3
Unit – II	Brute Force & Divide and Conquer: Brute Force: Selection sort– Sequential search and String Matching – closest pair and convex hull problem – Divide and Conquer: Merge sort – Quick sort – Binary search - Multiplication of large integers and Strassen's Matrix Multiplication – closest pair and convex hull problem.								9+3
Unit – III	Decrease and Conquer & Transform and Conquer: Decrease and Conquer: Insertion sort – Topological Sorting – Fake coin problem – Computing a Median and the Selection Problem – Transform and conquer: Presorting – Balanced search trees – AVL trees – 2 – 3 Trees – Heaps and Heap sort.								9+3
Unit – IV	Dynamic Programming & Greedy technique: Dynamic Programming: Warshall's and Floyd's algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions – Greedy Technique: Prim's algorithm – Kruskal's Algorithm – Dijkstra's Algorithm – Huffman Trees.								9+3
Unit – V	Backtracking & Branch and Bound: Backtracking: n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem – Branch and Bound: Assignment problem – Knapsack Problem – Traveling Salesman Problem – Overview of P, NP and NP-Complete Problems – Randomized algorithms.								9+3
TEXT BOOK:									
1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2017s.								
REFERENCES:									
1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", 3rd Edition, Prentice Hall of India, 2009.								
2.	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Reprint Edition, Pearson Education, 2006.								

*includes Term Work(TW) & Online / Certification course hours



COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)	
CO1	analyze the efficiency of algorithms using various frameworks										Analyzing (K4)	
CO2	apply brute force and divide and conquer techniques to solve various problems and analyze their efficiency										Analyzing (K4)	
CO3	utilize decrease and conquer and transform and conquer strategies for solving problems										Applying (K3)	
CO4	make use of dynamic programming and greedy techniques to solve problems										Applying (K3)	
CO5	solve difficult combinatorial problems with backtracking and branch & bound techniques										Applying (K3)	

Mapping of COs with POs and PSOs

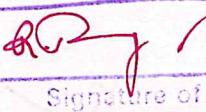
COs/POs/ PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2									3	1
CO2	3	3	2									3	1
CO3	3	2	2									3	1
CO4	3	2	2									3	1
CO5	3	2	2									3	1

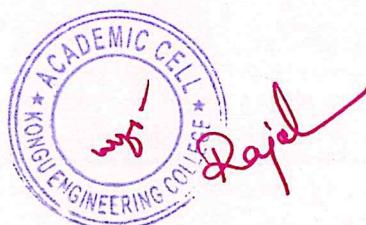
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	35	45	20			100
CAT2	-	30	50	20			100
CAT3	-	35	65				100
ESE	-	20	60	20			100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

 Signature of the Chairman Board of Studies - CSE, IIT



24ADT42 - OPERATING SYSTEMS																	
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)																	
Programme & Branch	B.Tech – Artificial Intelligence and Data Science & B.Tech. Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit								
Prerequisites	Nil	4	ES	45	15	0	60	120	4								
Preamble	This course provides basic operating system abstractions, system call interface, process, threads, and inter-process communication. Various management functions of an operating system will also be explored																
Unit – I	Operating Systems Overview:								9+3								
Introduction – Computer System Organization – Computer System Architecture – Operations – Resource Management – Security and Protection – Virtualization – Computing Environments. Operating Systems Structures: Services – User and OS Interface – System Calls.																	
Unit – II	Process Management:								9+3								
Process Concept – Process Scheduling – Operations on Processes – Interprocess Communication – IPC in Shared Memory and Message Passing Systems. CPU Scheduling: Scheduling Criteria – Scheduling Algorithms. Multithreaded Programming: Threads Overview – Multicore Programming – Multithreading Models.																	
Unit – III	Process Synchronization:								9+3								
The Critical Section Problem - Peterson's solution – Hardware support for Synchronization – Mutex Locks – Semaphores – Monitors. Deadlocks: Deadlock Characterization – Methods for handling deadlocks - Deadlock Prevention and Avoidance – Deadlock Detection – Recovery from Deadlock.																	
Unit – IV	Memory Management:								9+3								
Main Memory: Background – Contiguous Memory Allocation – Segmentation – Paging – Swapping. Virtual Memory: Background – Demand Paging – Page Replacement.																	
Unit – V	Storage Management:								9+3								
Mass Storage Structure: Overview – HDD Scheduling. File System: File Concept – Access Methods – Directory Structure – Protection. File System Implementation: File System Structure – File System Operations – Directory Implementation – Allocation Methods - Free Space Management.																	
TEXT BOOK:																	
1.	Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", Global Edition, John Wiley & Sons Inc., 2020.																
REFERENCES:																	
1.	William Stallings, "Operating Systems Internals and Design Principles", 9 th Edition, Prentice Hall, 2018.																
2.	Andrew S. Tanenbaum, "Modern Operating Systems", 4 th Edition, Pearson Education, 2016.																

