



SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institution | Approved by AICTE | Affiliated to Anna University | Accredited by NAAC with A++ Grade
Kuniamuthur, Coimbatore – 641008

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

CURRICULUM AND SYLLABI

B.TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

REGULATION 2022 (BATCH: 2024 – 2028)



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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

**REGULATION 2022
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B.TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

ABOUT THE DEPARTMENT

VISION

To produce globally competitive professionals in Artificial Intelligence and Data Science by imparting cognitive learning and encouraging industry collaboration towards serving the greater cause of society.

MISSION

1. Impart knowledge in cutting edge Artificial Intelligence and Data Science technologies in par with industrial standards.
2. Inculcate research and lifelong learning that benefit society at large.
3. Promote ethical values and entrepreneurial skills.

PROGRAMME OUTCOMES (POs)

Artificial Intelligence and Data Science Graduates will be able to:

PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 - Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 - Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 - The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 - Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 - Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 - Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11- Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 - Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1:

To build a successful career in IT/relevant industry or carryout research in advance areas of Artificial Intelligence, Data Science and address various issues in the society.

PEO 2:

To develop problem solving skills and ability to provide solution for real time problems.

PEO 3:

To develop the ability and attitude of adapting themselves to emerging technological Challenges.

PEO 4:

To excel with excellent communication skills, leadership qualities and social responsibilities.

PROGRAMME SPECIFIC OBJECTIVES (PSO)

PSO 1:

Understand, analyze and develop innovative solutions for real world problems in industry and research establishments related to Artificial Intelligence and Data Science.

PSO 2:

Ability to choose or develop the right tool for Data analysis and develop high end intelligent systems.

PSO 3:

Apply programming principles and practices for developing software solutions to meet future business and society needs.

Mapping of PO's to PEO's

Programme Educational Objectives (PEO)	Program Outcomes (PO)											
	1	2	3	4	5	6	7	8	9	10	11	12
PEO1	3	3	3	3	3	3	3	2	1	2	2	3
PEO2	3	3	3	3	3	2	2	2	2	3	3	3
PEO3	1	3	1	2	3	2	3	1	1	2	2	2
PEO4	1	1	3	2	1	3	3	3	3	3	3	1

Mapping of PO's to PSO's

Programme Specific Outcomes (PSO)	Programme Outcomes (PO)											
	1	2	3	4	5	6	7	8	9	10	11	12
PSO1	3	3	3	3	1	2	1	1	1	2	2	2
PSO2	3	3	3	1	3	1	1	1	2	2	2	3
PSO3	3	3	3	1	1	3	3	2	3	2	2	3

Mapping of PSO's & PEO's

Programme Specific Outcomes (PSO)	Programme Educational Objectives (PEO)			
	PEO1	PEO2	PEO3	PEO4
PSO1	3	3	2	2
PSO2	3	3	2	1
PSO3	3	2	3	3

1	Reasonably agreed	2	Moderately agreed	3	Strongly agreed
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B. TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
REGULATION 2022 (Batch: 2024 – 2028)

SEMESTER I								
S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category	
1.	23MA101	Mathematics I	3/1/0	4	4	60/40	BSC	
2.	23AS101	Applied Science	4/0/0	4	4	60/40	BSC	
3.	23EC111	Digital Logic Design and Computer Architecture	3/1/0	4	4	60/40	ESC	
4.	23TA101	Heritage of Tamils/ தமிழர் மரபு	1/0/0	1	1	60/40	HSMC	
5.	23IT101	Application Development Practices	1/0/4	5	3	50/50	ESC	
6.	23CS101	Problem Solving using C++	1/0/4	5	3	50/50	ESC	
7.	23AS102	Applied Science Laboratory	0/0/4	4	2	40/60	BSC	
8.	23MC101	Mandatory Course-I (Induction Programme)	3 weeks					MC
Total				27	21	800		

SEMESTER II							
S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1.	23MA201	Mathematics II	3/1/0	4	4	60/40	BSC
2.	23TA201	Tamils and Technology / தமிழரும் தொழில்நுட்பமும்	1/0/0	1	1	60/40	HSMC
3.	23AD201	Artificial Intelligence and Machine Learning Basics	3/1/0	4	4	60/40	PC
4.	23EN101	Oral and Written Communication Skills	2/0/2	4	3	50/50	HSMC
5.	23CS201	Data Structures and Algorithms	1/0/4	5	3	50/50	PC
6.	23CD201	Database Management Systems	1/0/4	5	3	50/50	PC
7.	23CY203	Programming in Java	1/0/4	5	3	50/50	PC
8.	23MC102	Mandatory Course II – Environmental Science	1/0/0	1	0	0/100	MC
Total				29	21	800	

SEMESTER III							
S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1.	23MA301	Mathematical Foundations for Computer Science	3/1/0	4	4	60/40	BSC
2.	23GE301	Universal Human Values	3/0/0	3	3	60/40	HSMC
3.	23AD304	Data Visualization	3/0/0	3	3	60/40	PC
4.	23IT301	Web Technology using React	1/0/4	5	3	50/50	PC
5.	23CS302	Python Programming	1/0/4	5	3	50/50	PC
6.	23AD302	Data Warehousing and Data Mining	3/0/2	5	4	50/50	PC
7.	23AD305	Data Visualization Laboratory	0/0/3	3	1.5	40/60	PC
8.	23MCXXX	Mandatory Course III	1/0/0	1	0	0/100	MC
Total				29	21.5	800	

SEMESTER IV							
S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1.	23AD401	Data Engineering	3/1/0	4	4	60/40	PC
2.	23CS403	Computer Networks	3/0/2	5	4	50/50	ESC
3.	23AD402	Design and Analysis of Algorithms	1/0/4	5	3	50/50	PC
4.	23AD403	Managing Cloud and Containerization	1/0/4	5	3	50/50	PC
5.	23CY202	Operating Systems	3/0/2	5	4	50/50	PC
6.	23IT402	Web Frameworks using REST API	0/0/4	4	2	40/60	PC
7.	23ME305	Design Thinking and Idea Lab	0/0/2	2	1	40/60	HSMC
Total				30	21	700	

SEMESTER V							
S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1.	23XXXXXX	Entrepreneurships and Startups	3/0/0	3	3	60/40	HSMC
2.	23AD9XX	Professional Elective – I	3/0/0	3	3	60/40	PEC

3.	23XXXXX	Open Elective – I	3/0/0	3	3	60/40	OEC
4.	23AD501	Machine Learning Models	3/0/2	5	4	50/50	PC
5.	23AD502	Data Science Using R	3/0/2	5	4	50/50	PC
6.	23AD9XX	Professional Elective – II	3/0/0 or 0/0/6	3/6	3	60/40 or 40/60	PEC
7.	23AD503	Mini Project - I	0/0/4	4	2	40/60	PW
Total				26/29	22	700	

SEMESTER VI

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1.	23AD601	Virtual Reality and Augmented Reality	3/1/0	4	4	60/40	PC
2.	23AD9XX	Professional Elective – III	3/0/0	3	3	60/40	PEC
3.	23AD9XX	Professional Elective – IV	3/0/0	3	3	60/40	PEC
4.	23ADXXX	Emerging Elective – I	3/0/0	3	3	60/40	EEC
5.	23AD602	Deep Learning and its Applications	3/0/2	5	4	50/50	PC
6.	23AD603	Natural Language Processing	3/0/2	5	4	50/50	PC
7.	23AD604	Mini Project - II	0/0/4	4	2	40/60	PW
Total				27	23	700	

SEMESTER VII

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1.	23IT702	Internet of Things	3/0/0	3	3	60/40	ESC
2.	23XXXXX	Principles of Management	3/0/0	3	3	60/40	HSMC
3.	23AD9XX	Professional Elective – V	3/0/0	3	3	60/40	PEC
4.	23AD9XX	Professional Elective – VI	3/0/0	3	3	60/40	PEC
5.	23XXXXX	Open Elective – II	3/0/0	3	3	60/40	OEC
6.	23ADXXX	Emerging Elective – II	3/0/0	3	3	60/40	EEC

7.	23IT703	Internet of Things Laboratory	0/0/3	3	1.5	40/60	ESC
8.	23EES01	Employability Enhancement Skills (Summer Internship / Summer Training – 4 weeks)			2	0/100	EES
Total				21	21.5	800	

SEMESTER VIII

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1	23AD801	Project	0/0/24	24	12	40/60	PW
Total				24	12	100	

HUMANITIES (15 CREDITS)

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Category
1	23EN101	Oral and Written Communication Skills	2/0/2	4	3	HSMC
2	23TA101	Heritage of Tamils/ தமிழர்மரபு	1/0/0	1	1	HSMC
3	23TA201	Tamils and Technology/ தமிழரும் தொழில்நுட்பமும்	1/0/0	1	1	HSMC
4	23GE301	Universal Human Values	3/0/0	3	3	HSMC
5	23XXXXX	Principles of Management	3/0/0	3	3	HSMC
6	23ME305	Design Thinking and Idea Lab	0/0/2	2	1	HSMC
7	23XXXXX	Entrepreneurships and Startups	3/0/0	3	3	HSMC

BASIC SCIENCES (18 CREDITS)

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Category
1	23AS101	Applied Science	4/0/0	4	4	BSC
2	23MA102	Mathematics I	3/1/0	4	4	BSC
3	23AS102	Applied Science Laboratory	0/0/4	4	2	BSC
4	23MA202	Mathematics II	3/1/0	4	4	BSC
5	23MA302	Mathematical Foundations for Computer Science	3/1/0	4	4	BSC

ENGINEERING SCIENCE (18.5 CREDITS)

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Category
1.	23EC111	Digital Logic Design and Computer Architecture	3/1/0	4	4	ESC
2.	23IT101	Application Development Practices	1/0/4	5	3	ESC
3.	23CS101	Problem Solving using C++	1/0/4	5	3	ESC
4.	23AD404	Networking and Communication	3/0/2	5	4	ESC
5.	23IT702	Internet of Things	3/0/0	3	3	ESC
6.	23IT703	Internet of Things Laboratory	0/0/3	3	1.5	ESC

PROFESSIONAL CORE (63.5 CREDITS)

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Category
1.	23AD201	Artificial Intelligence and Machine Learning Basics	3/1/0	4	4	PC
2.	23CS201	Data Structures and Algorithms	1/0/4	5	3	PC
3.	23CD201	Database Management Systems	1/0/4	5	3	PC
4.	23CY203	Programming in Java	1/0/4	5	3	PC
5.	23AD304	Data Visualization	3/0/0	3	3	PC
6.	23AD305	Data Visualization Laboratory	0/0/3	3	1.5	PC
7.	23IT301	Web Technology using React	1/0/4	5	3	PC
8.	23CS302	Python Programming	1/0/4	5	3	PC
9.	23AD302	Data Warehousing and Data Mining	3/0/2	5	4	PC
10.	23AD401	Data Engineering	3/1/0	4	4	PC
11.	23AD402	Design and Analysis of Algorithms	1/0/4	5	3	PC
12.	23AD403	Managing Cloud and Containerization	1/0/4	5	3	PC
13.	23IT402	Web Frameworks using REST API	0/0/4	4	2	PC

14.	23CY202	Operating Systems	3/0/2	5	4	PC
15.	23AD501	Machine Learning Models	3/0/2	5	4	PC
16.	23AD502	Data Science Using R	3/0/2	5	4	PC
17.	23AD601	Virtual Reality and Augmented Reality	3/1/0	4	4	PC
18.	23AD602	Deep Learning and its Applications	3/0/2	5	4	PC
19.	23AD603	Natural Language Processing	3/0/2	5	4	PC

PROFESSIONAL ELECTIVES (18 CREDITS)

VERTICAL - I CLOUD COMPUTING AND DATA STORAGE TECHNOLOGIES

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credits	Category
1.	23CD901	Data Virtualization	0/0/6	3	3	PEC
2.	23IT901	Cloud Services and Integration	3/0/0	3	3	PEC
3.	23CY901	Security and Privacy in Cloud	3/0/0	3	3	PEC
4.	23AD901	Storage Technologies	3/0/0	3	3	PEC
5.	23CS901	Software Defined Networks	3/0/0	3	3	PEC
6.	23CB901	Stream Processing	3/0/0	3	3	PEC

VERTICAL - II APPLIED AI

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credits	Category
1.	23IT911	Intelligent Multiagent and Expert Systems	3/0/0	3	3	PEC
2.	23AD911	App Development	0/0/6	6	3	PEC
3.	23CY911	ETL Tools	3/0/0	3	3	PEC
4.	23CS911	Statistical Pattern Recognition	3/0/0	3	3	PEC
5.	23CD911	Stochastic and Network Control	3/0/0	3	3	PEC
6.	23AD912	Bayesian Data Analysis	3/0/0	3	3	PEC

VERTICAL - III INFORMATION SECURITY

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credits	Category
1.	23IT921	Cyber Threats and Vulnerabilities	3/0/0	3	3	PEC
2.	23IT922	Cyber Physical Systems	3/0/0	3	3	PEC
3.	23IT923	Ethical Hacking and Auditing Frameworks	3/0/0	3	3	PEC
4.	23CY921	Data Privacy and Security	3/0/0	3	3	PEC
5.	23CY922	Cyber Crime and Forensics	3/0/0	3	3	PEC
6.	23CY923	Digital and Mobile Forensics	3/0/0	3	3	PEC

