LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK (LOCF)

FOR UNDERGRADUATE PROGRAMMES

Department of Computer Science and Applications

Effective from June 2024

SYLLABUS

(2024 Restructured Curriculum)

B. Sc Computer Science

SCHOOL OF COMPUTATIONAL SCIENCES

LOYOLA COLLEGE (AUTONOMOUS)

CHENNAI 600034

College of Excellence

PREFACE

The study of algorithmic processes, computational machinery, and computation itself is known as BSc (Bachelor of Science). The theoretical study of algorithms, computing, and information to the practical difficulties of implementing computational systems in hardware and software are all covered by the BSc subject.

By examining and amending a large set of frameworks of agreed/anticipated graduate qualities, qualification descriptors, and programming learning goals, the curriculum is supposed to assist in the preservation of standards utilized in Hardware and Software Technologies across the country. Students in all fields of computer science must learn about these topics.

The practical based approach to the curriculum planning intends to deliver the knowledge and concepts of various subjects like Programming techniques of Hardware, Operating Systems, Processors, Software and Firmware, Network and Communications, Relational databases and programming languages and tools cutting across the Software and IT industry to be learned at BSc level. The curriculum, which is based on computer science technology, includes implementations of all of the above-mentioned languages and tools.

The curriculum is based on some of the most important skill sets that employer have identified. Any exposure to the IT industry necessitates a thorough knowledge and grasp of these topics. Each course is crucial in light of the students' future prospects in the sector, as advancement from here could lead to positions in research and development, IT, or as an entrepreneur.

Students should master the curriculum using advanced tools and technology such as graphical representations and online tools for putting the written code into practice. Students are exposed to modern tools as a result of the curriculum's design. In this curriculum, more emphasis is given to content related to sustainability, skill acquisition, and entrepreneurship.

Students will be able to apply their knowledge in the future course of their further education, job, or research with the support of this curriculum and knowledge of the practical application of the courses. Students are expected to have knowledge in each area in order to meet industry needs, requests, and technological advancements.

The curriculum, teaching pedagogy, and assessment methods are assigned with appropriate cognitive levels as per BLOOM’s Taxonomy. The OBE-based evaluation methods will pave way for the assessment of the cognitive levels of the students and evaluate the expected course outcome attainment.

VISION AND MISSION OF LOYOLA COLLEGE

VISION

Towards holistic formation of youth, grounded in excellence, through accompaniment to serve the humanity.

MISSION

- To provide inclusive education through an integral and holistic formative pedagogy.
- To promote skills that prepare them for the future.
- To kindle in young minds the spirit of social and environmental justice with a blendof academic excellence and empathy.
- To stimulate critical and conscientious scholarship leading to meaningful and innovative human capital.

CORE VALUES

- Cura Personalis
- Pursuit of Excellence
- Moral Rectitude
- Social Equity
- Fostering solidarity
- Global Vision
- Spiritual Quotient

VISION AND MISSION OF THE DEPARTMENT

VISION:

To be the premier department in shaping young minds to achieve eminence in digital transformation.

MISSION

To provide a learning ambience and curiosity to explore new avenues with social responsibilities.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

(School of Computational sciences)

PEO 1	**LEARNING ENVIRONMENT AND LIFE LONG LEARNING** To access academic facilities in an environment of inclusiveness and inquisitiveness for effective and immersed learning throughout life to attain excellence in the chosen field of computational sciences.
PEO 2	**GLOBALLY RELEVANT CURRICULUM AND SCIENTIFIC TEMPERAMENT** To think innovatively, analyze scientifically and make decisions appropriately, for handling contemporary global concerns through the knowledge earned in the computational sciences curriculum.
PEO 3	**ACADEMIC EXCELLENCE AND CORE COMPETENCY** To excel in modern computational techniques and compete in higher studies/career, for addressing contemporary challenging problems with ease.
PEO 4	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP** To develop analytical, logical and critical problem solving skills for executing professional work and become experts/entrepreneurs in the field of computational sciences.
PEO 5	**ENVIRONMENT AND SUSTAINABILITY** To identify real world problems concerning environment and other issues; and apply the expertise in the computational sciences, to face the challenges and provide sustainable solutions.
PEO 6	**PROFESSIONALISM AND ETHICS WITH SOCIAL RESPONSIBILITY** To equip themselves with the necessary competency towards professionalism in the computational sciences maintaining ethical standards in addressing the needs of industry and society.