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)	
CO1	discuss the basic structure and architectural components of the operating system and interpret how application programs interact with the operating system through APIs.											Understanding (K2)
CO2	apply the various scheduling algorithms and synchronization techniques to achieve better performance of a computer system.											Applying (K3)
CO3	apply deadlock detection and handling methods											Applying (K3)
CO4	make use of memory management strategies and apply page replacement policies to address demand paging											Applying (K3)
CO5	apply the various file handling strategies to manage files on a secondary storage structure and in a distributed environment.											Applying (K3)

Mapping of COs with POs and PSOs

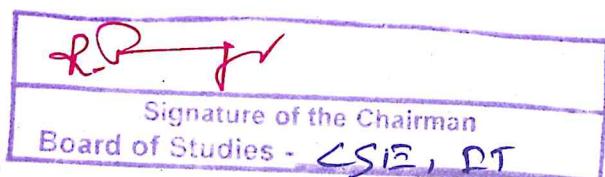
COs/POs/ PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1								3	1
CO2	3	2	1	1								3	1
CO3	3	2	1	1								3	1
CO4	3	2	1	1								3	1
CO5	3	2	1	1								3	1

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	80	20				100
CAT2	-	50	50				100
CAT3	-	50	50				100
ESE	-	60	40				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)



24ADT43 - DATABASE MANAGEMENT SYSTEMS									
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)									
Programme & Branch	B.Tech – Artificial Intelligence and Data Science & B.Tech. Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	4	PC	45	0	0	45	90	3
Preamble	The course provides an emphasis on how to organize, maintain and retrieve information from a database management system more efficiently and effectively.								
Unit – I	Basics of Database and Relational Model:								
	Introduction – Database System Applications – Purpose of database systems – View of data – Database Languages Database Architecture – Database Users and administrators – Relational Model – Structure of Relational Databases – Database Schema– Keys – Schema Diagrams – Relational Query Languages – Relational Algebra.								
Unit – II	SQL and Database Design:								
	SQL: Basic structure – Operations – Aggregate Functions – Nested Sub queries – Modification of the database – Intermediate SQL: Joins – Views– Integrity Constraints – SQL data types and schemas – Index– Authorization- Database Design: ER model – Constraints – ER diagrams – Reduction to Relational Schema – ER design issues.								
Unit – III	Relational Database Design:								
	Features of good relational designs – Functional dependency – Decomposition using functional dependencies – Normal Forms: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.								
Unit – IV	Indexing and Query Processing:								
	Ordered indices– B+ Tree index files– B tree index files – Multiple key access– Bitmap indices – Overview of Query Processing- Measures of Query cost.								
Unit – V	Transactions:								
	Transaction concept – Transaction model –Storage structure – Transaction atomicity and durability – Isolation – Serializability– Conflict Serializability–View Serializability–Concurrency control: Lock-based Protocols–Deadlock Handling.								
TEXT BOOK:									
1.	Silberschatz Abraham, Korth Henry F. and Sudarshan S., "Database System Concepts", 7th Edition, McGraw Hill, New York, 2019.								
REFERENCES:									
1.	Elmasri Ramez and Navathe Shamkant B., "Fundamental Database Systems", 6th Edition, Pearson Education, New Delhi, 2010.								
2.	Date C.J., Kannan A. and Swamynathan S., "An Introduction to Database Systems", 8th Edition, Pearson Education, New Delhi, 2006.								