VERTICAL – IV NEXT GENERATION AI

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credits	Category
1.	23AD931	Generative AI	3/0/0	3	3	PEC
2.	23AD932	Quantum Artificial Intelligence	3/0/0	3	3	PEC
3.	23AD933	Prompt Engineering	3/0/0	3	3	PEC
4.	23AD934	Intelligent Robotic Automation	3/0/0	3	3	PEC
5.	23AD935	Advanced Machine Learning	3/0/0	3	3	PEC
6.	23AD936	Explainable AI	3/0/0	3	3	PEC
7.	23AD937	AI for Humanity	3/0/0	3	3	PEC
8.	23AD938	Autonomous Vehicles and Drones	3/0/0	3	3	PEC
9.	23AD939	AI for Remote Sensing	3/0/0	3	3	PEC

VERTICAL - V DATA SCIENCE

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credits	Category
1.	23AD941	Predictive Analytics	3/0/0	3	3	PEC

2.	23AD942	Information Extraction and Retrieval	3/0/0	3	3	PEC
3.	23AD943	Computational Statistics for Data Science	3/0/0	3	3	PEC
4.	23AD944	Ethics in Data Science	3/0/0	3	3	PEC
5.	23AD945	Video Analytics	3/0/0	3	3	PEC
6.	23AD946	Web and Social Media Mining	3/0/0	3	3	PEC
7.	23AD947	Business Analytics	3/0/0	3	3	PEC
8.	23AD948	Speech Processing	3/0/0	3	3	PEC
9.	23AD949	Risk Analytics	3/0/0	3	3	PEC

VERTICAL - VI EXTENDED REALITY

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credits	Category
1.	23AD951	Virtual Reality in Game Development	3/0/0	3	3	PEC
2.	23AD952	Augmented Reality and Video Streaming	3/0/0	3	3	PEC
3.	23AD953	APP Development using VRAR	3/0/0	3	3	PEC
4.	23AD954	Extended Reality for UX/UI Design	3/0/0	3	3	PEC
5.	23AD955	Metaverse Technologies	3/0/0	3	3	PEC
6.	23AD956	Virtual Reality Design and Communication	3/0/0	3	3	PEC
7.	23AD957	3D Modeling using VR	3/0/0	3	3	PEC
8.	23AD958	Sensors and Actuators in AR/VR	3/0/0	3	3	PEC
9.	23AD959	Mixed Reality and Advanced Systems	3/0/0	3	3	PEC

OPEN ELECTIVE COURSES (6 CREDITS)

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Category
1.	23AD001	Fundamentals of Data Structures	1/0/4	5	3	OEC
2.	23AD002	Information Retrieval Techniques	3/0/0	3	3	OEC

3.	23AD003	Machine Learning Algorithms in Python	3/0/0	3	3	OEC
4.	23AD004	Data Visualization using R	3/0/0	3	3	OEC
5.	23AD005	Data Science and Analytics	3/0/0	3	3	OEC
6.	23AD006	Deep Learning Essentials	3/0/0	3	3	OEC

EMERGING ELECTIVE COURSES (6 CREDITS)

S.No	Course Code	Course	L/T/P	Contact hrs/week	Credit	Category
1.	23AD007	Edge AI	3/0/0	3	3	EEC
2.	23AD008	Geospatial Data Science and Location Intelligence	3/0/0	3	3	EEC
3.	23AD009	Healthcare Analytics	3/0/0	3	3	EEC
4.	23AD010	Genomics Data Science	3/0/0	3	3	EEC
5.	23AD011	Responsible AI	3/0/0	3	3	EEC
6.	23AD012	Brain and Neuroscience	3/0/0	3	3	EEC

EMPLOYABILITY ENHANCEMENT SKILLS (2 CREDITS)

S.No	Course Code	Course	Duration	Credit	Category
1.	23EES01	Employability Enhancement Skills (Summer Internship / Summer Training)	4 WEEKS	2	EES

MANDATORY COURSES (NON-CREDIT)

S.No	Course Code	Course	Category
1.	23MC101	Induction Programme	MC
2.	23MC102	Environmental Sciences	MC
3.	23MC103	Soft Skills	MC
4.	23MC104	Management Organizational Behaviour	MC
5.	23MC105	General Aptitude	MC
6.	23MC106	Life Skills and Ethics	MC
7.	23MC107	Stress Management	MC
8.	23MC108	Constitution of India	MC
9.	23MC109	Essence of Indian Traditional Knowledge	MC
10.	23MC110	Biology	MC

VALUE ADDED COURSES

S.No	Course Code	Course	Category
1.	23VA701	Data Representation and Interpretation using Python	VAC
2.	23VA702	Android Enterprise	VAC
3.	23VA703	Chatbot Development	VAC
4.	23VA704	Hardware and Troubleshooting	VAC
5.	23VA705	Rapid Development for AI	VAC
6.	23VA706	Robotic Process Automation	VAC
7.	23VA707	Spark and Scala	VAC
8.	23VA130	Effective Communication Skills	VAC

Scheme of Distribution

S.NO	Stream	Credits/Semester								Credits	AICTE Norms
		I	II	III	IV	V	VI	VII	VIII		
1.	Humanities (HSMC)	1	4	3	1	3		3		15	15
2.	Basic Sciences(BSC)	10	4	4						18	23
3.	Engineering Sciences(ESC)	10			4			4.5		18.5	22
4.	Professional Core (PC)		13	14.5	16	8	12			63.5	54
5.	Professional Electives(PEC)					6	6	6		18	18
6.	Open Elective(OEC)					3		3		6	15
7.	Emerging Electives(EEC)						3	3		6	
8.	Project work (PW)					2	2		12	16	16
9.	Employability Skills							2		2	
10.	Mandatory Course (MC)									-	
Total		21	21	21.5	21	22	23	21.5	12	163	
AICTE(AI&DS)		18.5	23.5	27.5	20.5	22	17	18	16		163

23MA101	MATHEMATICS I		3/1/0/4
Nature of Course	J (Problem Analytical)		
Pre requisites	-		
Course Objectives:			
1	To use logical notation to define the fundamental data types and structures used in computer algorithms and systems.		
2	To use the concepts of graph theory in practical situations.		
3	To acquire thorough knowledge of fundamental notions of proof's and its application in Cryptography.		
4	To analyse data pertaining to discrete and continuous random variables to interpret the results.		
5	To impart the knowledge of counting principles, to think critically and apply it in real world problems.		
Course Outcomes (Theory)			
Upon completion of the course, students shall have ability to			
C101.1	Recall the basic concepts of logical laws, structures and probability.	[R]	
C101.2	Understand the concepts of proof techniques, structures and random variables.	[U]	
C101.3	Apply the logical and foundational structures of mathematics with an emphasis on writing proofs.	[AP]	
C101.4	Apply the concepts of graph and number theory in cryptography.	[AP]	
C101.5	Apply the probability concepts in transition from real problem to a probabilistic model.	[AP]	
Course Contents:			
MODULE I : LOGICAL PROOF'S & FUNCTIONS (20 Hrs)			
Proofs: Definitions - Proof by cases - Proof by contradiction - Logical formulas - Propositions - Truth table - Logical operators - Tautologies and Contradictions – Contrapositive - Equivalences and implications - Predicates - Free and bound variables – Quantifiers - Universe of discourse - Sets: Basic sets - Operations on Sets – Law on Sets (without proof) - Cartesian product of sets. Relations: Types of relations and their properties - Relational matrix and graph of a relation - Equivalence relations - Partial ordering relation - Graphical representation of relations - Binary relation - Functions: Classifications of functions – Induction - Ordinary induction and Strong induction - Recursive data types - Definition of recursive and structural induction.			
MODULE II : NUMBER THEORY & GRAPH THEORY (20 Hrs)			
Number Theory: Divisibility - Greatest common divisor - Euclid's algorithm - Prime numbers - Fundamental theorem of arithmetic - Modular arithmetic - Multiplicative inverses and cancelling - Relatively prime - Euler's theorem. Graph Theory: Vertices and Degrees - Types of graphs - Handshaking theorem - Adjacency matrices - Walks and paths - Directed acyclic graphs and scheduling – Isomorphism - Connectivity - Trees - Spanning trees - Minimum weight spanning trees - Prim's algorithm - Kruskal algorithm.			
MODULE III : COUNTING & PROBABILITY (20 Hrs)			
Sums and Asymptotics - Sums of Powers - Harmonic Numbers - Asymptotic Notation -The Division Rule - Counting Subsets - Sequences with Repetitions - The Pigeonhole Principle - Events and Probability Spaces - Set Theory and Probability - Conditional Probability - The Four-Step Method for Conditional Probability - The Law of Total Probability - Baye's theorem – Independence - Mutual Independence - Pairwise Independence - Random Variables - Distribution Functions - Bernoulli Distributions - Uniform Distributions - Binomial Distributions - Great Expectations - Conditional Expectation - Linearity of Expectation - Infinite Sums - Expectations of Products.			
Total Hours:			60
Text Books:			

1	Tremblay J.P and Manohar R, “Discrete Mathematical Structures with applications to Computer Science”, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30 th Reprint, 2011.
2	Koshy. T, “Elementary Number Theory with Applications”, Elsevier Publications, New Delhi, Second Edition, 2007.
3	Eric Lehman, F. Thomson Leighton and Albert R. Meyer, “Mathematics for Computer Science”, 14 th Edition, MIT Open courseware, 2018.

Reference Books:

1	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, —Discrete Mathematical Structures, sixth edition, Pearson Education Pvt Ltd., New Delhi, 2017
2	Kenneth H. Rosen, - Discrete Mathematics and its Applications, Eight Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, Eight Edition, 2021.
3	Thomas Koshy, —Discrete Mathematics with Applications, Elsevier Publications, 2004.
4	P. Grimaldi, - Discrete and Combinatorial Mathematics: An Applied Introduction, Fifth Edition, Pearson Education sia, New Delhi, Fifth Edition, 2019.

Web References:

1	https://onlinecourses.nptel.ac.in/noc23_cs109/preview
2	https://onlinecourses.nptel.ac.in/noc23_cs120/preview
3	https://onlinecourses.nptel.ac.in/noc23_ma77/preview
4	https://onlinecourses.nptel.ac.in/noc23_ma72/preview

Online Resources:

1	https://www.coursera.org/specializations/discrete-mathematics
2	https://www.cs.ucdavis.edu/~rogaway/classes/20/fall21/mit-book.pdf
3	https://mathworld.wolfram.com/topics/DiscreteMathematics.html
4	https://mathworld.wolfram.com/topics/NumberTheory.html

Assessment Methods & Levels (based on Blooms’ Taxonomy)

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms’ Taxonomy)

Formative Assessment based on Capstone Model

Course Outcome	Bloom’s Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C101.1	Remember	Quiz	20
C101.2	Understand	Presentation	20
C101.3 – C101.5	Apply	Tutorial	20
C101.3 – C101.5	Apply	Assignment	20

Assessment based on Summative and End Semester Examination

Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]			
	CIA1 : [60 Marks]	CIA2 : [60 Marks]				
Remember	20	20	20			
Understand	30	30	30			
Apply	50	50	50			
Analyse	-	-	-			
Evaluate	-	-	-			
Create	-	-	-			
Assessment based on Continuous and End Semester Examination						
Continuous Assessment (40%) [200 Marks]			End Semester Examination (60%) [100 Marks]			
CA 1: 100 Marks		CA 2: 100 Marks				
SA 1 (60 Marks)	FA 1 (40 Marks)			SA 2 (60 Marks)	FA 2 (40 Marks)	
	Component - I (20 Marks)	Component - II (20 Marks)			Component - I (20 Marks)	Component - II (20 Marks)

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)(Theory)																					
COs	POs												PSOs								
	a	b	c	d	e	f	g	h	i	j	k	l	1	2	3						
C101.1	1	1											1								
C101.2	2	2											1								
C101.3	3	3																			
C101.4	3	3											1								
C101.5	3	3																			
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>3</td> <td>Strongly agreed</td> <td>2</td> <td>Moderately agreed</td> <td>1</td> <td>Reasonably agreed</td> </tr> </table>																3	Strongly agreed	2	Moderately agreed	1	Reasonably agreed
3	Strongly agreed	2	Moderately agreed	1	Reasonably agreed																

23AS101	APPLIED SCIENCE		L/T/P/C
			4/0/0/4
Nature of Course		E (Theory based)	
Pre requisites		Nil	
Course Objectives:			
1	To learn the fundamental concepts of physics and apply this knowledge to both scientific and engineering problems.		
2	To make the students enrich basic knowledge in various fields such as Electrostatics and magnetism.		
3	To understand the principle and applications of electrochemistry and Polymer science, and explore the knowledge of various energy sources and storage devices.		
4	To understand the concepts of photophysical and photochemical processes in spectroscopy.		
Course Outcomes:			
Upon completion of the course, students shall have ability to			
C101.1	Understand the principles of electrostatics and problems relating to electric field and electric potential.		[U]
C101.2	Realize the nature of magnets, properties and the magnetic effect of electric current.		[U]
C101.3	Describe the nature of electromagnetic wave and its propagation through different media and interfaces involved in different situations.		[AP]
C101.4	Understand the principle and working of reference electrodes, energy storage devices and polymer products in engineering fields.		[U]
C101.5	Interpret the principle and working of analytical techniques.		[AP]
Course Contents:			
Electrostatics:		15 hours	
Charges and their conservation; Coulomb's law - superposition principle. Electric field – electric field due to a point charge, electric field lines; electric dipole, electric field intensity due to a dipole - behaviour of a dipole in a uniform electric field. Electric potential - potential difference - electric potential due to a point charge and dipole - equipotential surfaces – electrical potential energy of a system of two point charges. Electric flux-Gauss's law and its applications. Electrostatic induction-capacitor and capacitance – dielectrics- electric polarisation – parallel plate capacitor with and without dielectric – applications of capacitor – energy stored in a capacitor - Capacitors in series and in parallel – Van de Graaff generator.			
Magnetism:		15 hours	
Definitions of fundamental terms – Magnetic field around a current carrying conductor – Direction of magnetic field and current – Biot-Savart law and its application: Magnetic field due to Line charge – Ampere's law and its application: magnetic field due to a solenoid. Electromagnetic Induction and Alternating Current: Electromagnetic induction - Faraday's law - induced emf and current - Lenz's law. Self-induction - Mutual induction - self-inductance of a long solenoid - mutual inductance of two long solenoids. Methods of inducing emf - (i) by changing magnetic induction (ii) by changing area enclosed by the coil and (iii) by changing the orientation of the coil. AC generator - (Single phase, three phase). Eddy current - applications - transformer - Alternating current - AC circuit with resistance - AC circuit with inductor - AC circuit with capacitor - LCR series circuit - Resonance and Q - factor - power in AC circuits.			
Chemistry of Batteries and Polymers:		15 hours	
Chemistry of batteries -Introduction-Cells and its types-emf series-Nernst equation and its applications. Reference electrodes-standard hydrogen electrode, saturated calomel electrode, glass electrode-pH-measurement. Discussion of energy storage -Lead acid, Nickel cadmium and Lithium-ion batteries-Energy Sources-Fuel cells (H ₂ -O ₂). Polymers -Classifications-addition and			

condensation polymerization-free radical mechanism. **Atomic and molecular Spectroscopy:** Beer Lambert's law, principle, instrumentation, and applications of electronic spectroscopy (UV-visible), Vibrational and rotational spectroscopy (IR) and atomic spectrum-Flame emission spectroscopy (FES).