PROGRAMME OUTCOMES (POs)

(School of Computational Sciences)

PO1	**DISCIPLINARY KNOWLEDGE & INFORMATION/DIGITAL LITERACY** To acquire literacy in the respective discipline of computational sciences and demonstrate scholarly knowledge in the information-digital era.
PO2	**SELF DIRECTED AND LIFE-LONG LEARNING** To adapt oneself to technological advancements in computing and engage in life- long self-learning for personal development in the context of interdisciplinary nature of future endeavors.
PO3	**SUSTAINABLE SOCIAL AND ENVIRONMENTAL CONSCIOUSNESS** To realize social and environmental problems and contribute the computational expertise to face the challenges and provide sustainable solutions.
PO4	**CRITICAL THINKING, ANALYTICAL REASONING & PROBLEM SOLVING** To critically reason out, analyze and develop solutions through various computational techniques for real time problems.
PO5	**SCIENTIFIC REASONING AND PROFESSIONALISM** To apply scientific reasoning in the approach to handle professional matters, and manifest the core competencies, adhere to collaborative efforts within ethical frameworks and emerge as professionals holding key positions.
PO6	**SKILL DEVELOPMENT FOR LEADERSHIP AND ENTREPRENEURSHIP** To construct togetherness with people by building professional skills and provide effective leadership progressing to become experts/entrepreneurs in the field of Computational Sciences.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

(Department of Computer Science and Applications)

PSO 1	To apply the acquired knowledge and competence to identify the real world problems scientifically and develop a system to provide a complete solution in a professional way.
PSO 2	To inculcate critical thinking and skills to excel in technologies and its services used ethically in Public and Private Sectors, Teaching and Research.
PSO3	To adopt creative frameworks for sustainable development in their career with virtuous standards to become a successful entrepreneur or application developer.
PSO 4	To be capable of upgrading and advancing knowledge through innovation and technology as evidenced by current developments.
PSO 5	To embrace an admirable and commendable life with environmental concern. Perform professionally with social and ethical responsibility as an individual and a successful team player.
PSO 6	To assimilate computational techniques to acquire required skills on multidisciplinary areas to meet the standards and global demands.
PSO 7	Tend to work in a collaborative environment through application of scientific reasoning and communicate effectively to the stakeholders.

RESTRUCTURED UG CURRICULUM 2024 - SCIENCE TEMPLATE

	I	II	III	IV	V	VI	Hr	Cr
PART I: Ability Enhancement Course	**GL 3(3)**	**GL 3(3)**	**GL 3(3)**	**GL 3(3)**			**12**	**12**
PART II: Ability Enhancement Course	**GE 6(3)**	**GE 6(3)**	**GE 5(3)**	**GE 5(3)**			**22**	**12**
PART III: Discipline Specific Core (DSC)	**MC 12(12)**	**MC 12(12)**	**MC 12(12)**	**MC 8(8)**	**MC 22(22)**	**MC 20(20)**	**86**	**86**
Discipline Specific Elective (DSE)				**ME 4(4)**	**ME 4(4)**		**8**	**8**
Skill Enhancement Course (SEC)					**RC 4(4)**	**MS 10(8)**	**14**	**12**
						IN(4)		**4**
	AR 6(4)	**AR 6(4)**	**AO 5(3)**	**AO 5(3)**			**22**	**14**
		MOOC/ SS*	**MOOC/ SS***	**MOOC/ SS***	**MOOC/ SS***			
			CD (BT/ AT/NME) 3(2)	**CD (BT/ AT/NME) 3(2)**			**6**	**4**
PART IV: Generic Elective Course (GEC)	**FC 3(1)**	**FC 3(1)**	**FC 2(1)**	**FC 2(1)**			**10**	**4**
	CC*	**CC(1) ***						**1**
PART V: Life Skills (LSK)			**OR***	**OR* (2)**				**2**
Hours/Credits	**30 (23)**	**30 (24)**	**30 (24)**	**30 (26)**	**30 (30)**	**30 (32)**	**180**	**159**

- **GL**-General Language
- **GE**-General English
- **MC**-Major Core; **AR**-Allied Required; **AO**-Allied Optional; **ME**-Major Elective; **MS**-Major Skill; **IN**-Internship; **SS**-Self Study; **CD**-Cross Disciplinary; **RC**-Research and Competency Skill; **MOOC**-Massive Open Online Course
- **BT**-Basic Tamil; **AT**-Advanced Tamil; **NME**-Non-Major Elective; **FC**-Foundation Course
- **CC**- Co-curricular Activities; **OR**-Outreach.