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)	
CO1	design a relational model for a given application										Applying (K3)	
CO2	design an ER model and write SQL queries for a given scenario										Applying (K3)	
CO3	design a relational database using normalization methods for a given application										Applying (K3)	
CO4	apply indexing techniques in the design of relational database										Applying (K3)	
CO5	apply the concept of concurrency control in transaction processing										Applying (K3)	

Mapping of COs with POs and PSOs

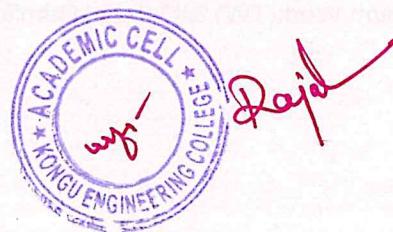
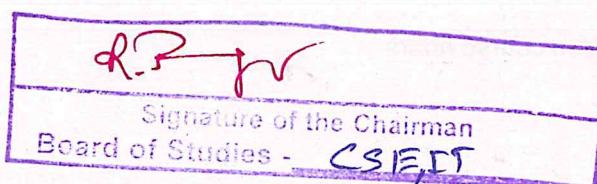
COs/POs PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	2						2	3	1
CO2	3	2	2	2	2						2	3	1
CO3	3	2	2	2	2						2	3	1
CO4	3	2	2	2	2						2	3	1
CO5	3	2	2	2	2						2	3	1

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	45	55				100
CAT2	-	35	65				100
CAT3	-	40	60				100
ESE	-	40	60				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)



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24ADC41 - WEB TECHNOLOGY									
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)									
Programme & Branch	B.Tech – Artificial Intelligence and Data Science & B.Tech - Artificial Intelligence and Machine Learning	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	4	PC	45	0	30	45	120	4
Preamble	This course provides a concise introduction to the fundamental concepts of data analysis using Power BI								
Unit – I	JavaScript: Introduction – Operators – Control Structures – Repetition – break and continue. Functions: Function Definition – Scope Rules – Recursion. Array: Basics – Growing Arrays – Passing Arrays to Function –map-filter - reducer- Event Handling – DOM – Local Storage.								
Unit – II	Advanced JavaScript: Error handling – try -catch –finally -Callback – Callback hell – promises – await and async – Destructuring objects- OOPS- this keyword – closures- Lexical scope - API Integration with AXIOS.								
Unit – III	Server-side JS Framework: Node JS: Introduction – Architecture – Features – Creating Web Servers with HTTP Request – Response – Event Handling –GET and POST Methods – Modules – Express: Routing – Middleware – Error Handling. MongoDB: Basics- Connect to NoSQL Database using Node JS – Implementation of CRUD operations.								
Unit – IV	ReactJS – Features: React: Introduction – Installation – createReact app - components — importing and exporting components - props – props validation – conditional rendering - managing state - component Life cycle -- Events - React Router -- map -List – keys.								
Unit – V	ReactJS - Hooks: Introduction to hooks - Rules of hook - Building hooks- useState – useEffect – useReducer – useRef – useContext -- Forms –controlled and uncontrolled component - Hooks API integration.								
LIST OF EXPERIMENTS / EXERCISES:									
1.	Perform form validation using JavaScript.								
2.	Integrate API in a webpage using JavaScript.								
3.	Design a web application using HTTP Request and HTTP Response.								
4.	Develop an application using GET and POST method in NodeJS.								
5.	Implement CRUD operations using MongoDB and NodeJS.								
6.	Design a web application using components, modules and router in React.								
7.	Mini Project: Design and develop web application using client-side framework react and host it free hosting service.								
TEXT BOOK:									
1.	Paul Deitel, Harvey M.Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", 5th Edition, Prentice Hall, 2011 for Unit I.								
2	https://developer.mozilla.org/en-US/docs/Web/JavaScript for Unit II.								
3	Infosys campus connect material shared by infy for Unit III.								
4	https://react.dev/learn for Units IV and V.								
REFERENCES/ MANUAL / SOFTWARE:									
1.	Wieruch, Robin, "The Road to Learn React: Your Journey to Master Plain Yet Pragmatic React. Js.", 1st Edition, Germany, Lean Publishing, 2017.								
2.	Operating System : Windows/Linux								
3.	Software: MongoDB, NodeJS, Express and React								
4.	Laboratory Manual								

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)
CO1	develop an interactive and dynamic web pages using JavaScript.										
CO2	apply JavaScript features and integrate API in a website.										
CO3	create a web application using NodeJS with database connectivity.										
CO4	Make use of react features to create components, modules and state management.										
CO5	Build a web application for real world problems using React Library.										