Total Hours: **45**

Text Books:

1	Rajendran, V "Engineering Physics" Mc Graw Hill Publications Ltd, New Delhi, 2017.
2	David Halliday, Robert Resnick, Jearl Walker "Fundamentals of Physics", 11 th edition, Wiley, 2018.
3	Gaur, R.K. and Gupta, S.L., "Engineering Physics", DhanpatRai Publishers, 2012.
4	Bhattacharya, D.K. and Poonam, T., "Engineering Physics II", Oxford University Press, 2017.
5	Dara S.S, Umare S.S, "Engineering Chemistry", First revised Edition by S. Chand & Company Ltd., New Delhi 2015.
6	Jain P. C. & Monica Jain., "Engineering Chemistry", 17 th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2020.
7	Fundamentals of Molecular Spectroscopy, 4 th Edition by C. N. Banwell Publishing McGraw-Hill Book Company (P) Ltd, England, 2017.

Reference Books:

1	Avadhanulu M.N., Kshirshagar P.G., Arun Murthy TVS "A Text Book of Engineering Physics" S.Chand & Co Ltd, 2018.
2	Sadiku M H, "Principles of Electromagnetics", Oxford University Press Inc., New Delhi, 2015
3	R. Wolfson, "Essential University Physics", Volume 1 & 2. Pearson, 2020.
4	S.O. Kasap, "Principles of Electronic Materials and Devices", McGraw Hill Education, 2017.
5	David Griffiths 'Introduction to Electrodynamics' 4th Edition, Cambridge University Press 2017.
6	Perez, Nestor, "Electrochemistry and Corrosion Science", Springer, 2016.
7	Ghazi A.Karim. "Fuels, Energy and the Environment", CRC Press, Taylor and Francis group, 2012.

Web References:

1	https://nptel.ac.in/courses/115101005
2	https://www.udemy.com/course/electrostatics-1-electric-charges-fields-and-related-laws/
3	https://openlearninglibrary.mit.edu/courses/course-v1:MITx+8.02.1x+1T2019/about
4	https://onlinecourses.nptel.ac.in/noc22_ph31/preview
5	https://ocw.mit.edu/courses/8-02t-electricity-and-magnetism-spring-2005/
6	https://unacademy.com/batch/legend-2o-for-jee-main-and-advanced-2022/7IXHRCZE/topics/WQCLD/courses/RAATL
7	https://archive.nptel.ac.in/courses/108/106/108106073/
8	https://www.kth.se/.../electrochem/welcome-to-the-division-of-applied-electrochemistry
9	www.corrosionsource.com/
10	https://www.sciencedirect.com/book/9780750646253/battery
11	http://www.rnlkwc.ac.in/pdf/study-material/chemistry/Spectroscopy
12	https://ocw.mit.edu/courses/chemistry
13	nptel.ac.in/courses/105106112/1_introduction/5_corrosion.pdf
14	https://ocw.mit.edu/courses/chemistry

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C101.1	Understand	Assignment - I	20
C101.2	Understand	Quiz - I	20
C101.3	Apply		
C101.4	Understand	Assignment - II	20
C101.5	Apply	Quiz - II	20
Assessment based on Summative and End Semester Examination			
Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1 : [60 Marks]	CIA2 : [60 Marks]	
Remember	30	30	30
Understand	50	50	50
Apply	20	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination						
Continuous Assessment (40%) [200 Marks]						End Semester Examination (60%) [100 Marks]
CA 1 : 100 Marks			CA 2 : 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component - I (20 Marks)	Component - II (20 Marks)		Component - I (20 Marks)	Component - II (20 Marks)	

Course Outcomes (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
C101.1	3	2	2		1							1	1			1
C101.2	3	2	2		1							1	1	1		1
C101.3	3	2	2	1	1							1	1	1		
C101.4	3	2	2		1							1	1			1
C101.5	3	2	2	1	1							1		1		1

23EC111	DIGITAL LOGIC DESIGN AND COMPUTER ARCHITECTURE	3/1/0/4
Nature of Course	G (Theory Analytical)	
Pre requisites	Nil	
Course Objectives:		
1.	To understand number systems, logic gates and boolean functions	
2.	To familiarize combinational and sequential logic circuits	
3.	To learn the basic structure and operations of a computer	
4.	To understand control unit design and memory organization	
5.	To discuss pipelining and parallelism and multicore architecture	
6.	To explore the I/O communication and interfacing	
Course Outcomes		
Upon completion of the course, students shall have ability to		
C111.1	Implement logic circuits and simplify Boolean functions.	[AP]
C111.2	Analyze combinational and sequential logic circuits.	[A]
C111.3	Interpret the design of control unit.	[U]
C111.4	Illustrate cache memory and virtual memory.	[AP]
C111.5	Examine parallelism in multicore and hazards in pipelining.	[AP]
C111.6	Distinguish the different ways of communication with I/O devices.	[U]
Course Contents:		
MODULE I Digital logic		20 Hours
Number Systems - Boolean algebra – Minimization of Boolean Functions using Karnaugh Maps – Implementation of Logic Circuits using Gates – Combinational Logic: Adder, Subtractor, Multiplexer, Demultiplexer, Encoders, Decoders – Sequential Logic: Flip flops, Registers, Counters – Finite State Machines.		
MODULE II Computer Organization		20 Hours
Basic Operational Concepts - Instruction Format – Instruction Sets - Addressing Modes - Design of CPU - Hardwired Control unit design - Micro Programmed Control unit design – Memory organization - Programmable Logic Array - Programmable Array Logic - Cache memory - Virtual Memory – Multicycle MIPS.		
MODULE III Pipelining and Communication		20 Hours
Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets, Data Path and Control Consideration, Superscalar Operation, Instruction Level Parallelism, Multicore Architecture. I/O Communication: Handshaking, Buffering, I/O techniques, Buses, Interrupts.		
		Total Hours: 60 hours
Text Books:		
1.	David Harris, Sarah L. Harris, “Digital Design and Computer Architecture”, 1 st Edition, Morgan Kaufmann, 2021.	
2.	M. Morris R. Mano, Michael D. Ciletti, “Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog”, 6th Edition, Pearson, 2019.	
3.	William Stallings, “Computer Organization & Architecture”, Pearson ,11 th Edition, 2022.	
4.	Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, “Computer Organization and Embedded Systems”, McGraw Hill, 6 th Edition 2018.	
Reference Books:		

1.	John P.Hayes, "Computer Architecture and Organization", McGraw-Hill, 3 rd Edition, 2017.
2.	John F. Wakerly, "Digital Design: Principles and Practices", 5th Edition, Pearson, 2018

Web References:

1.	https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/
2.	https://www.tutorialspoint.com/digital_circuits/digital_circuits_logic_gates.htm
3.	https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/

Online Resources:

1.	https://www.coursera.org/learn/comparch
2.	https://onlinecourses.nptel.ac.in/noc23_ee29/preview

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)

Formative Assessment based on Capstone Model

Course Outcome	Bloom's Level	Assessment Component	FA (16%) [80 Marks]
C111.1, C111.2	Apply	Tutorial	20
C111.3	Understand	Assignment	20
C111.4, C111.5	Apply	Case Study	20
C111.6	Understand	Quiz	20

Assessment based on Summative and End Semester Examination

Revised Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1 : [60 Marks]	CIA2 : [60 Marks]	
Remember	30	20	20
Understand	30	30	20
Apply	20	50	40
Analyse	20	-	20
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination

Continuous Assessment (40%) [200 Marks]						End Semester Examination (60%) [100 Marks]
CA 1 : 100 Marks			CA 2 : 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
		Component - I (20 Marks)		Component - II (20 Marks)		Component - I (20 Marks)

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C111.1	3	3	2									2	3		2
C111.2	3	3	2									2	3		2
C111.3	3	3	2									2	3		2
C111.4	3	3	2									2	3		2
C111.5	3	3	2									2	3		2
C111.6	3	3	2									2	3		2

23TA101	HERITAGE OF TAMILS		1/0/0/1
Nature of Course:	C (Theory Concept)		
Pre requisites:	NIL		
Course Objectives:			
1	To know various concepts of Tamil Language families.		
2	To know about the essentialities of Heritage.		
3	To understand the Aram concepts of Tamils and the cultural influence.		
Course Outcomes:			
Upon completion of the course, students shall have ability to			
C101.1	Know about the language families in India, impact of religions and the contribution of Bharathiyar and Bharathidhasan.		[U]
C101.2	Observe the growth of sculpture, making of musical instruments and the role of temples in socio and economic lives.		[U]
C101.3	Understand the significance of folklore and martial arts.		[U]
C101.4	Learn the sangam literature, sangam age and overseas conquest of Cholas.		[U]
C101.5	Understand the contribution of Tamils to Indian Freedom Struggle, role of Siddha medicine and print history of Tamil Books.		[U]
Course Contents:			
Language and Literature: 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 Bharathiyar and Bharathidhasan.			
Heritage - Rock Art Paintings to Modern Art – Sculpture: 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. FolkAndMartialArts: Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyllattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.			
Thinai ConceptOfTamils - 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. ContributionofTamilstoIndiannationalmovementandindianculture:Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.			
			Total Hours: 15
Text-cum-Reference Books:			
1	தமிழகவரலாறு – மக்களும்பண்பாடும்—கே.கே.பிள்ளை(வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).		
2	கணினித்தமிழ் – முனைவர்இல. சுந்தரம் . (விகடன்பிரசுரம்).		
3	கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)		
4	பொருளை – ஆற்றங்கரைநாகரிகம். (தொல்லியல்துறைவெளியீடு)		

5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C101.1	Understand	Quiz	20
C101.2	Understand	Seminar	20
C101.3	Understand	Seminar	20
C101.4	Understand	Quiz	20

Assessment based on Summative and End Semester Examination			
Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1 : [60 Marks]	CIA2 : [60 Marks]	
Remember	40	40	40
Understand	60	60	60
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination						
Continuous Assessment (40%) [200 Marks]					End Semester Examination (60%) [100 Marks]	
CA 1 : 100 Marks			CA 2 : 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component - I (20 Marks)	Component - II (20 Marks)		Component - I (20 Marks)	Component - II (20 Marks)	

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C101.1	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-
C101.2	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-
C101.3	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-
C101.4	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
C101.5	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-