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

OVERALL COURSE STRUCTURE

Restructured LOCF curriculum effective from June 2024

SEM	SUBJECT CODE	COURSE TITLE	SUBJECT CATEGORY T/L/P	SUB PART DISCRIPTION	HOURS	CREDIT
I		General Language-I	T	GL	3	3
I		General English-I	T	GE	6	3
I		Foundation Course	T	FC	3	1
I	**UCS1MC01**	Programming Techniques using Python	T	MC	4	4
I	**UCS1MC02**	Python Programming Lab	L	MC	4	4
I	**UCS1MC03**	Digital Logic Fundamentals	T	MC	4	4
I	**UCA1AR01**	Mathematical Statistics for Computer Science	T	AR	6	4
SEM						
II		General Language-II	T	GL	3	3
II		General English-II	T	GE	6	3
II		Foundation Course	T	FC	3	1
II	**UCS2MC01**	Programming with Java	T	MC	4	4
II	**UCS2MC02**	Data Structures	T	MC	4	4
II	**UCS2MC03**	Data Structures using Java Lab	L	MC	4	4
II	**UCA2AR01**	Microprocessor	T	AR	6	4
SEM						
III		General Language-III	T	GL	3	3
III		General English-III	T	GE	5	3
III		Foundation Course	T	FC	2	1
III	**UCS3MC01**	Relational Database Management Systems	T	MC	4	4
	UCS3MC02	Relational Database Management Systems Lab	L	MC	4	4

III	**UCS3MC03**	Data Communication & Networks	T	MC	4	4
III	**UCS3AO01/ UCS3AO02**	Data Analytics using MS-Excel Lab / Digital Marketing Lab	L	AO	5	3
III	**UCS3CD01**	Introduction to Data Analytics	L	NME	3	2
SEM						
IV		General Language-IV	T	GL	3	3
IV		General English-IV	T	GE	5	3
IV		Foundation Course	T	FC	2	1
IV	**UCS4MC01**	Web Programming with ASP.Net	T	MC	4	4
IV	**UCS4MC02**	Web Programming with ASP.Net Lab	L	MC	4	4
IV	**UCS4ME01/ UCS4ME02/ UCS4ME03/ UCS4ME04**	Internet of Things/ Cloud computing/ UI/UX Design Lab / Block chain Technology	L T	ME	4	4
IV	**UCS4AO01/ UCS4AO02**	Java programming Lab/ Software Testing Lab	L	AO	5	3
IV	**UCS4CD01**	PC Troubleshooting	L	NME	3	2
SEM						
V	**UCS5MC01**	PHP and MYSQL	T	MC	4	4
V	**UCS5MC02**	PHP and MYSQL Lab	L	MC	4	4
V	**UCS5MC03**	Full Stack Web Development Lab	L	MC	6	6
V	**UCS5MC04**	Operating System	T	MC	4	4
V	**UCS5MC05**	Software Engineering	T	MC	4	4
	UCS5ME01/ UCS5ME02	Robotic Process Automation Lab / Devops Lab	L	ME	4	4
	UCS5RC01	Research Methodology	T	RC	4	4
SEM						
VI	**UCS6MS01/ UCS6MS02**	Mobile App Development / Machine Learning using Python	T	MS	5	4

VI	**UCS6MS03/ UCS6MS04**	Mobile App Development Lab / Machine Learning using Python Lab	L	MS	5	4
VI	**UCS6MC01**	Artificial Intelligence	T	MC	4	4
VI	**UCS6MC02**	Natural Language Processing	L	MC	6	6
VI	**UCS6MC03**	Cyber Security	T	MC	4	4
VI	**UCS6MC04**	Project	L	MC	6	6
VI	**UCS6IN01**	Internship		IN		4
	Total				180	159

COURSE DESCRIPTOR

(Syllabus)

SEMESTER-I

Course Code	**UCS1MC01**
Course Title	**Programming Techniques using Python**
Credits	4
Hours/Week	4
Category	MC - Theory
Semester	I
Regulation	2024

Course Overview

1. Summary of topics related to fundamentals of computer and algorithmic problem solving.
2. Introductory programming concepts using python.
3. Fundamental concept in programming and problem solving using python.
4. Fundamental concepts- conditionals , iteration, string manipulation
5. Concepts of files and exception.

Course Objectives

1. To understand the basics of algorithmic problem solving.
2. To learn to solve problems using Python conditionals and loops.
3. To define Python functions and use function calls to solve problems.
4. To use Python data structures – lists, tuples, dictionaries to represent complex data.
5. To do input/output with files in Python..

Prerequisites	Basics of mathematics and statistics.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Algorithms, building blocks of algorithms - notation (pseudo code, flow chart, programming language), Python interpreter and interactive mode, Python Data types ,variables, expressions, statements, precedence of operators, comments.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	Conditionals: conditional statements, Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, recursion; Strings: string slices, immutability, string functions and methods, array and array operations.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; List comprehension. Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; Dictionary comprehension, advanced list processing, set and set operations.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exception handling, exceptions.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
V	Modules, importing modules, Python Libraries-Creating user interfaces using TKinter-The basics of Numpy arrays –Data manipulation with pandas.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

TextBooks

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning Development Limited, 2017.

Suggested Readings

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data'', Third Edition, MIT Press.
4. Eric Matthes, "Python Crash Course, A Hands – on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, McGraw Hill, 2018.