Mapping of COs with POs and PSOs

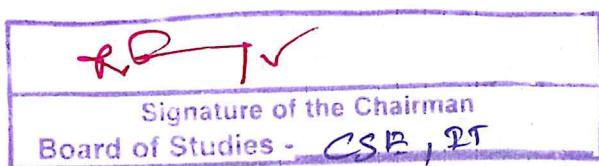
COs/POs/ PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	1							3	1
CO2	3	2	2	2	1							3	1
CO3	3	2	2	2	1							3	1
CO4	3	2	2	2	1							3	1
CO5	3	2	2	2	1							3	1

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	30	70				100
CAT2	-	20	80				100
CAT3	-	20	80				100
ESE	-	20	80				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)



Rajesh



24ALC41- DEEP LEARNING									
(Common to Artificial Intelligence and Data Science & Artificial Intelligence and Machine Learning branches)									
Programme & Branch	B.Tech – Artificial Intelligence and Data Science & B.Tech. Artificial Intelligence and Machine Learning	Sem	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	4	PC	45	0	30	45	120	4
Preamble	This course is designed to impart the skills required to build different deep neural network architectures								
Unit – I	Perceptron and Gradient Based Learning:								9
	Perceptron: Two-Input Perceptron - The Perceptron Learning Algorithm -Limitations of the Perceptron -Combining Multiple Perceptrons - Implementing Perceptrons with Linear Algebra - Bias Term. Gradient-Based Learning: Intuitive Explanation of the Perceptron Learning Algorithm - Derivatives and Optimization Problems - Solving a Learning Problem with Gradient Descent - Constants and Variables in a Network - Analytic Explanation of the Perceptron Learning Algorithm - Perceptron to Identify Patterns								
Unit – II	Sigmoid Neurons And Backpropagation: Modified Neurons to Enable Gradient Descent for Multilevel Networks - Activation Function - Function Composition and the Chain Rule - Using Backpropagation to Compute the Gradient - Backpropagation with Multiple Neurons per Layer - Programming Example: Learning the XOR Function - Network Architectures. Classification: Datasets used in training network - Hyperparameter Tuning and Test Set Information Leakage - Training and Inference - Extending the Network and Learning Algorithm for Multiclass Classification - Network for Digit Classification - Loss Function for Multiclass Classification - Programming Example: Classifying Handwritten Digits - Mini-Batch Gradient Descent								9
Unit – III	DL frameworks: Programming Example: Moving to a DL Framework - The Problem of Saturated Neurons and Vanishing Gradients - Initialization and Normalization Techniques to Avoid Saturated Neurons - Cross-Entropy Loss Function to Mitigate Effect of Saturated Output Neurons - Different Activation Functions to Avoid Vanishing Gradient in Hidden Layers - Experiment: Tweaking Network and Learning Parameters - Hyperparameter Tuning and Cross-Validation. Regression: Output Units- The Boston Housing Dataset - Programming Example: Predicting House Prices with a DNN - Improving Generalization with Regularization - Experiment: Deeper and Regularized Models for House Price Prediction								9
Unit – IV	CNN: The CIFAR-10 Dataset - Characteristics and Building Blocks for Convolutional Layers - Combining Feature Maps into a Convolutional Layer - Combining Convolutional and Fully Connected Layers into a Network - Effects of Sparse Connections and Weight Sharing - Programming Example: Image Classification with a Convolutional Network.								9
Unit – V	Recurrent Neural Networks: Limitations of Feedforward Networks - Recurrent Neural Networks - Mathematical Representation of a Recurrent Layer - Combining Layers into an RNN - Alternative View of RNN - Backpropagation Through Time - Programming Example: Forecasting Book Sales - Dataset Considerations for RNNs. LONG SHORT-TERM MEMORY: Introduction to LSTM - LSTM Activation Functions - Creating a Network of LSTM Cells - Alternative View of LSTM - Encoding Text- Longer-Term Prediction and Autoregressive Models- Beam Search- Programming Example: Using LSTM for Text Autocompletion								9
LIST OF EXPERIMENTS / EXERCISES:									
1.	Implement XOR function using DNN								
2.	Create a multi-layer neural network for chosen dataset.								
3.	Implement a Deep Neural Networks(DNN) for regression problems								
4.	Implement Convolutional neural networks and use them to classify images								
5.	Implement Recurrent neural networks for prediction problems								
6.	Implement LSTM to predict next word								
7.	Develop a mini project using DL Architectures								
TEXT BOOK:									
1.	Magnus Ekman, Learning Deep Learning: Theory and Practice of Neural Networks, Computer Vision, NLP, and Transformers using TensorFlow, Addison –Wesley, 1st edition, 2021								
REFERENCES:									
1.	Aggarwal, Charu C, "Neural Networks and Deep learning", Springer Cham, 1st Edition, 2018.								
2.	Lovelyn, S., Rose, L. Ashok kumar, D. KarthikaRenuka, Deep Learning using Python, Wiley India Pvt. Ltd., First Edition, 2019..								
3.	Operating System : Windows/Linux								
4.	Software: Python								