23IT101	APPLICATION DEVELOPMENT PRACTICES	1/0/4/3
Nature of Course	F (Theory programming)	
Pre requisites	Nil	
Course Objectives:		
1.	To discuss the essence of agile development methods.	
2.	To understand and apply Scrum framework.	
3.	To set up and create a GitHub repository.	
4.	To impart the knowledge of web application development platforms.	
5.	To create interactive websites using HTML, CSS.	
6.	To recognize the user experience design methodologies like Java script for responsive web design.	
Course Outcomes		
Upon completion of the course, students shall have ability to		
C101.1	Relate the concepts of agile software engineering and its advantages in software development.	[R]
C101.2	Demonstrate the roles and responsibilities of Scrum, Lean Software Development and how to setup the GitHub repository.	[U]
C101.3	Analyze the working model and develop static, dynamic websites.	[A]
C101.4	Utilize the knowledge of HTML, CSS and Bootstrap using forms to build modern interactive web applications.	[AP]
C101.5	Develop dynamic web pages using HTML5 with validation using Java Script objects and by applying different event handling mechanisms.	[AP]
Course Contents:		
<p>Module - I: Software Development and Basic Linux Programming 5 Hours History of traditional software development model, SDLC, Waterfall Model, Agile Software Development - Agile Manifesto and Principles, Agile Values, Characteristics, Agile methods and practices, Agile Vs Waterfall Model, Introduction to Scrum, Roles and Responsibilities, Practices and Artifacts, User Story, Review Meetings, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint Scrum Team, Extreme Programming (XP) – Principles, Lean Software Development – Principles, Kanban, Introduction to Git - Getting a Git Repository, Recording Changes to the Repository, Viewing the Commit History, Undoing Things, Working with Remotes, Tagging, Git Aliases, Git Branching, Branches in a Nutshell, Basic Branching and Merging, Branch Management, Remote Branches, Rebasing. Introduction to GitHub – Introduction, Set up Git, Create a repository, GitHub Flow, Contribution to Projects, Communicating on GitHub. Linux Basic Commands - Linux Basic Commands, Linux File Permissions, Basic System Administration, Process Management, Archival. Linux Shell Script - Shell Basics, Writing first script, Conditional statements, Loops, Command line arguments, Functions & file manipulations, Background processes, Scheduling processes -At, batch & Cron -Networking.</p>		
<p>Module - II: HTML 5 Hours HTML Basics - Understand the structure of an HTML page, New Semantic Elements in HTML 5, Learn to apply physical/logical character effects, Learn to manage document spacing. Tables - Understand the structure of an HTML table, Learn to control table format like cell spanning, cell spacing, border. List - Numbered List, Bulleted List, Working with Links, Understand the working of hyperlinks in web pages, Learn to create hyperlinks in web pages, Add hyperlinks to list items and table contents. Image Handling - Understand the role of images in web pages, Learn to add images to web pages, Learn to use images as hyperlinks. Frames - Understand the need for frames in web pages, Learn to create and work with frames. HTML Forms for User Input - Understand the role of forms in web pages, Understand various HTML elements used in forms, Single line text field, Text area, Check box, Radio buttons, Password fields, Pull-down menus, File selector dialog box. New Form Elements - Understand the new HTML form elements such as date, number, range, email, search and data list, Understand audio, video, article tags.</p>		
<p>Module - III: Front End Development 5 Hours Introduction to Cascading Style Sheets - What CSS can do, CSS Syntax, Types of CSS. Working with Text and Fonts - Text Formatting, Text Effects, Fonts. CSS Selectors - Type Selector, Universal Selector, ID Selector, Class selector. Colors and Borders – Background, Multiple Background, Colors RGB and RGBA, HSL and HSLA, Borders, Rounded Corners, Applying Shadows in border, Implementing CSS3 in the "Real World" – Modernizr, HTML5 Shims, SASS, and Other CSS Preprocessors, CSS Grid Systems, CSS Frameworks. Introduction to Bootstrap – Introduction, Getting Started with Bootstrap, Bootstrap Basics, Bootstrap grid system, Bootstrap Basic Components, Bootstrap Components, Page Header, Breadcrumb, Button Groups, Dropdown, Nav & Navbars. JavaScript Essentials - Var, Let and</p>		

Const keyword, Arrow functions, default arguments, Template Strings, String methods, Object de-structuring, Create, apply, prototype, bind method, Spread and Rest operator, Typescript Fundamentals, Types & type assertions, Creating custom object types, function types, Typescript OOPS - Classes, Interfaces, Constructor, Decorator & Spread Operator, Difference == & === , Asynchronous Programming in ES6, Promise Constructor, Promise with Chain, Promise Race.

Total Hours **15**

Lab Component:

S. No	List of Experiments
1	Study of Basic Linux Commands.
2	Implementation of Shell Programming.
3	Design a web page using HTML basic tags.
4	Develop web site with suitable contents and links.
5	Design web pages using lists and tables.
6	Build a web client-side Login, Registration form and Dashboard with drop down menus.
7	Develop a HTML form and validation using HTML5 features.
8	Create a website using HTML: To embed an image map in a web page. To fix the hot spots. Show all the related information when the hot spots are clicked.
9	Apply style specification in HTML page using CSS.
10	Develop dynamic web application using HTML, CSS and JavaScript.
Total Hours 60	

Text Books:

1.	Roman Pichler, "Agile Product Management with Scrum Creating Products that Customers Love", Pearson Education, 1 st Edition, 2010.
2.	Jeff Sutherland, "Scrum the Art of Doing Twice the Work in Half the Time", Random House Publisher, 1 st Edition, 2015.
3.	Scott Chacon, Ben Straub, "Pro GIT", CreateSpace Independent Publishing Platform, 2017.
4.	Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting BIBLE", Wiley India Pvt. Limited, 2020.
5.	Jennifer Niederst Robbins., "Learning Web Design, A beginner's guide to HTML, CSS, JavaScript, and Web Graphics", O'Reilly Media, 5 th Edition, 2018.
6.	Jennifer Smith and the AGI Creative Team, "Web Design with HTML and CSS", Wiley Publisher, 1 st Edition, 2011.
7.	Stephen Blumenthal, "JavaScript: JavaScript for Beginners - Learn JavaScript Programming with ease", 1 st Edition, 2017.

Reference Books:

1.	Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", Prentice Hall, 2 nd Edition, 2014.
2.	Mike Cohn, "User Stories Applied: For Agile Software", Addison Wesley, 2 nd Edition, 2016.
3.	Thomas a Powell, "HTML & CSS: The Complete Reference", 5 th Edition, Tata McGraw Hill Education Private Limited, 2010.
4.	Russ Ferguson, "Beginning JavaScript: The Ultimate Guide to Modern JavaScript Development", Apress Publishers, 3 rd Edition, 2019.

5.	Deitel, Deitel, Goldberg, "Internet and World Wide Web – How to program", 5 th Edition, Prentice Hall Publishers, 2012.
Web References:	
1.	https://www.coursera.org/specializations/agile-development
2.	https://www.edx.org/learn/agile
3.	https://nptel.ac.in/courses/106/105/106105182/
4.	https://developer.mozilla.org/en-US/docs/Web/HTML
5.	https://developer.mozilla.org/en-US/docs/Web/CSS
6.	https://developer.mozilla.org/en-US/docs/Web/JavaScript
Online Resources:	
1.	http://www.agilenutshell.com/
2.	https://www.atlassian.com/agile/scrum
3.	https://www.youtube.com/user/AgileMikeCohn
4.	https://www.coursera.org/learn/html-css-javascript-for-web-developers
5.	https://online-learning.harvard.edu/subject/javascript

Continuous Assessment								End Semester Practical Examination	Total
Theory				Practical			Total (A+B)		
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)			
80	120	200	100	75	25	100	200	50	100

Formative Assessment based on Capstone Model - Theory			
Course Outcome	Bloom's Level	Assessment Component	FA (10%) [80 Marks]
C101.1	Remember	Assignment - 1	20
C101.2, C101.3	Understand Analyze	Quiz	20
C101.4	Apply	Case Study	20
C101.5	Apply	Assignment - 2	20
Assessment based on Summative - Theory			
Bloom's Level	Summative Assessment (15%) [120 Marks]		
	CIA1: (60 Marks)		CIA2: (60 Marks)
Remember	20	10	
Understand	30	30	
Apply	40	50	
Analyse	10	10	
Evaluate	-	-	
Create	-	-	
Assessment based on Continuous and End Semester Examination – Practical			

Bloom's Level	Continuous Assessment (25%) [100 Marks]		End Semester Examination (50%) [100 Marks]
	FA: (75 Marks)	SA: (25 Marks)	
Remember	30	20	20
Understand	20	30	30
Apply	40	40	40
Analyse	10	10	10
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination							
Continuous Assessment (50%)							End Semester Practical Examination (50%)
CA 1 (100 Marks)		CA 2 (100 Marks)			Practical Exam (100 Marks)		
SA 1 (60M)	FA 1		SA 2 (60M)	FA 2		FA (75M)	
	Component-I (20 Marks)	Component-II (20 Marks)		Component-I (20 Marks)	Component-II (20 Marks)		

Course Outcomes (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C101.1	2	2	1	1								2	3	2	2
C101.2	3	2	3	3	3	2						2	3	3	2
C101.3	3	2	3	3	3	2						2	3	3	2
C101.4	3	2	3	3	3	2						2	3	3	2
C101.5	3	2	3	3	3	2						1	3	3	2

23CS101	PROBLEM SOLVING USING C++		1/0/4/3
Nature of Course	K (Problem Programming)		
Pre requisites	NIL		
Course Objectives:			
1	To learn the fundamental programming concepts and methodologies which are essential to build good C++ programs.		
2	To gain knowledge on control structures and functions in C++.		
3	To provide the basic object-oriented programming concepts and apply them in problem solving.		
4	To introduce file streams and operations for storing data permanently.		
5	To know generic programming paradigm.		
Course Outcomes:			
Upon completion of the course, students shall have ability to			
C101.1	Illustrate the fundamental concepts and methodologies required to develop a program for given problems.		[U]
C101.2	Develop a program for real-time problems with pointers and objects.		[AP]
C101.3	Apply the Constructors, destructors, and Overloading concepts to solve the solve.		[AP]
C101.4	Develop C++ programs with Interfaces, Exception and File processing		[AP]
C101.5	Implement the concepts on file streams, I/O and Lambda Expression.		[AP]
Course Contents:			
Module I C++ Programming Fundamentals			5 Hours
C vs C++, Basic of OOPS, the main () function, Header files, Basic Input and Output (I/O) using cin and cout, Variable, Constant. Operators: Arithmetic Operators, Assignment Operators, Relational Operators, Logical Operators, Bitwise Operators, Other Operators, Operator Precedence. Control Statements: if, if...else and Nested if...else, switch case, break and continue, Loops - for loop, while loop, do while loop, goto. Arrays and Strings: 1D array, 2D array, Strings, String functions. Function: Basics, call by value, call by reference & return by reference, Inline function, overloading Functions, inline Functions, Recursive Functions. Pointers: Pointer, Dynamic Memory Allocation.			
Module II Object Oriented Concepts			5 Hours
Classes and Objects, public, private, protected. Constructors and destructors: Overloaded Constructor, Copy Constructor, Shallow Copying Deep Copying. Overloading: this' Pointer, structs vs Classes, Friends of a class, Operator Overloading, Inheritance, Overloading vs Overriding, Polymorphism, Virtual Functions, Pure Virtual Functions and Abstract Classes.			
Module III Files and Generic Programming			5 Hours
Abstract Classes as Interfaces, Exception, Files, Streams and I/O, STL, Generic Programming, Lambda Expression.			
			Total Hours (Theory) 15 Hours
Lab Component			
S.No.	Lab Exercise		
1.	Practice of C Programming using Branching and Iterative constructs.		
2.	Programs using arrays and strings.		
3.	Programs using Functions.		
4.	Programs using Structures and Pointers.		
5.	Programs using classes and objects.		
6.	Programs using constructor and destructor.		
7.	Programs using method overloading, operator overloading and polymorphism concepts.		
8.	Programs using friend class.		
9.	Programs using virtual functions and abstract class.		
10.	Programs using inheritance concepts.		
11.	Programs using exception handling concept.		

12.	Programs using Files.		
13.	Mini project		
		Total Hours (Lab)	60 Hours
		Total Hours(15+30)	75 Hours
Text Books:			
1.	E Balagurusamy, "Object Oriented Programming with C++", 4 th Edition, Tata McGraw-Hill Education, 2008.		
2.	YashavantP. Kanetkar, "Let us C++", BPB Publications, 2020.		
3.	M. Sprankle, "Problem Solving and Programming Concepts", 9th Edition, Pearson Education, New Delhi, 2011.		
Reference Books:			
1.	Herbert Schildt, "The Complete Reference C++", 4th edition, MH, 2015.		
2.	John Hubbard, "Schaum's Outline of Programming with C++", MH, 2016.		
Web References:			
1.	https://www.geeksforgeeks.org/c-plus-plus/		
2.	http://web.stanford.edu/class/cs106/		
Online Resources:			
1.	https://nptel.ac.in/courses/106101208		
2.	https://www.hackerrank.com/domains/cpp		
3.	https://codeforces.com/blog/entry/74684		
4.	https://www.hackerearth.com/practice/notes/tricky-and-fun-programming-in-c/		

Continuous Assessment									End Semester Practical Examination	Total
Theory				Practical			Total (A+B)	Total Continuous Assessment		
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)				
80	120	200	100	75	25	100	200	50	50	100

Formative Assessment based on Capstone Model - Theory			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (10%) [80 Marks]
C101.1	Understand	Quiz	20
C101.2 & C101.3	Apply	Assignment	20
C101.4	Apply	Assignment	20
C101.5	Apply	Case Study	20

Assessment based on Summative Assessment - Theory		
Bloom's Level	Summative Assessment (15%) [120 Marks]	
	CIA1: (60 Marks)	CIA2: (60 Marks)
Remember	20	20
Understand	40	30
Apply	40	50

Analyse	-	-	
Evaluate	-	-	
Create	-	-	
Assessment based on Continuous and End Semester Examination - Practical			
Bloom's Level	Continuous Assessment (25%) [100 Marks]		End Semester Practical Examination (50%) [100 Marks]
	FA: (75 Marks)	SA: (25 Marks)	
Remember	10	20	20
Understand	30	20	20
Apply	50	50	50
Analyse	10	10	10
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Practical Examination								
Continuous Assessment (50%)							End Semester Practical Examination (50%)	
CA 1 (100 Marks)			CA 2 (100 Marks)			Practical Exam (100 Marks)		
SA 1 (60M)	FA 1		SA 2 (60M)	FA 2		FA (75M)		SA (25M)
	Component-I (20 Marks)	Component-II (20 Marks)		Component-I (20 Marks)	Component-II (20 Marks)			

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)								
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3						
C101.1	3	3											3								
C101.2	3	3	3	2	2				2	1		3	3	2	1						
C101.3	3	3	3	2	3				2	1		3	3	2	1						
C101.4	3	3	3	3	3				3	2		3	3	2	2						
C101.5	3	3	3	3	3				2	2		2	3	2	1						
C101	3	3	3	3	3				3	2		2	3	2	2						
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">3</td> <td style="width: 30%;">Strongly agreed</td> <td style="width: 10%; text-align: center;">2</td> <td style="width: 30%;">Moderately agreed</td> <td style="width: 10%; text-align: center;">1</td> <td style="width: 20%;">Reasonably agreed</td> </tr> </table>																3	Strongly agreed	2	Moderately agreed	1	Reasonably agreed
3	Strongly agreed	2	Moderately agreed	1	Reasonably agreed																