Web Resources

1. https://www.python.org/
2. https://www.freecodecamp.org/
3. https://www.techwithtim.net

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	Understand algorithmic solutions to simple computational problems.	K1, K2
CO 2	Execute simple Python programs using sequences data ,Modules and libraries	K3, K4
CO 3	Create simple Python programs using conditionals and looping and create user interface using Tkinder library.	K5, K6

Course Code	**UCS1MC02**
Course Title	**Python Programming Lab**
Credits	04
Hours/Week	04
Category	Major Core (MC) –Practical
Semester	I
Regulation	2024

Course Overview

1. Fundamentals of computer and algorithmic problem solving.
2. Understanding of python data types and libraries.
3. Understanding of conditional statements functions, string, arrays.
4. Fundamental concepts- – lists, tuples, dictionaries.
5. Fundamental concepts of files and exception.

Course Objectives

1. To understand the problem solving approaches.
2. To learn the basic programming constructs in Python.
3. To practice various computing strategies for Python-based solutions to real world problems.
4. To use Python data structures – lists, tuples, dictionaries.
5. To do input/output with files in Python.

Prerequisites	Basic knowledge in Programming language.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	1. Write a python program to perform arithmetic operations. 2 Write a python program to prepare Students Marks Statement.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	3. Write a python program to calculate Electricity Bill.			
II	4. Write a python program to exchange the values of two variables. 5. Write a python program to circulate the values of n variables. 6. Write a python program to distance between two points.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	7. Write a python program to create array and sum of array of N numbers using Numpy. 8. Write a python program to read CSV file using Pandas. 9. Write a python program to draw line and bar chart using matplotlib.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	10. Write a python program to perform List operations 11. Write a python program to perform List operations 12. Write a python program to perform Dictionary operations.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
V	13. Write a python program to perform word count and copy file. 14. Write a python program to demonstrate exceptional handling. 15.Write a python program to perform Voter's age validation,	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

Text Books

1.Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

2.Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning Development Limited, 2017.

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1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.

2. Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.

3. John V Guttag,Introduction to Computation and Programming Using Python: With Applications to

Computational Modeling and Understanding Data‘‘, Third Edition, MIT Press.

4. Eric Matthes, “Python Crash Course, A Hands – on Project Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019.

5. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, McGraw Hill, 2018.

Web Resources

1. https://www.python.org.
2. https://www.freecodecamp.org/
3. https://www.techwithtim.net

CourseOutcomes(COs) and CognitiveLevel Mapping

COs	CO Description	Cognitive Level
CO1	Develop algorithmic solutions to simple computational problems.	K1,K2
CO2	Develop and execute program for real time problems	K3, K4
CO3	Write Python programs using lists. tuples, dictionary and files	K5, K6

Course Code	**UCS1MC03**
Course Title	**Digital Logic Fundamentals**
Credits	04
Hours/Week	04
Category	MC
Semester	I
Regulation	2024

Course Overview

1. To develop a comprehensive understanding of the basic principles underlying number systems and digital systems.
2. The course serves as a foundation for further studies in computer science, electrical engineering, and related fields.
3. It covers fundamental concepts, tools, and techniques essential for designing, analyzing, and implementing digital circuits.

Course Objectives

1. Understanding of number systems, including binary representation, logic gates, and Boolean algebra.
2. To design and analyze combinational logic circuits using truth tables, karnaugh maps, and Boolean algebra.
3. To design and analyze the sequential logic circuits, including flip-flops, registers, counters, and state machines,
4. To illustrate the design and usage of memory devices.

Prerequisites	Basic knowledge on Digital Logic Circuits and Boolean Algebra.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Number Systems –Introduction - Digital Logic - Number Systems - Conversion from One Number System to Another- Digital Codes Introduction - Weighted Binary Code- Non-Weighted Binary Code - Alphanumeric Code Error Detection and Error Correction Codes.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	Digital Arithmetic – Introduction - Binary Operations - Representation of Signed Numbers in Binary - Subtraction Using 1's Complement Method - Subtraction Using 2's Complement Method - Addition and Subtraction of Octal Numbers - Addition and Subtraction of Hexadecimal Numbers - Addition and Subtraction of BCD.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Boolean Algebra –Introduction - Boolean Logic- Boolean Operations - Operator Precedence -Laws of Boolean Algebra - Representation of Boolean Function – Simplification methods in Boolean algebra.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Logic Gates – Basic Logic Gates – Universal Gates – Combinational Circuits – Flip Flops – S-R Flip Flop – J-K Flip Flop - D - Flip Flop - T Flip Flop - Counters - Synchronous Counter - Application of Counters.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Shift Registers – Introduction – 4 Bit Register - Shift Register modes - Counter Design Using Registers -Universal Register - Memory Devices – Introduction - Architecture of a Memory Unit - Volatile and Non-volatile Memory - Semiconductor Memories - Secondary Storage Devices (Auxiliary Memory) - Programmable Logic Devices (RAM and ROM).	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Book

Jaydeep Chakravorty, “Digital Electronics and Logic Design”, First Edition, Universities Press, 2012.