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	make use of perceptron and Gradient-Based Learning for classification	Applying (K3) Precision(S3)
CO2	make use of back propagation and classification to solve real world problems	Applying (K3) Precision(S3)
CO3	apply different deep learning frameworks to solve real world problems	Applying (K3) Precision(S3)
CO4	exemplify the concepts of CNN models and apply it for solving computer vision related problems	Applying (K3) Precision(S3)
CO5	explicate the concepts of RNN models and apply it for solving Natural Language problems	Applying (K3) Precision(S3)

Mapping of COs with POs and PSOs

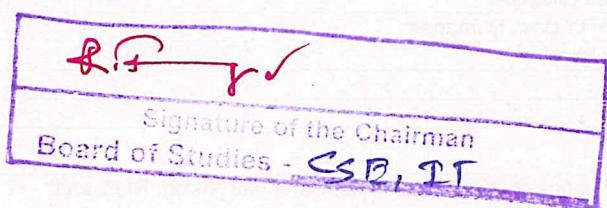
COs/POs /PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	3		2							2	2
CO2	3	2	3		2							2	2
CO3	3	2	3		2							2	2
CO4	3	2	3		2							2	2
CO5	3	2	3		2							2	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	40	60				100
CAT2	-	40	60				100
CAT3	-	40	60				100
ESE	-	40	60				100

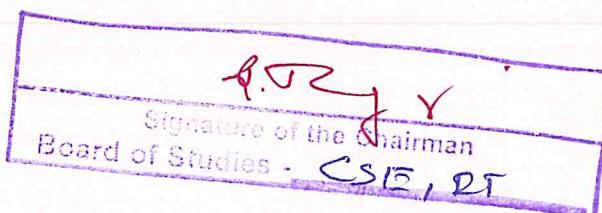
* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)



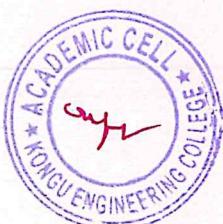
24ADL41 – DATABASE MANAGEMENT SYSTEMS LABORATORY													
(Common to Artificial Intelligence and Machine Learning & Artificial Intelligence and Data Science branches)													
Programme & Branch	B.Tech. Artificial Intelligence and Machine Learning & B.Tech. Artificial Intelligence and Data Science			Sem	Category	L	T	P	SL*	Total	Credit		
Prerequisites	NIL			4	PC	0	0	30	0	30	1		
Preamble	This course provides hands-on experience in applying machine learning algorithms for real world problems.												
LIST OF EXPERIMENTS / EXERCISES:													
1.	Demonstrate Data Definition Language and integrity constraints.												
2.	Demonstrate Data Manipulation Language commands.												
3.	Demonstrate Data Control Language and Transaction Control Language commands.												
4.	Execute nested and sub queries in SQL.												
5.	Demonstrate Join operations in SQL.												
6.	Create Views and index and perform SQL operations in it.												
7.	Implement Cursors and its types												
8.	Implement Triggers and its operations.												
9.	Demonstrate the concept of looping using PL/SQL statements.												
10.	Develop Procedures and Functions to perform operations in SQL.												
REFERENCES/ MANUAL /SOFTWARE:													
1.	Front End: Microsoft .NET Framework SDK v2.0, Java etc.,												
2.	Back End: ORACLE / MYSQL												
3.	Manuals: https://docs.oracle.com/cd/E11882_01/server.112/e41085.pdf												
4.	Laboratory Manual												
COURSE OUTCOMES: On completion of the course, the students will be able to										BT Mapped (Highest Level)			
CO1	develop SQL commands to create and manipulate databases									Applying (K3) Precision (S3)			
CO2	execute queries using concepts of PL/SQL									Applying (K3) Precision (S3)			
CO3	execute queries using the concepts of triggers and cursors in PL/SQL									Applying (K3) Precision (S3)			
Mapping of Cos with POs and PSOs													
COs/POs /PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	2				2	2	1	3	2
CO2	3	3	2	2	2				2	2	1	3	2
CO3	3	2	2	2	2				2	2	1	3	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

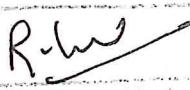
*includes Term Work(TW) & Online / Certification course hours