23AS102	APPLIED SCIENCE LABORATORY		L/T/P/C
			0/0/4/2
Nature of Course			
E (Skill based)			
Pre requisites			
Basic Applied Science laboratory skills			
Course Objectives:			
1.	To carry out experiments to understand the basic laws of magnetism.		
2.	To Understand of how objects become electrically charged and how electrical charge is transferred from one object to another.		
3.	To understand the principles and applications of electrochemistry and learning electro-analytical methods, and explore the knowledge of various energy sources and storage devices.		
4.	To understand the concepts of photo-physical and photochemical processes in spectroscopy.		
Course Outcomes:			
Upon completion of the course, students shall have ability to			
C102.1	To determine the magnetic field around a current-carrying conductor and Planck's constant.	[An]	
C102.2	To determine the rate of growth or decay in a resistor-capacitor circuit and to estimate the resonance frequency and Q-factor of an LCR circuit.	[An]	
C102.3	To determine the relationship between the magnetic flux density and the magnetizing field strength and to find the specific resistance of the wire.	[Ap]	
C102.4	To determine the pH, single electrode potential using reference electrodes, Strength of acids by conductometric titration and Electroplating process based on electrolytic cell.	[Ap]	
C102.5	Interpret the principle and to estimate the amount of iron content in the given solution using spectroscopic technique.	[An]	
Lab Components:			
1	Determination of Magnetic field along the axis of current carrying coil-Stewart and Gee method and compare with the theoretical value.	[An]	
2	Determination of characteristics of an RC circuit.	[Ap]	
3	Determination of characteristics of LCR circuit and compare with the theoretical value.	[An]	
4	Determination of Hysteresis loss of a ferromagnetic material.	[Ap]	
5	Determine the Specific resistance of a given coil of wire using the Carey Foster bridge	[Ap]	
6	Determination of Planck's Constant of an LED and compare with the standard value.	[An]	
7	Determination of strength of strong acid by pH metry.	[Ap]	
8	Estimation of dissolved oxygen in waste water using Winkler's method.	[Ap]	
9	Determination of single electrode potential of Zinc and Copper by Potentiometric method.	[Ap]	
10	Determination of cathode efficiency of Nickel using electroplating process.	[Ap]	
11	Estimation of iron content in the given solution by spectrophotometry.	[An]	
12	To determine the strength of acids (HCl & CH ₃ COOH) Vs NaOH by conductometric method.	[Ap]	
Life Skills Experiments			
13	Determination of pressure required to shut off the fuel pump nozzle.	[Ap]	
14	Determination of capacitance required to shut off the circuit in a circuit breaker.	[Ap]	
15	Determination of earth, neutral and phase line in a circuit.	[Ap]	

16	To know the presence of dissolved oxygen in given water sample using glucose by redox principle.	[Ap]
17	To view the colour of the different medium of given water sample using litmus paper test.	[Ap]
18	To detect the chlorine content in tap water using simple chemical method.	[Ap]
Total Hours:		36
Text Book:		
1	Anoop Sing Yadav "Applied Physics Lab Manual" Vayu Education of India Publisher, 2018.	
2	P. Kulkarni, Manual for Experiments in Engineering Physics, 2015	
3	S. K. Gupta, "Engineering physics practical's", Krishna Prakashan Pvt. Ltd., 2014.	
4	P. R. Sasikumar "Practical Physics", PHI Ltd., 2011.	
5	Method of Sampling and Test (Physical and Chemical) for Water and Wastewater- Iron, 2003, Part-53; First Revision.	
6	Method of Sampling and Test (Physical and Chemical) for Water and Wastewater: pH Value (1983; Part-11; First Revision).	
7	Method of Sampling and Test (Physical and Chemical) for Water and Wastewater, Biochemical Oxygen Demand, 1993, Part-44; First Revision.	
8	Chemistry Laboratory Manual by CSOS, Chhattisgarh State Open School, E-Book. NIOS.	
References:		
1	Dr. Ruby Das and Prashant Kumar Sahu, A Textbook of Engineering Physics Practical , 2016, 2 nd Edition	
2	S. L. Gupta and Dr. V. Kumar, "Practical physics with viva voice", Pragati Prakashan Publishers, Revised Edition, 2009.	
3	M. N. Avadhanulu, A. A. Dani and Pokely P.M, "Experiments in Engineering Physics", S. Chand & Co, 2008.	
4	Sawyer, C. N., McCarty, P. L., and Parkin, G. F. 2000. Chemistry for Environmental Engineering. Fourth Edition, McGraw-Hill, Inc., New York.	
5	American Public Health Association et al, Standard Methods for the Examinations of Water and Waste Water, APHA. 1998.	
6	AWWA, WEF, APHA, 1998, Standard Methods for the Examination of Water and Wastewater (Method: 5210B, BOD).	
Web References – Simulation Links / Animation Videos		
1	https://vlab.amrita.edu/?sub=1&brch=192&sim=972&cnt=4	
2	https://www.plexim.com/academy/analog-electronics/rc-time-constant	
3	https://phet.colorado.edu/sims/html/circuit-construction-kit-ac/latest/circuit-construction-kit-ac_all.html	
4	https://www.allaboutcircuits.com/technical-articles/hysteresis-loss-estimation-modeling-and-the-steinmetz-equation/	
5	https://bop-iitk.vlabs.ac.in/exp/carey-foster-bridge/simulation.html	
6	https://mpv-au.vlabs.ac.in/modern-physics/Determination_of_Plancks_Constant/experiment.html	
7	https://ee1-nitk.vlabs.ac.in/exp/determination-of-ph/simulation.html	
8	https://ee1-nitk.vlabs.ac.in/exp/determination-of-biological-oxygen/simulation.html	
9	https://www.youtube.com/watch?v=opSUKbaR2Sc	
10	https://mm-coep.vlabs.ac.in/exp/electrochemical-machining-process/simulation.html	
11	https://ee1-nitk.vlabs.ac.in/exp/determination-of-total-iron/simulation.html	
12	https://www.youtube.com/watch?v=e_uFXjU9v7o	

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
75	25	100	60	40	100

Assessment based on Continuous and End Semester Examination			
Bloom's Level	Continuous Assessment (60%) [100 Marks]		End Semester Practical Examination (40%) [100 Marks]
	FA (75 Marks)	SA (25 Marks)	
Remember	-	-	-
Understand	10	10	10
Apply	30	30	30
Analyse	30	30	30
Evaluate	30	30	30
Create	-	-	-

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C102.1	3	2	1	2					2			1	1		1
C102.2	2	1	1	2					2			1	1	1	1
C102.3	3	2	1	2					2			2	1	1	
C102.4	3	2	1	2					2			2	1		1
C102.5	3	2	1	2					2			1		1	1

23MC101	INDUCTION PROGRAMME		1/0/0/0
Nature of Course	Induction Programme		
Pre requisites	Nil		
Course Objectives:			
1.	To have broad understanding of society and relationships		
2.	To nurture the character and fulfil one's responsibility as an engineer, a citizen and a human being		
3.	To incorporate meta skills and values		
Course Outcomes:			
Upon completion of the course, students shall have ability to			
C101.1	Explore academic interest and activities		[AP]
C101.2	Work for excellence		[AP]
C101.3	Promote bonding and give a broader view of life and character		[AP]
Course Contents:			
<p>PHYSICAL ACTIVITY: Research over the past years has shown Yoga to have stress-relieving powers on students, paving the way for improved academic performance with the practice of asanas, meditation and breathing exercises. To prove these words Yoga classes has been planned in this module.(CO mapping: C101.1, C101.2, C101.3)</p> <p>CREATIVE ARTS (students can select any one of their choice): Cultural development supports students to understand, feel comfortable with, value and appreciate the potential enrichment of cultural diversity. They should challenge discrimination, whether based on cultural or racial difference. Students should experience cultural traditions embedded in arts, crafts, language, literature, theatre, song, music, dance, sport, Science, technology and travel. Students should develop an appreciation of beauty both in experiencing artistic expression and by exploring their own creative powers. To inculcate those skills they are given a chance to exhibit their talents through painting, sculpture, pottery, music, dance, craft making and so on. .(CO mapping: C101.1, C101.2, C101.3)</p> <p>UNIVERSAL HUMAN VALUES: Moral development involves supporting students to make considered choices around their behaviour and the values that provide a framework for how they choose to live. Moral development is also learning about society's values, understanding the reasons for them, how they are derived and change; and how disagreements are resolved. Students must consider the consequences of personal and societal decisions on the wider community – local and global- and on the environment and future generations. To acquire this the students are exposed to training to enhance their soft skills. .(CO mapping: C101.1, C101.2, C101.3)</p> <p>LITERARY AND PROFICIENCY MODULES:Social development helps students to work effectively together, developing the inter-personal skills required to relate positively with their peers and people of all ages. Students must also understand how to participate productively in a diverse and plural society and learn about, and how to effectively engage with societal institutions and processes. They should understand that a person may have different roles and responsibilities within society. To reach this the following aspects are given in the form of Reading, writing, speaking – debate, role play etc.Communication and computer skills. (CO mapping: C101.1, C101.2, C101.3)</p> <p>LECTURES BY EMINENT PEOPLE: Teaching with Lectures. ... It is essential to see lectures as a means of helping students learn to think about the key concepts of a particular subject, rather than primarily as a means of transferring knowledge from instructor to student. During</p>			

the induction period students will attend to Guest lectures by subject experts.(CO mapping: C101.1, C101.2, C101.3)

VISIT TO LOCAL AREAS:Traveling is in fact a way of learning to learn. You are out of your comfort zone and so you must learn to be able to adapt to a new learning environment in a very short time. It also helps in your overall learning as well. In the induction period students will be taken to different places near college to learn new things. Eg.Meditation centre/orphanage/Hospital.(CO mapping: C101.1, C101.2, C101.3)

FAMILIARIZATION TO DEPARTMENT/BRANCH INNOVATION: Hod's of different branches will present about their department followed by department visit to view various facilities available at their department, new innovations from students and faculties etc. .(CO mapping: C101.1, C101.2, C101.3)

Course Articulation Matrix (Lab)															
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1						3	3	3	3	3	3	3			1
2						3	3	3	3	3	3	3			1
3						3	3	3	3	3	3	3			1
Avg						3.0	3.0	3.0	3.0	3.0	3.0	3.0			1.0
1	Reasonably agreed				2	Moderately agreed					3	Strongly agreed			

23MA201	MATHEMATICS II	3/1/0/4
Nature of Course		J (Problem analytical)
Prerequisites		-
Course Objectives:		
1	To study the basic probability concepts	
2	To apply mathematical linear programming techniques to solve constrained problems.	
3	To formalize the notion of strategic thinking and rational choice by using the tools of game theory	
4	To acquaint the student with transform techniques which are used in variety of engineering fields.	
5	To introduce the concepts of Group theory	
Course Outcomes:		
Upon completion of the course, students shall have ability to		
C201.1	Recall the concepts of basic probability and Fourier series.	[R]
C201.2	Formulate and analyze the existence of solutions to Optimization problems	[U]
C201.3	Formulation of modern probability theory and think of random variables as an intrinsic need for the analysis of random phenomena.	[AP]
C201.4	Apply game theory concepts in searching, auctioning and trading.	[AP]
C201.5	Apply Fourier transform to discrete time sequence and use of group theory, Coding theory in communication system.	[AP]
Course Contents		
MODULE 1: Probability theory		(20 hrs)
Deviation from mean – Markov’s inequality – Chebyshev’s theorem - Properties of variance – Sum of random variables – Gambler’s ruin – Chebshev’s inequality – Deviation on sum of independent random variables - Weak law of large numbers – Van der Waerden’s theorem (Statement only) – Chernoff bounds – Above the mean and under the mean of Chernoff Bound.		
MODULE 2: Linear Programming and Game Theory		(20 hrs)
Basics of Linear Programming – Formulations of Linear Programming Problems –Graphical method - Simplex Method – Linear Programming in Matrix Form – Two phase method – Duality– Transportation Problem - Initial Basic Feasible solutions (NWC,LCM,VAM)– Optimal solution by MODI method– Game theory: Introduction – Zero-Sum Matrix Games – Payoff matrix–The Minimax and Maximin theorem– Mixed strategies – Graphic solution of games.		
MODULE 3: Fourier Analysis and Group Codes		(20 hrs)
Fourier series: Half range series – Discrete Fourier transform – Properties (Statement only) – Problems – Computing using convolution of sequences using Fast Fourier transform – Group Theory: Semigroups – Monoids – Groups – Cosets – Lagrange’s theorem– Coding theory: Encoders and Decoders – Group Code – Hamming Codes –Basic notions of error correction using matrices– Parity-check Matrix Decoding – Coset Decoding.		
Total Hours:		60 hrs
Text Books:		
1	H. Pishro-Nik, "Introduction to probability, statistics, and random processes", Kappa Research LLC, 2014.	
2	Hamdy A. Taha , "Operations Research: An Introduction", 10th Edition, Pearson, 2019.	
3	T Veerarajan, "Discrete Mathematics with Graph Theory and Combinatorics", Tata McGrawHill, New Delhi, 2007.	