Suggested Readings

1. M.Morris Mano, “Computer System Architecture”, Third Edition, Prentice Hall of India, 2006.
2. G.K.Kharate, “Digital Electronics”, First Edition, Oxford University Press, 2010.
3. David Harris, Sarah Harris, “Digital Design and Computer Architecture”, Second Edition, Morgan Kaufmann, 2012.

Web Resources

1. https://www.javatpoint.com/logic-gates-in-digital-electronics
2. https://www.tutorialspoint.com/digital_circuits/digital_circuits_logic_gates.htm
3. https://www.researchgate.net/profile/Dk-Kaushik/publication/264005171_Digital_Electronics/links/53fca84a0cf2364ccc04b6dd/Digital-Electronics.pdf
4. https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To develop a solid foundation in number systems, binary arithmetic and digital logic.	K1, K2
CO 2	To design, analyze, and implement digital circuits and systems effectively.	K3, K4
CO 3	To construct counters based on the requirements and address the memory.	K5, K6

Course Code	**UCA1AR01**
Course Title	**Mathematical Statistics for Computer Science**
Credits	04
Hours/Week	06
Category	AR
Semester	I
Regulation	2024

Course Overview

1. Mathematical statistics is a branch of applied mathematics that deals with the theoretical aspects of statistical methods.
2. This course provides a basic foundation in probability theory and statistical inference, focusing on mathematical techniques for analyzing and interpreting data.
3. It covers the understanding of the mathematical principles underlying statistical methods and their application to real-world problems.
4. This course develops critical thinking and analytical skills through problem-solving exercises and mathematical proofs.

Course Objectives

1. To understand the fundamental concepts of statistics.
2. To apply mathematical statistics to solve problems from various domains like science, engineering, economic and social sciences
3. To develop analytical skills through problem-solving exercises and communicate mathematical ideas effectively.
4. To apply matrices to solve real-world problems like optimization, regression analysis, image processing and network analysis.

Prerequisites	Basic knowledge of Mathematics.

SYLLABUS				
Unit	**Content**	**Hrs**	**COs**	**Cognitive Level**
I	Introduction: Origin and Development of Statistics, Definition of Statistics, Statistics in Business, Data Measurement. Frequency Distribution and Measures of Central Tendency: Frequency Distributions, Graphic Representation of Frequency Distribution, Measures of Central Tendency, Arithmetic Mean, Median, Mode.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	Measures of Dispersion, Skewness and Kurtosis: Dispersion, Measures of Dispersion, Range, Quartile Deviation, Mean Deviation, Variance, Standard Deviation, Co-efficient of Dispersion, Co-efficient of Variation, Skewness, Kurtosis	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Correlation and Regression: Karl Pearson Coefficient of Correlation, Calculation of the Correlation Co-efficient for a Bivariate Frequency Distribution, Spearman's Rank Correlation Coefficient, Lines of Regression, Properties of Regression coefficients.	18	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Probability: Definition of Probability, Definitions of various Terms: Trial and Event, Exhaustive Events, Favourable Events, Mutually Exclusive Events, Equally Likely Events, Independent Events. Mathematical Probability, Statistical Probability.	18	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Matrices: Symmetric, Skew Symmetric, Hermitian, Skew Hermitian, Orthogonal, unitary matrices, Eigen values, Eigen vectors – Cayley Hamilton theorem.	18	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. S.C.Gupta and V.K. Kapoor, " Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, First Edition, August 2000 (Unit I, II, III and IV)
2. Shanti Narayan, P.K.Mittal," A Textbook of Matrices", S Chand & Co Ltd ,2010 (Unit V)
3. Ken Black, "Business Statistics for Contemporary Decision Making", Wiley, John Wiley and Sons, 6th Edition, 2012 (For Applications)

Suggested Readings

1. Vittal P. R, “Mathematical Statistics”, (1st edition – 2002), Margham Publications, Chennai-17

2. Goon. A. M., Gupta. M. K. and Dass Gupta. B, “Fundamentals of Statistics – Volume II” (6th edition - 1990), The World Press Private Ltd., Calcutta.