Rajal



24EGL41 - COMMUNICATION SKILLS LABORATORY																						
(Common to all Engineering and Technology branches)																						
Programme & Branch		All B.E/B.Tech branches		Sem	Category	L	T	P	S L*	Total	Credit											
Prerequisites		NIL		4 / 5	HS	0	0	30	0	30	1											
Preamble	This course is designed to impart necessary skills to listen, speak, read and write in order to acquire better professional communication skills, soft skills and verbal aptitude skills.																					
LIST OF EXPERIMENTS / EXERCISES:																						
1.	Self Introduction & Mock Interviews																					
2.	Resume Writing – One Page Resumes and Conventional Resumes																					
3.	Reading Aloud: Techniques and Practices																					
4.	Presentation: Technical Topics/Case Studies																					
5.	Situational Dialogues/Conversational Practices																					
6.	Group Discussions																					
7.	Book/Movie Reviews																					
8.	Soft Skills (Computer Based Test)																					
9.	Listening Test (Computer Based Test)																					
10.	Verbal Aptitude (Computer Based Test)																					
REFERENCES/MANUAL/SOFTWARE:																						
1.	Lab Manual																					
2.	Orell Talk Corporate Language Lab Software																					
COURSE OUTCOMES: On completion of the course, the students will be able to																						
CO1	acquire career-related soft skills and verbal skills								BT Mapped (Highest Level)													
CO2	enhance essential professional and workplace communication skills								Understanding (K2), Imitation (S1)													
CO3	communicate effectively in English in different contexts								Applying (K3), Naturalization (S5)													
Applying (K3), Articulation (S4)																						
Mapping of Cos with POs and PSOs																						
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2									
CO1								2	3		1											
CO2								2	3		2											
CO3								2	3		2											
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy																						


 Signature of the Chairman
 Board of Studies - S & H (English)

J. Rajiv



24GCL41 - PROFESSIONAL SKILLS TRAINING – I																						
(Common to all Engineering & Technology Branches)																						
Programme & Branch	All B.E/B.Tech Branches			Sem.	Category	L	T	P	SL*	Total	Credit											
Prerequisites	Nil			4	EC	0	0	45	35	80	2											
Preamble	This subject is to enhance the employability skills and to develop career competency.																					
Unit – I	Soft Skills - I																					
Soft skills and its importance: Pleasure and pains of transition from an academic environment to work environment-Need for change- Fear, stress and competition in the professional world-Importance of positive attitude- Self motivation and continuous knowledge upgradation-Self-confidence. Professional grooming and practices: Basics of corporate culture-Key pillars of business etiquette- Basics of etiquette-Introductions and greetings-Rules of the handshake, earning respect, business manners-Telephone etiquette- Body Language.																						
Unit – II	Quantitative Aptitude & Logical Reasoning - I																					
Problem solving level I: Quantitative Aptitude: Numbers, H.C.F. and L.C.M. of Numbers, Square Root and Cube Root, Simplification, Percentage, Average, Ratio and Proportion, Partnership, Profit and Loss, Alligation or Mixture, Permutations and Combinations, Probability. Logical Reasoning : Series, Analogy, Coding Decoding, Directions Decision Making, Blood Relations.																						
TEXT BOOK:																						
1.	Nishit Sinha, Dinesh Khattar& Showick Thorpe, "Placement Training Companion: Think. Solve. Succeed", Pearson Education 2025																					
REFERENCES:																						
1.	Dr. R.S. Agarwal, "Quantitative Aptitude for Competitive Examinations". S. Chand publications New Delhi, 2025.																					
2.	Gopalaswamy Ramesh & Mahadevan Ramesh - The Ace of Soft Skill: Attitude, Communication and Etiquette for Success, Pearson Education, 2024.																					
COURSE OUTCOMES:																						
On completion of the course, the students will be able to																						
CO1	develop the soft skills of learners to support them work efficiently in an organization as an individual and as a team.																					
CO2	solve real time problems using numerical ability.																					
CO3	solve basic problems in logical reasoning by applying standard problem-solving techniques.																					
Mapping of COs with POs and PSOs																						
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11											
CO1	3	2				3		3		3	2											
CO2	3	2				3		3		3	2											
CO3	3	2				3		3		3	2											
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy																						
ASSESSMENT PATTERN - THEORY																						
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %															
CAT1		50	50				100															
CAT2		50	50				100															
CAT3		50	50				100															
ESE	NA																					
* ±3% may be varied (CAT 1, 2 & 3 – 50 marks)																						

<i>RGP ✓</i>
Signature of the Chairman
Board of Studies - CSE



(C.N. SHANTHA)