4.	Erwin Kreyszig, "Advanced Engineering Mathematics", 13 th Edition, John Wiley & Sons, Inc.
Reference Books:	
1	Ralph. S.C. Gupta and V.K.Kapoor, "Fundamentals of Mathematical Statistics", twelfth edition, Sulthan Chand and sons, 2014.
2	Eric Lehman, FThomson Leighton and Albert R.Meyer, "Mathematics for Computer Science", 14 th Edition, MIT Open courseware, 2018.
3	Kanti Swarup, P.K.Gupta, Manmohan, "Operations research", 2nd Edition, Sultan Chand and Sons, 2015.
Web References:	
1	https://archive.nptel.ac.in/courses/111/105/111105090/
2	https://archive.nptel.ac.in/courses/110/104/110104063/
3	https://archive.nptel.ac.in/courses/111/101/111101164/
4	https://archive.nptel.ac.in/courses/111/106/111106113/
Online Resources:	
1	http://discrete.openmathbooks.org/dmoi3.html
2	https://ocw.mit.edu/courses/18-310-principles-of-discrete-applied-mathematics-fall-2013/pages/syllabus/
3	https://www.csie.ntu.edu.tw/~sylee/courses/dm/resources.htm
4	https://www.maa.org/press/ebooks/resources-for-teaching-discrete-mathematics
5	https://see.stanford.edu/Course/EE261/137

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C201.1	Remember	Quiz	20
C201.2	Understand	Seminar	20
C201.3 – C201.5	Apply	Tutorial	20
C201.3 – C201.5	Apply	Assignment	20

Assessment based on Summative and End Semester Examination			
Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1 : [60 Marks]	CIA2 : [60 Marks]	
Remember	20	20	20
Understand	30	30	30
Apply	50	50	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination						
Continuous Assessment (40%) [200 Marks]					End Semester Examination (60%) [100 Marks]	
CA 1: 100 Marks			CA 2: 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component - I (20 Marks)	Component - II (20 Marks)		Component - I (20 Marks)		Component - II (20 Marks)

Course Outcomes (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C201.1	1	1	1										1		
C201.2	1	2	1										2		
C201.3	3	3	2										2		
C201.4	1	1	2										1		
C201.5	2	1	2										2		

23TA201	TAMILS AND TECHNOLOGY		1/0/0/1
Nature of Course:	C (Theory Concept)		
Pre requisites:	NIL		
Course Objectives:			
1	To know about weaving, ceramic, design and construction technologies in sangam age.		
2	To know the significance of technologies such as manufacturing, agriculture and irrigation.		
3	To understand the development of Scientific Tamils and Tamil Computing.		
Course Outcomes:			
Upon completion of the course, students shall have ability to			
C201.1	Describe about the weaving industry in sangam age and ceramic technology.		[U]
C201.2	Observe the design of houses, sculptures and construction of temples.		[U]
C201.3	Relate the various manufacturing materials and stone types in Silappathikaram.		[U]
C201.4	Understand the significance of agriculture and irrigation technology in ancient period.		[U]
C201.5	Explain the growth of scientific Tamil, Tamil computing and digitization of Tamil books.		[U]
Course Contents:			
<p>Weaving and Ceramic Technology: Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries. Design and Construction Technology: Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple) - ThirumalaiNayakarMahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.</p> <p>Manufacturing Technology: 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 beads - Archeological evidences - Gem stone types described in Silappathikaram. Agriculture and Irrigation Technology: Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.</p> <p>Scientific Tamil & Tamil Computing: 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.</p>			
Total Hours:			15
Text-cum-Reference Books:			
1	தமிழகவரலாறு – மக்களும்பண்பாடும்—கே.கே.பிள்ளை(வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).		
2	கணினித்தமிழ் – முனைவர்இல. சுந்தரம் . (விகடன்பிரசுரம்).		

3	கீழடி – வைகைநதிக்கரையில் சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
4	பொருநை – ஆற்றங்கரைநாகரிகம். (தொல்லியல்துறைவெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C201.1	Understand	Seminar	20
C201.2	Understand	Quiz	20
C201.3, C201.4	Understand	Quiz	20
C201.5	Understand	Seminar	20

Assessment based on Summative and End Semester Examination			
Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1 : [60 Marks]	CIA2 : [60 Marks]	
Remember	40	40	40
Understand	60	60	60
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination						
Continuous Assessment (40%) [200 Marks]						End Semester Examination (60%) [100 Marks]
CA 1 : 100 Marks			CA 2 : 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component - I (20 Marks)	Component - II (20 Marks)		Component - I (20 Marks)	Component - II (20 Marks)	

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C201.1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1
C201.2	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1
C201.3	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1
C201.4	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1
C201.5	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1

23AD201	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING BASICS	3 / 1 / 0 / 4
Nature of Course:	H (Theory Technology)	
Pre requisites:	NIL	
Course Objectives:		
1	To learn the basic concepts of Artificial Intelligence and Machine Learning.	
2	To familiarize the artificial intelligence techniques for building well-engineered and efficient intelligent systems.	
3	To provide an insight to different Classification, Regression techniques and to explore discovering clusters in the given data.	
4	To enable the students to understand machine learning algorithms and their applicability to real world problems.	
Course Outcomes:		
Upon completion of the course, students shall have ability to		
C201.1	Interpret the basic principles of AI in solutions that require problem solving, inference, perception and learning.	[U]
C201.2	Devise the acquired knowledge to solve constraint satisfaction problems, make optimal decisions and search strategies in AI powered applications.	[A]
C201.3	Understand the concepts behind different types of classification and regression algorithms and their appropriateness.	[U]
C201.4	Analyse the differentiation of clustering kind of learning algorithms and importance of Markov models to apply suitably in real world problems.	[A]
C201.5	Examining the challenges and considerations involved in deploying AI applications and perception.	[AP]
Course Contents:		
MODULE I - OVERVIEW OF ARTIFICIAL INTELLIGENCE AND AGENTS (20 hrs)		
Introduction to AI, Types of AI, Intelligent Agents, Agents & Environment - Problem Solving - Defining the problem as state space search, production system, problem characteristics and issues in the design of search programs - Problem solving agents - Search strategies - Uniformed and informed, Breadth first search, Depth first search - Heuristic search strategies: Greedy best - first search, A* search, AO* search, Optimization problems: Hill climbing search, Simulated annealing search, Local beam search. Case Study: AI powered contextual intelligence.		
MODULE II - CLASSIFICATION AND REGRESSION (20 hrs)		
Introduction, Linear classification, Perceptron update rule - Perceptron convergence, Generalization - Maximum margin classification - Classification errors – Regularization - Logistic regression - Linear regression - estimator bias and variance - Active learning - non-linear predictions, Kernals - Kernal regression - Support Vector Machine - kernel optimization - Model selection - Feature selection - Boosting, margin, and complexity. Case Study: Spam Filtering.		
MODULE III - CLUSTERING (20 hrs)		
Margin and generalization - Mixture models – EM Algorithm – EM Regularization – Clustering - Spectral clustering, Markov models - Hidden Markov models (HMMs) - Bayesian networks -		

Learning Bayesian networks – Machine Learning Applications – Issues – Challenges. **Case Study:** Fraud Detection on Financial Transactions.

Total Hours: 60

Text Books:

1.	Utpal Chakraborty, "Artificial Intelligence for All: Transforming Every Aspect of Our Life", BPB Publications, February 2020.
2.	Ethem Alpaydın, "Introduction to Machine Learning", 4 th Edition, The MIT Press, 2020.
3.	Harsh Bhasin, "Machine Learning for Beginners", BPB Publications, January 2020.
4.	Kevin P. Murphy, "Machine Learning A probabilistic Perspective", MIT press, 2018.
5.	Tom M. Mitchell , " Machine Learning", 3 rd Edition, Tata McGrawHill, 2015.
6.	S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2015.

Reference Books:

1.	Abhivardhan, "Artificial intelligence: Ethics & International Law", 3 rd edition, BPB Publications, January 2019.
2.	Hastie, T., R. Tibshirani, and J. H. Friedman, "The Elements of Statistical Learning: Data Mining, Inference and Prediction" New York, NY: Springer, 2001.
3.	Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", 1 st Edition, Wiley, 2017.
4.	I. Bratko, "Prolog: Programming for Artificial Intelligence", Fourth edition, Addison-Wesley Educational Publishers Inc., 2018.

Web References:

1.	http://www.nptelvideos.in/2012/11/artificial-intelligence.html
2.	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_expert_systems.htm
3.	https://onlinecourses.nptel.ac.in/noc16_cs18/

Online Resources:

1.	http://www.nptelvideos.in/2012/11/artificial-intelligence.html
2.	http://freevideolectures.com/Course/2257/Machine-Learning
3.	https://towardsdatascience.com/machine-learning/

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)

Formative Assessment based on Capstone Model

Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C201.1	Understand	Quiz	20
C201.3	Understand		
C201.2	Analyze	Assignment	20
C201.4	Analyze	Idea Presentation	20
C201.5	Apply	Tutorial	20

Assessment based on Summative and End Semester Examination

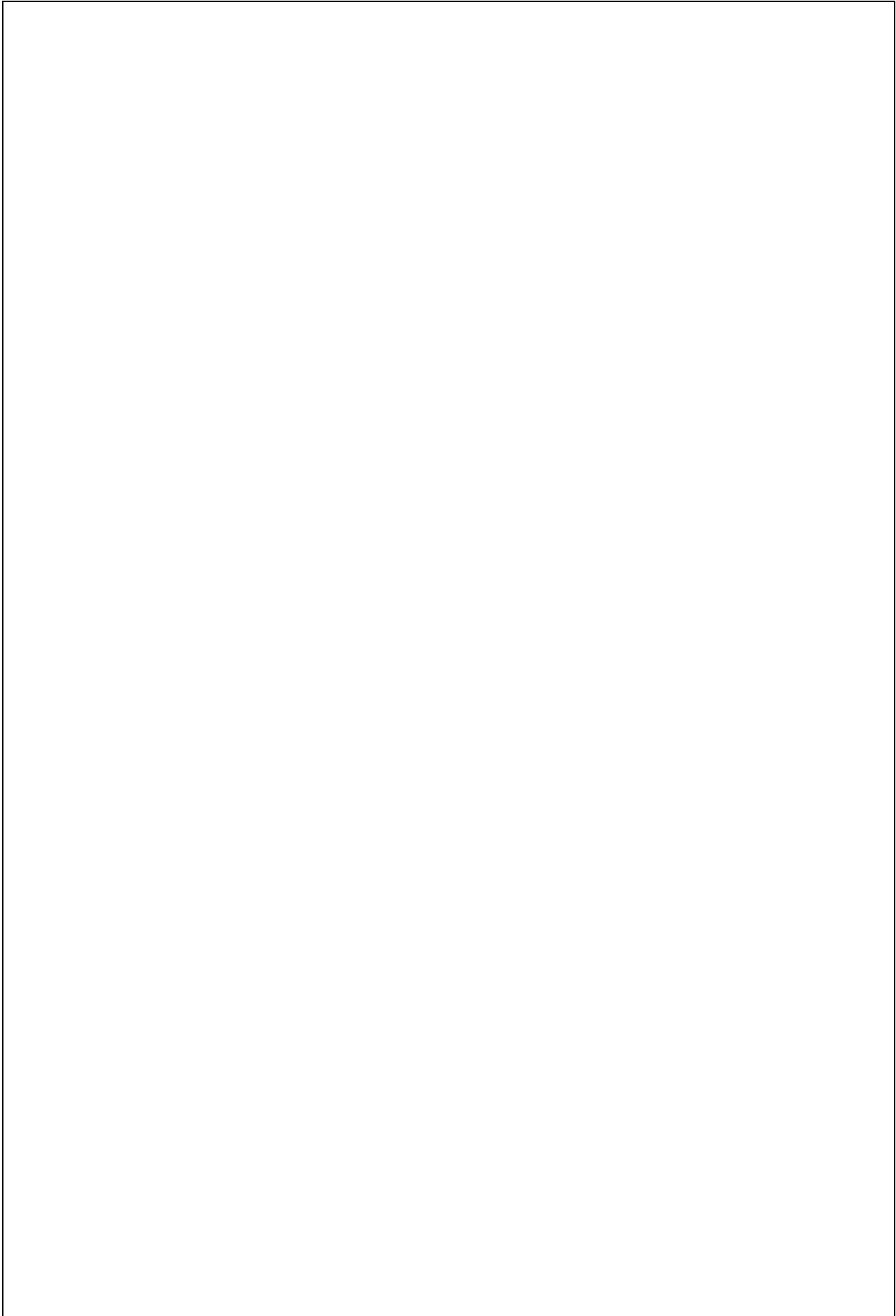
Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1 : [60 Marks]	CIA2 : [60 Marks]	
Remember	20	20	20
Understand	30	30	30
Apply	20	20	20
Analyse	30	30	30
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination

Continuous Assessment (40%) [200 Marks]						End Semester Examination (60%) [100 Marks]
CA 1 : 100 Marks			CA 2 : 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component - I (20 Marks)	Component - II (20 Marks)		Component - I (20 Marks)	Component - II (20 Marks)	

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C201.1	2	2	2	2	2	3				1		1	3	1	2
C201.2	2	3	2	2	2	3				1	1	1	2	2	2
C201.3	2	2	2	2	2	3				1	1	1	1	2	2
C201.4	2	2	2	2	2	3				2	2	2	2	1	2
C201.5	2	2	2	2	2	3				1	1	2	1	1	2