3. Biswas, S.A, “Textbook of Matrix Algebra”, New Age International, 1997.

4. Gupta S.C. “An Introduction to Matrices”, (Reprint). Sultan Chand & Sons, 2008.

Web Resources

1. https://study.com/academy/lesson/cayley-hamilton-theorem-definition-equation-example.html
2. https://www.khanacademy.org/math/statistics-probability/probability-library/basic-theoretical-probability/a/probability-the-basics
3. https://www.csueastbay.edu/scaa/files/docs/student-handouts/marija-stanojcic-mean-median-mode-variance-standard-deviation.pdf

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	Understand the fundamental concepts of probability and matrices for statistical analysis	K1, K2
CO 2	Analyze the principles and techniques of statistical methods to make decisions based on data and reliable conclusions	K3, K4
CO 3	Assess the importance of applying mathematical methods to interpret data effectively for problem-solving skills	K5, K6

SEMESTER-II

Course Code	**UCS2MC01**
Course Title	**Programming with Java**
Credits	04
Hours/Week	04
Category	Major Core (MC) -Theory
Semester	II
Regulation	2024
Course Overview 1. To understand and know the importance of OOPs in real-world problems. 2. To familiarize with controls structures and looping statements. 3. To emphasize the importance of interfaces and packages. 4. It also covers concurrent programming techniques and handling errors.	
Course Objectives 1. To understand and apply Object Oriented Programming Principle to solve real world problems. 2. To implement re-usability for efficient software development. 3. To create packages and manage concurrent processes using threads in java. 4. To explore and utilize the error handling features in Java.	
Prerequisites	Basic knowledge on programming.

SYLLABUS				
Unit	**Content**	**Hrs**	**COs**	**Cognitive Level**

I	Fundamentals of Object Oriented Programming: Basic Concepts of OOPS-Benefits of OOPS-Applications of OOPS. Java Evolution: Java Features-Simple java program-java tokens -java virtual machine. Constants-Variables, Data Types – Scope of variables-type casting- Operators and Expressions.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	Decision Making and Branching Statements, Decision Making and Looping Statements. Arrays, Strings. Classes, Objects and Methods: Constructors.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Methods overloading- Static Members-Inheritance-Overriding methods-Final variable and methods-Final Class - Finalizer methods- Abstract methods and classes.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	Interfaces: Defining Interface- Extending Interface-Implementing Interface-Accessing Interface Variable. Packages: Putting Classes Together- Java API Packages – Using System Packages – Naming Conventions – Creating Packages – Accessing a Package – Using a Package – Adding a Class to a Package.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
V	Multi threaded Programming: Creating Threads, Extending a Thread class- Life cycle of a Thread, Thread Priority- Implementing Runnable Interface. Managing errors and Exceptions: Exceptions - Exception Handling Code-Multiple Catch Statements- Using Finally-Throwing our own Exceptions.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

Text Book

Programming with Java, E. Balagurusamy, Tata McGraw-Hill, 2019, Sixth Edition.

Suggested Readings

1. Java - The Complete Reference, Schildt Herbert and Peter Naughton, Tata McGraw-Hill, 2019, Eleventh Edition.

2. Programming with Java, Dr. C. Muthu, Tata McGraw-Hill, 2010, Second Edition, University of Chicago Press and Ivy Press Ltd., p.193.

Web Resources

1. https://www.tutorialspoint.com/java/index.htm
2. https://www.javatpoint.com/java-tutorial

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	Understand the fundamental concepts of object-oriented programming in Java	K1, K2
CO 2	Analyze programming constructs with objects, Classes, inheritance, packages, and interfaces.	K3, K4
CO 3	Develop simple applications to solve real-world problems.	K5, K6

Course Code	**UCS2MC02**
Course Title	**Data Structures**
Credits	04
Hours/Week	04
Category	Major Core (MC) – Theory
Semester	II
Regulation	2024

Course Overview

1. This course introduces the fundamentals of data structures.
2. Learn to write programs for different Data Structures.
3. This Develop programming skills which require to solve given problem.
4. This course provides the systematic organization of data in a computer system.
5. It helps to critique an appropriate data structure by analyzing the given data.

Course Objectives

1. To provide the knowledge of basic data structure and their implementations.
2. To understand the functionality of different data structures.
3. To use the appropriate data structure in context of solution of given problem.
4. To understand the fundamental trade-offs in the design of the data structures.

Prerequisites	Basic knowledge on data types.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction and Overview: Basic Terminologies related to Data Structures, Types of Data Structures, Advantages of Data Structures, Classification of data structure, Arrays- Single dimensional Array- two dimensional Array- Multidimensional Array.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	Sorting – sorting Techniques- Bubble sort, Selection sort, Insertion sort, Stacks- Representation of stack- Operations on stack, Queues- Representation of Queues-operations on queues, Circular Queue- Representation of Queues-operations on circular queues	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

III	Arithmetic Expressions: Evaluation of a postfix expression, transforming infix expression into postfix, Linked List- Singly Linked List: Representation - Traversing, Searching, Inserting, Deleting, Doubly Linked List: Representation- Traversal, Inserting, Deleting	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Recursion – Factorials, Trees – Tree terminology, Binary Trees-inserting, deleting, Traversing Binary Trees -Pre order, In-order, Post order.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Hashing, double hashing, collisions, Graphs: Graph Theory Terminology- Breadth first search, Depth first search, Weighted Graphs- Shortest-Path problem.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Seymour Lipschutz, Data Structures, Schaum's Outline series, 1st Edition, 2013.
2. Narasimha Karumanchi, Data Structure and Algorithms Made easy in Java,2nd Edition, 2011

Suggested Readings

1. Narasimha Karumanchi, Data Structures and Algorithms made easy Career Monk Publications, 2nd Edition, 2016.
2. Michael T. Goodrich; Roberto Tamassia; Michael H. Goldwasser; Subhasish Banerjee, Data Structures and Algorithms in Java,2022.