23EN101	ORAL AND WRITTEN COMMUNICATION SKILLS	2/0/2/3
Nature of Course		
		Theory Skill Based
Pre requisites		
		Basics of English Language
Course Objectives:		
1	To empower students to comprehend different aspects of communication using LSRW skills.	
2	To highlight the essential aspects of effective oral & written communication necessary for professional success.	
3	To expand the skills of the students in preparing job search artefacts and negotiating their use in GDs and interviews.	
4	To enable students to communicate contextually in specific, personal and professional situations with courtesy.	
5	To enrich students to carry out day to day communication at the work place to facilitate efficient interpersonal communication.	
Course Outcomes:		
Upon completion of the course, students shall have ability to		
C101.1	Remember and expand writing skills through guided activities.	R
C101.2	Apply communication skills in a corporate environment.	AP
C101.3	Analyse and collaborate better with colleagues, building stronger professional and personal relationships.	AN
C101.4	Apply technical writing skills to write letters, emails and prepare technical documents.	AP
C101.5	Analyze and communicate effectively in personal and professional situations.	AN
Course Contents:		
Module I		
<p>Reading : Reading techniques -Skimming and scanning - Cloze reading - Reading and understanding technical articles – Reading for detailed comprehension: Email and letters - Reading advertisements - Table completion: Interpreting charts and graphs - Verbal reasoning – Comprehending reviews – Reading and responding to instant messages.</p>		
Module II		
<p>Writing : Formal letters (Sales letter, calling for quotations, seeking clarification, placing an order, complaint letter, inviting, accepting and declining letters) - Emails - Minutes of meeting - Professional report writing - Proposal writing - Resume / job application letter - Case study.</p>		
Module III		
<p>Listening : Situational listening - Listening about an experience - Listening about short extracts - Listening an interview - Conversational speaking. Speaking : Conversational speaking - Decipher the picture given and answer the question posed along with it - Decipher the mind map given and speak about it - Listen to the questions posed and answer them appropriately.</p>		



Lab Components		
1	Conversational listening	[U]
2	Speaking - Pictography	[AP]
3	Listening about an experience	[U]
4	Listening to short extracts	[U]
5	Writing - Resume Writing, Job application letter	[AP]
6	Mock interview	[AP]
Total Hours:		60
Text Books:		
1	Jay Sullivan, "Simply Said: Communicating Better at Work and Beyond", Wiley Publication, 2018.	
2	Alfred J Gerald, Brusaw T Charles,. Olu E Walter, "Handbook of Technical Writing", Bedford/St. Martin's Boston publication, New York, 2012.	
3	Liz Hamp-Lyons and Ben Heasley, "Study Writing :A Course in Written English for Academic Purposes", Updated Edition, Cambridge University Press, 2006.	
4	Dr.Praveen Sam and K N Shoba - A Course in Technical English by Cambridge University press, 2020.	
Reference Books:		
1	Rutherford J Andrea, " Basic Communication Skills for Technology", Upper Saddle River, N.J. : Prentice Hall, 2001.	
2	Singh Hardeep (Author), Kothari (Author), "Written & Oral Technical Communication Skills For Engineers/Scientists" - LAMBERT Publications, 2019.	
Web References:		
1	http://www.academiccourses.com/Courses/English/Business-English	
2	https://www.liveworksheets.com/worksheets/en/English_as_a_Second_Language_(ESL)/Technical_English	
Online Resources:		
1	https://www.coursera.org/specializations/business-english	
2	https://www.businessenglishresources.com/learn-english-for-business/student-section/practice-exercises-new/	

Assessment							Total (A+B)	Total Continuous Assessment	End Semester Continuous Examination	Total
Theory			Practical							
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)				
80	120	200	100	75	25	100	200	50	50	100

Formative Assessment based on Capstone Model - Theory			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (10%) [80 Marks]
C101.1 C101.2	Understand	Listening to Short Extracts	20
C101.3	Apply	Speaking - Pictography	20
C101.4	Apply	Mock Interview	20
C101.5	Apply	Assignment	20
Assessment based on Summative and End Semester Examination - Theory			
Bloom's Level	Summative Assessment (15%) [120 Marks]		End Semester Examination (25%) [100 Marks]
	CIA1: (60 Marks)	CIA2: (60 Marks)	
Remember	20	20	20
Understand	40	40	40
Apply	40	40	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Assessment based on Continuous and End Semester Examination - Practical			
Bloom's Level	Continuous Assessment (25%) [100 Marks]		End Semester Examination (25%) [100 Marks]
	FA: (75 Marks)	SA: (25 Marks)	
Remember	20	20	20
Understand	30	30	30
Apply	50	50	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Course Outcomes (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C101.1										3			1	1	1
C101.2								2		3			1	1	1
C101.3								2		3	2		1	1	1
C101.4										3			1	1	1
C101.5										3		3	1	1	1

23CS201		DATA STRUCTURES AND ALGORITHMS		1/0/4/3
Nature of Course:		F (Theory Programming)		
Prerequisites:		Problem Solving using C++		
Course Objectives:				
1.	To introduce list data structure and its applications.			
2.	To impart the importance of stacks and queues in problem solving.			
3.	To provide knowledge on Tree and Graph data structures.			
4.	To discuss the role of hashing in information storage and retrieval.			
Course Outcomes:				
Upon completion of the course, students shall have ability to:				
C201.1	Implement the basic data structures like array and LinkedList.			[AP]
C201.2	Solve real world problems efficiently by applying stack and queue data structures.			[AP]
C201.3	Enumerate the applications with tree data structures.			[AP]
C201.4	Discuss the importance of hashing techniques in information storage.			[U]
C201.5	Employ graph algorithms for solving real time computing problems and analyze them.			[A]
Course Contents:				
Module I Linked List & Stack 5 Hours				
Linked List: Array vs Linked list - Types of linked list - Singly, Doubly and Circular Linked list - Applications of linked list. Stack: Stack Model, Array and Linked list implementation of Stack –Applications of Stack - Infix, Prefix and Postfix expressions - infix to postfix conversion - Expression Evaluation- Balancing Parenthesis.				
Module II Queue and Trees 5 Hours				
Queue: Queue Model, Array and Linked list implementation of Queue-Priority Queue - Applications of Queue. Trees: Binary Tree - Binary Search Tree - Insertion, Deletion, Traversal - Inorder, Preorder, Postorder, Level order traversal.				
Module III Graphs and Hashing 5 Hours				
Graphs: Weighted and Directed graphs - Adjacency matrix and list implementation - Traversal – Breadth First Search & Depth First Search. Hashing: Direct Address Table, Hash function, Collision resolution techniques, Linear Probing, quadratic probing, double hashing.				
Total Hours (Theory):				15 Hours
S. No.	Lab Exercises			
1	Implementation of Singly, Doubly and Circular Linked List.			
2	Implementation of Stack using Arrays.			
3	Implementation of Stack using Linked List.			
4	Implementation of Stack applications			
5	Implementation of Queue using Arrays.			
6	Implementation of Queue using Linked List.			
7	Implementation of Queue applications.			
8	Implementation of Hashing techniques			
9	Implementation of Binary Search Tree.			

10	Implementation of Graph Traversal algorithms.	
		Total Hours (Lab): 60 Hours
		Total Hours: (15+60) 75 Hours
Text Books:		
1	Sartaj Sahni, "Data Structures, Algorithms and Applications in C++", Silicon paper publications, 2004.	
2	Anany Levitin, Introduction to the design & analysis of algorithms , 3 rd Edition, Pearson Education, 2021.	
3	Michael T. Goodrich, "Data Structures and Algorithms in C++", 2nd Edition, Wiley Publication, 2011.	
Reference Books:		
1	Seymour Lipschutz, "Data Structures by Schaum Series", 2 nd edition, Tata McGraw Hill, 2013.	
2	Narasimha Karumanchi, "Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles", 5 th Edition, Career Monk, 2016.	
3	Debasis Samanta, "Classic data structures", Prentice Hall of India, 2 nd edition, 2014.	
Web References:		
1	https://www.codingninjas.com/courses/c-plus-plus-data-structures-and-algorithms	
2	https://www.edx.org/course/data-structures-algorithms-using-c	
Online Resources:		
1	https://www.programiz.com/dsa/	
2	https://freevideolectures.com/course/2519/c-programming-and-data-structures	
3	https://www.cprogramming.com/algorithms-and-data-structures.html	

Continuous Assessment							Total (A+B)	Total Continuous Assessment	End Semester Practical Examination	Total
Theory			Practical							
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)				
80	120	200	100	75	25	100	200	50	50	100

Formative Assessment based on Capstone Model - Theory			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (10%) [80 Marks]
C201.1	Apply	Quiz	20
C201.2	Apply	Case Study	20
C201.3, C201.4	Apply	Assignment	20
C201.5	Analyze	Assignment	20
Assessment based on Summative Assessment - Theory			
Bloom's Level	Summative Assessment (15%) [120 Marks]		
	CIA1: (60 Marks)		CIA2: (60 Marks)

Remember	20	20
Understand	40	30
Apply	40	40
Analyse	-	10
Evaluate	-	-
Create	-	-

Assessment based on Continuous and End Semester Examination - Practical

Bloom's Level	Continuous Assessment (25%) [100 Marks]		End Semester Practical Examination (50%) [100 Marks]
	FA: (75 Marks)	SA: (25 Marks)	
Remember	10	10	10
Understand	30	30	30
Apply	60	40	40
Analyse	-	20	20
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Practical Examination

Continuous Assessment (50%)								End Semester Practical Examination (50%)
CA 1 (100 Marks)			CA 2 (100 Marks)			Practical Exam (100 Marks)		
SA 1 (60M)	FA 1		SA 2 (60M)	FA 2		FA (75M)	SA (25M)	
	Component-I (20 Marks)	Component-II (20 Marks)		Component-I (20 Marks)	Component-II (20 Marks)			

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C201.1	3	3	2									1	3	1	1
C201.2	3	3	3	3	3				2	1		2	3	2	2
C201.3	3	3	3	3	3				2	1		2	3	2	2
C201.4	3	3	3	3	3				2	1		2	3	2	2
C201.5	3	3	3	3	3				2	1		2	3	2	2
C201	3	3	3	3	3				2	1		2	3	2	2
	3	Strongly agreed			2	Moderately agreed			1	Reasonably agreed					

23CD201	DATABASE MANAGEMENT SYSTEMS	1/0/4/3
Nature of Course:	D (Theory Application)	
Prerequisites:	Nil	
Course Objectives:		
1	To introduce fundamental concepts of Data Base Management Systems and concepts of Relational Data Models.	
2	To explain Relational algebra, Relational calculus and Normalization.	
3	To implement different relational model constraints and SQL queries.	
4	To manage Database using transactions, concurrency and query optimization.	
Course Outcomes:		
Upon completion of the course, students shall have ability to:		
C201.1	Discuss the basic concepts and various data models used in database design	[U]
C201.2	Illustrate Relational algebra, Relational calculus and Normalization.	[AP]
C201.3	Write SQL commands and Subqueries with Constraints.	[AP]
C201.4	Determine Appropriate transactions, views, cursors and triggers to perform the given task.	[AP]
C201.5	Analyze database storage structures, query processing and recovery system.	[A]
Course Contents:		
MODULE I INTRODUCTION		5 Hours
Introduction to DBMS, Characteristics of DBMS, DBMS vs File Systems, need for DBMS, Three Level DBMS Architecture, Data Models – Introduction, Benefits, and Phases, ER Diagrams – Symbols, Components, Relationships, Weak entities, Attributes, Cardinality, Relational Algebra, Domain Relational Calculus, Tuple Relational Calculus, Normalization - 1NF, 2NF, 3NF, BCNF, 4NF		
MODULE II CONSTRAINTS AND SQL COMMANDS		5 Hours
DDL Commands - Create, Drop, Alter, Truncate, Rename, Keys - primary Key, Foreign Key DML Commands - Select, Insert, Update, Delete, Any, All, In, Exists, Non Exists, Union, Intersection, Subqueries - nested, correlated, Joins- Inner, Outer, and Equi, Functions - SUM, COUNT, AVG, MIN, MAX, Clauses - Group By, Having By, Embedded SQL, Dynamic SQL, Transaction Concepts – Transaction model – ACID Properties – Serializability –Transactions as SQL statements.		
MODULE III QUERIES AND TRANSACTIONS		5 Hours
Creation and Dropping of Views, Creation and Execution of Stored Procedures Cursors and Triggers - Opening, Fetching and Closing, Creation , Insertion, Deletion and Updating Database Applications: Payroll Processing Systems, Railway Reservation Systems, Bank Management System Introduction, Storage media and file structures, B+ Tree Hashing – static and Dynamic, Introduction to Query Processing – Issues in query optimization – Steps in query processing, Concurrency control and transactions, Lock based protocols Recovery System – Failure classification		
Lab Experiments:		
1. Conceptual Database design using E-R DIAGRAM		
2. Implementation of SQL commands DDL, DML, DCL and TCL		
3. Queries to demonstrate implementation of Integrity Constraints		
4. Practice of Inbuilt functions		
5. Implementation of Join and Nested Queries AND Set operators		
6. Implementation of virtual tables using Views		

7. Practice of Procedural extensions (Procedure, Function, Cursors, Triggers)	
8. Mini Project (Application Development)	
i) IT Training Group Database	
ii) Blood Donation System	
iii) Salary Management System	
iv) Traffic Light Information System	
Total Hours:	
45	
Text Books:	
1	Abraham Silberschatz, Henry F Korth, S Sudarshan, "Data base System Concepts", 7 th Edition, McGraw hill, 2020.
2	Vijay Krishna Pallaw, "Database Management Systems", 2 nd Edition Asian Books Private Limited, 2010.
3	Mark L. Gillenson, "Fundamentals of Database Systems", 7 th Edition, Wiley India Pvt. Limited, 2008.
Reference Books:	
1	Raghu Ramakrishnan, Johannes Gehrke, Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw-Hill Education, 2017
2	C. Date, "SQL and Relational Theory", O'Reilly Media, Incorporated, 2011.
Web References:	
1	http://www.sqlcourse.com/
2	https://www.w3schools.com/sql/
3	https://www.geeksforgeeks.org/dbms/
Online Resources:	
1	https://www.coursera.org/learn/database-management
2	https://www.udemy.com/database-management-system/
3	https://onlinecourses.swayam2.ac.in/cec22_cs18/preview