Web Resources

1. https://www.javatpoint.com/data-structure-introduction
2. https://www.mygreatlearning.com/blog/data-structures-using-java/
3. https://www.udemy.com/course/data-structures-and-algorithms-in-java/
4. https://everythingcomputerscience.com/books/schoolboek-data_structures_and_algorithms_in_java.pdf

Course Outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To recognize and understand the usage of common data structures.	K1, K2
CO 2	To employ the concept of data structures in problem solving.	K3, K4
CO 3	To analyze the various data structures and its operations.	K5, K6

Course Code	**UCS2MC03**
Course Title	**Data Structures using Java Lab**
Credits	04
Hours/Week	04
Category	Major Core (MC) – Practical
Semester	II
Regulation	2024

Course Overview

1. This course introduces the implementation of data structures in java.
2. Learn to write programs for different Data Structures.
3. This develop programming skills which require to solve given problem.
4. It also deals with concurrent programming techniques.

Course Objectives

1. This course is aimed to understanding of OOP concepts and basics of Java programming.
2. To explore and utilize the error handling features in Java.
3. To use the appropriate data structure in context of solution of given problem.
4. To understand the fundamental trade-offs in the design of the data structures.

Prerequisites	Basic knowledge on programming using data structure concept.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	1. Implement Control flow and Loopings 2. Exercise with classes and objects 3. Explore scope of variables 4. Explore String handling functions	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	5. Make use of code reusability using Inheritance 6. Attain the concept of Abstraction with Abstract classes 7. Explore Method Overloading concept 8. Utilize Method Overriding concept 9. Implement the concept of Interface 10. Make use of Packages	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

III	11. Implement concurrent programming using threads 12. Exercise to handle Exceptions.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Implement the following Data structures concept 13. Arrays 14. Singly linked list 15. Doubly Linked List 16. Circular Linked List	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Algorithms 17. Searching 18. Sorting	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Programming with Java, E. Balagurusamy, Tata McGraw-Hill, 2019, Sixth Edition.
2. Narasimha Karumanchi, Data Structure and Algorithm Made easy in Java,2nd Edition, 2011

Suggested Readings

1. Java - The Complete Reference, Schildt Herbert and Peter Naughton, Tata McGraw-Hill, 2019, Eleventh Edition.
2. Michael T. Goodrich; Roberto Tamassia; Michael H. Goldwasser; Subhasish Banerjee, Data Structures and Algorithms in Java,2022.

Web Resources

1. https://www.javatpoint.com/java-practice-programs
2. https://www.w3resource.com/java-exercises/
3. https://www.w3schools.in/data-structures-tutorial/intro/
4. https://everythingcomputerscience.com/books/schoolboek-data_structures_and_algorithms_in_java.pdf

Course Outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To implement the programming concepts in Java.	K1, K2
CO 2	To understand the Object-Oriented Programming concepts in java.	K3, K4
CO 3	To experiment with programming constructs like objects, classes, inheritance, packages and interfaces.	K5, K6

Course Code	**UCA2AR01**
Course Title	**Microprocessor**
Credits	4
Hours/Week	6
Category	AR
Semester	II
Regulations	2024

Course Overview

1. Microprocessor is an integrated study of physics, electronics and computer organization.

2. It covers the basic concepts of microprocessor, its functional units and pinout signals.

3. This course elaborates on the instructions and familiarizes the students in writing assembly language programs.

4. This course explores on interfacing the microprocessor with the peripherals.

5. In addition, this course provides the basic knowledge in solving real world problems using assembly language programming.

Course Objectives

1. To understand the basic concepts of microprocessor and its applications in real world.

2. To understand the pinout functions and architecture of 8085.

3. To understand the various instructions of 8085 in writing assembly language program.

4. To understand the machine cycle and time delays.

5. To understand the role of 8085 in interfacing.

Prerequisites	Basic knowledge of physics and computer organization.