Continuous Assessment							Total (A+B)	Total Continuous Assessment	End Semester Practical Examination	Total
Theory			Practical							
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)				
80	120	200	100	75	25	100	200	50	50	100

Formative Assessment based on Capstone Model - Theory			
Course Outcome	Bloom's Level	Assessment Component	FA (10%) [80 Marks]
C201.1	Understand	Quiz	20
C201.2	Apply	Case Study	20
C201.3, C201.4	Apply	Tutorial	20
C201.5	Analyse	Assignment	20
Assessment based on Summative and End Semester Examination - Theory			
Bloom's Level	Summative Assessment (15%) [120 Marks]		

	CIA1: (60 Marks)	CIA2: (60 Marks)
Remember	10	10
Understand	40	30
Apply	50	40
Analyse	-	20
Evaluate	-	-
Create	-	-

Assessment based on Continuous and End Semester Examination - Practical

Bloom's Level	Continuous Assessment (25%) [100 Marks]		End Semester Examination (50%) [100 Marks]
	FA: (75 Marks)	SA: (25 Marks)	
Remember	20	10	10
Understand	20	20	20
Apply	40	40	40
Analyse	20	30	30
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination

Continuous Assessment (50%)							End Semester Practical Examination (50%)	
CA 1 (100 Marks)			CA 2 (100 Marks)			Practical Exam (100 Marks)		
SA 1 (60M)	FA 1		SA 2 (60M)	FA 2		FA (75M)		SA (25M)
	Component-I (20 Marks)	Component-II (20 Marks)		Component-I (20 Marks)	Component-II (20 Marks)			

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C201.1	3	3	2	2								2	3	2	2
C201.2	3	3	2	2	2				2	2	2	3	3	2	3
C201.3	3	3	2	2	2				2	2	2	3	3	2	3
C201.4	3	3	2	2	2				2	2	2	3	3	2	3
C201.5	3	3	2	2								3	3	2	3

23CY203	PROGRAMMING IN JAVA		1/0/4/3
Nature of Course	F (Theory Programming)		
Pre requisites	Nil		
Course Objectives:			
1	To understand the JavaBeans concepts and basic of core java.		
2	To Understand conditional and control statements		
3	To provide insight knowledge of OOP concepts and Collection framework		
4	To demonstrate threads, JDBC & exception handling with real world examples		
Course Outcomes :			
Upon completion of the course, students shall have ability to			
C201.1	Develop the features of core java paradigm.		[AP]
C201.2	Apply looping statements, strings in real time environment.		[AP]
C201.3	Apply the concepts of Exception Handling in real world applications and usage of collection frameworks.		[AP]
C201.4	Develop Multithreaded applications		[AP]
C201.5	Develop GUI Applications using swing component and java application to interact with database by using relevant JDBC Driver		[AP]
Course Contents:			
Module I			5 Hours
Overview of Java - Java Buzzwords – Data Types, Variables and Arrays – Operators –Conditional statements - Control Statements – Defining classes in Java – Methods -Access specifiers - Static members- Java Doc comments- JavaBeans Standards – Wrapper Classes – String – StringBuilder – StringBuffer. Types of Streams, The Byte-stream I/O hierarchy, Character Stream Hierarchy, Random Access File class, The java.io.Console Class, Serialization, Dates, Numbers, and Currency, Working with Dates, Numbers, and Currencies, Parsing, Tokenizing, and Formatting, Locating Data via Pattern Matching, Tokenizing.			
Module II			5 Hours
Class and Object, Encapsulation and Abstraction, Inheritance, Polymorphism, Message Passing, Keywords : this, super, static, final, extends and implements. Method Signature and Prototype, Mutator Methods and Accessor Methods, Var-Arg Method, hashCode() and toString() methods. Immutable Objects Vs Mutable Objects, User defined Immutable Class, Packages. Constructors : Introduction, Default Constructor, User Defined Constructors, Constructor Overloading, Instance Variable, Instance Methods, Instance Block and Instance Flow Of Execution. Regular Expressions (RegEx). Inheritance Introduction, Types of Inheritance, Up Casting, Down Casting, IS-A Relationship & HAS-A Relationship, Composition Vs Aggregation, Polymorphism : Method Overloading, & Method Overriding Abstraction : Abstract Methods and Abstract classes. Interfaces, abstract classes and Interfaces, Concrete Methods Vs Abstract Methods, Differences between classes, abstract classes and Interfaces.			
Module III			5 Hours
Exception Handling - try catch block, Finally Block, Exception Hierarchy, Multiple Exceptions In a Catch Block, Parameterized Try Block, Overriding Methods And Exception. Creating Your Own Exception, The Assert Keyword, The Generics Framework, Collections : Set, List, Map & Tree, The Iterator Interface. Working with Hashtable Collection Threads : Introduction to Threads, Creating and Starting Threads, Basic Thread Control Methods. Multithreading, Working with Multiple, threads, Thread Life Cycle, Thread Priorities, Synchronizing Methods. JDBC : Drivers, CURD operations, Database connectivity Servlets : Overview of Servlets , Servlet Life Cycle, Servlet Request and Response , web.xml and its need, Servlet Configuration, Session Tracking. Introduction to swings –Swing components.			
			Total Hours 15
List of Component:			
S. No.	Lab Exercises		
1	Basic Java Programs using Loops (Pattern Problems)		
2	Implement a Java program to perform Array & String operations.		
3	Implementation of Student application using Class and Objects		
4	Implementation of Encapsulation and Inheritance.		
5	Implementation of method overloading and overriding		

6	Implement a java program using Abstract & interface.
7	Programs using collection Interface
8	Implementation of multi-threading for generation of Prime Numbers and Fibonacci Series.
9	Program to handle multiple exception using try, catch and finally block
10	Implement Simple application using servlets.
11	Implement CURD operation using JDBC.
12	Project – Console based project with oops concepts
Total Hours: 60	
Text Books:	
1.	Herbert Schildt, "Java: The Complete Reference", 9th edition, Tata McGraw Hill, 2014.
2.	Kathy Sierra, "Head First Java: A Brain-Friendly Guide, 2nd Edition, Oreilly, 2009.
3.	Herbert Schildt, "Java A Beginner's Guide, Create, Compile and Run Java Programs Today", 8th edition, Tata McGraw Hill, 2020.
Reference Books:	
1.	Paul Deitel, Harvey Deitel, "Java How To Program", 10th Edition, Prentice Hall Publications, 2014.
2.	Y. Daniel Liang, "Introduction to Java Programming", 9th Edition, Prentice Hall Publications, 2015.
3.	Ed Roman, Rlma Patel, Sriganesh, Gerald Brose, "Mastering Enterprise JavaBeans" 3 rd edition, Wiley, 2005.
Web References:	
1	http://www.nptel.ac.in
2	http://www.javaworld.com
3	https://www.learnjavaonline.org/
4	https://www.codecademy.com/learn/learn-java
Online Resources:	
1	https://www.coursera.org/courses?query=java
2	https://www.tutorialspoint.com/java/index.htm
3	https://www.w3schools.com/java/java_intro.asp

Continuous Assessment									End Semester Practical Examination	Total
Theory				Practical			Total (A+B)	Total Continuous Assessment		
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)				
80	120	200	100	75	25	100	200	50	50	100
Formative Assessment based on Capstone Model – Theory										
Course Outcome		Bloom's Level	Assessment Component				FA (10%) [80 Marks]			
C203.1		Apply	Quiz				20			
C203.2		Apply	Assignment				20			
C203.3		Apply	Case study				20			
C203.4		Apply	Assignment				20			
C203.5		Apply								
Assessment based on Summative Assessment – Theory										
Bloom's Level		Summative Assessment (15%) [120 Marks]								
		CIA1: (60 Marks)			CIA2: (60 Marks)					
Remember		20			20					
Understand		40			40					

Apply	40	40
Analyze	-	-
Evaluate	-	-
Create	-	-

Assessment based on Continuous and End Semester Examination - Practical

Bloom's Level	Continuous Assessment (25%) [100 Marks]		End Semester Examination (50%) [100 Marks]
	FA: (75 Marks)	SA: (25 Marks)	
Remember	10	10	10
Understand	30	30	30
Apply	60	60	60
Analyze	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination

Continuous Assessment (50%)								End Semester Practical Examination (50%)
CA 1 (100 Marks)			CA 2 (100 Marks)			Practical Exam (100 Marks)		
SA 1 (60M)	FA 1		SA 2 (60M)	FA 2		FA (75M)	SA (25M)	
	Component-I (20 Marks)	Component-II (20 Marks)		Component-I (20 Marks)	Component-II (20 Marks)			

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C203.1	2	2	2	-	-	-	-		2	-	-	2	2	-	2
C203.2	3	3	3	-	-	-	-	2	2	2	-	2	2	2	2
C203.3	2	2	3	-	2	-	-		2	-	-	3	-	-	3
C203.4	3	2	2	-	2	-	-	2	2	2	-	3	-	2	3
C203.5	3	2	2	-	2	-	-	2	2	2	-	3	-	2	3

23MC102	ENVIRONMENTAL SCIENCES	2 /0 /0 /0
Nature of Course	:C (Theory Concept)	
Pre requisites	:Basics in Environmental Studies	
Course Objectives:		
1	To learn the integrated themes on various natural resources.	
2	To gain knowledge on the type of pollution and its control methods.	
3	To have an awareness about the current environmental issues and the social problems.	
Course Outcomes:		
Upon completion of the course, students shall have ability to		
C102.1	Recall and play an important role in transferring a healthy environment for future generation.	[R]
C102.2	Illustrate the importance of natural resources and conservation of biodiversity.	[U]
C102.3	Interpret and analyze the impact of engineering solutions in a global and societal context.	[U]
C102.4	Apply the gained knowledge to overcome pollution problems.	[AP]
C102.5	Apply the gained knowledge in various environmental issues and sustainable development.	[AP]
Course Contents:		
Natural Resources:		
Introduction-Forest resources: Use and abuse, case study-Major activities in forest-Water resources-over utilization of water, dams-benefits and problems. Mineral resources-Use and exploitation, environmental effects of mining- case study–Food resources- World food problems, case study. Energy resources -Renewable and non-renewable energy sources Land resources-Soil erosion and desertification – Role of an individual in conservation of natural resources.		
Environmental Pollutions:		
Definition – causes, effects and control measures of: a. Air pollution-Acid rain - Greenhouse effect-Global warming- Ozone layer depletion – case study- Bhopal gas tragedy. Water pollution c. Soil pollution - Solid waste management-Recycling of plastics-Pyrolysis method- causes, effects and control measures of municipal solid wastes d. Noise pollution. e. Nuclear hazards-case study-Chernobyl nuclear disaster-Role of an individual in prevention of pollution.		
Social issues and the Environment:		
Sustainable development-water conservation, rain water harvesting, E-Waste Management – Environmental ethics: 12 Principles of green chemistry-Scheme of labelling of environmental friendly products (Eco mark) – Emission standards – ISO 14001 standard.		
Total Hours:		30
Text Books:		
1	AnubhaKaushik and C P Kaushik “Perspectives in Environmental Studies”4 th Edition, Newage International (P) Limited, Publisher Reprint 2014. New Delhi	
2	Rajagopalan, R, “Environmental Studies-From Crisis to Cure”, Oxford University Press 2015.	
Reference Books:		
1	Tyler Miller, Jr., “Environmental Science”, Brooks/Cole a part of Cengage Learning, 2014.	
2	William Cunningham and Mary Cunningham, “Environmental Science”, 13 th Edition, McGraw Hill,2015.	
3	Gilbert M. Masters, “Introduction to Environmental Engineering and Science”, Third Edition, Pearson Education, 2014.	
Web References:		
1	http://nptel.ac.in/courses/104103020/20	
2	http://nptel.ac.in/courses/120108002	
3	http://nptel.ac.in/courses/122106030	

4	http://nptel.ac.in/courses/120108004/
5	http://nptel.ac.in/courses/122102006/20

Online Resources:

1	https://www.edx.org/course/subject/environmental-studies
2	www.environmentalscience.org

Assessment Methods & Levels (based on Bloom's Taxonomy)

Formative assessment based on Capstone Model (Max. Marks:50)

Course Outcome	Bloom's Level	Assessment Component	Marks
C102.1	Remember	Quiz	10
C102.2	Understand	Case study based on environmental aspect	20
C102.3	Understand	Class presentation	10
C102.4& C102.5	Apply	Assignment	10

Summative assessment based on Continuous Assessment

Bloom's Level	Continuous Assessment		
	CIA-I [0 marks]	CIA-II [0 marks]	Term End Assessment [50 marks]
Remember	-	-	30
Understand	-	-	40
Apply	-	-	30
Analyze	-	-	-
Evaluate	-	-	-
Create	-	-	-

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)

COs	POs											PSOs			
	a	b	c	d	e	f	g	h	i	j	K	l	1	2	3
C102.1							3								
C102.2							3								
C102.3						2	3								
C102.4							3								
C102.5							3								

3	Strongly agreed	2	Moderately agreed	1	Reasonably agreed
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