SYLLABUS

Unit	CONTENT	Hrs	COs	Cognitive Level
1	Introduction: Microprocessor as a programmable device — Advances in semiconductor technologies—organization of			

	microprocessor based system—from large computer to single chip microcontroller—computer languages-8085 programming model-instruction, data format and storage--basic applications of Microprocessor.	**18**	CO1, CO2, CO3	K1,K2, K3,K4, K5,K6
2	Instruction set— bus organization –8085 pinout and signals –8085 architecture—generating control signals—demultiplexing address and data.	**18**	CO1, CO2, CO3	K1,K2, K3,K4, K5,K6
3	8085 machine cycles and bus timings: Opcode fetch machine cycle- Memory read machine cycle- Memory write machine cycle- I/O read machine cycle- I/O Write machine cycle. Counters and Time delays: Time delay using one register- a register pair- loop within a Loop technique.	**18**	CO1, CO2, CO3	K1,K2, K3,K4, K5,K6
4	Stack and subroutines- Stack- Subroutine- Restart- Call and return instructions- Advanced subroutine concepts--Microprocessor Based Software Development Systems—tools for developing assembly language programs--Interfacing peripherals: 8085 interrupts—8085 vectored interrupts.	**18**	CO1, CO2, CO3	K1,K2, K3,K4, K5,K6
5	Interfacing data converters: basic concepts—D/A converters—A/D converters—programmable interface devices: 8279 logic block diagram--Programmable peripheral devices(8255A)—Programmable interrupt controller(8259)—Programmable interval timer(8254)—Programmable DMA controller(8237)--Interfacing a matrix keyboard--Interfacing 7 segment LED display. Introduction to 8086.Introduction to 8086—Introduction to microprocessor in IoT.	**18**	CO1, CO2, CO3	K1,K2, K3,K4, K5,K6

Text Books

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming and applications with 8085", 6/e, Penram International Publishing Pvt. Ltd., 2013.

2. Douglas V Hall,"Microprocessor and Interfacing ",SIE 3rd edition.

3.V. Vijayendran,Viswanathan," Fundamentals of Microprocessor 8085: Architecture Programming, and Interfacing",Viswanathan S., Printers & Publishers Pvt. Ltd (2009).

4.Rajkamal,"IoT:architecture, design principles and applications", McGraw Hill Higher Education.

Suggested Readings

1. Mathur A.P., Introduction to Microprocessors. 3rd edn., Tata McGraw, New Delhi,
2. A.P.Godse, D.A.Godse,"Microprocessors and Interfacing", Technical Publications,Pune.
3. Dr.D.K.Kaushik,"An Introduction to Microprocessor 8085", Dhanpat Rai Publishing Company.
4. Simone Cirani,Gianluigi,Ferrasi,Marco Picone,Luca veltri,"Internet of Things Architectures, protocols and standards",Wiley-2019

Web Resources

1. https://nptel.ac.in/courses
2. https://onlinecourses.nptel.ac.in/noc24_ee40/preview
3. https://adityaeeeb.weebly.com/uploads/4/2/0/0/42007913/mpmc_textbook_godse.pdf

Course Outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO1	Understand microprocessor and its functional units.	K1, K2
CO2	Understand various instructions to write an assembly language program to solve problems.	K3, K4
CO3	Identify the need for various interfacing peripherals to solve real world problems.	K5, K6

SEMESTER-III

Course Code	**UCS3MC01**
Course Title	**Relational Database Management Systems**
Credits	4
Hours/Week	4
Category	MC
Semester	III
Regulation	2024

Course Overview

1. This course is designed to provide the basics of data management.
2. This provides the skill to design and develop databases to maintain the real world data.
3. This course provides back-end programming skills.
4. The aim of the course is to write efficient queries to retrieve data based on the requirement.

Course Objectives

1. To understand the basics of databases and database management.
2. To create and manipulate tables (Data Storages).
3. To write simple queries to fetch data from the databases.
4. To create stored objects using PL/SQL and perform error handling.

Prerequisites	Fundamental Programming Skills.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction to Database Systems - DBMS-File management systems- FMS versus DBMS-Overview of database management -Introduction to SQL- DBMS Models- Database System Architecture -Relational model- Relational Databases introduction - Relational Algebra-Database integrity- Keys-views- Database design-	12	CO1 CO2 CO3	K1,K2, K3,K4, K5,K6

	Functional dependencies- Normalisation and Normal forms- ER modelling.			
II	Transaction Processing - Transaction - Recovery- Transaction Models- Two-Phase commit - Concurrency problems- Locking-Deadlocks- Transaction serialisability isolation levels- Database Security –Database control- Users and database privileges-Filtering Table privileges-Statistical databases-Query execution and optimization-Advanced topics in DBMS- Deductive databases-Internet and DBMS- Multimedia databases-Digital Libraries- Mobile databases.	12	CO1 CO2 CO3	K1,K2, K3,K4, K5,K6
III	Introduction to SQL types -DDL Data types- Creating and managing tables-Creating and managing constraints- Error codes- DML Retrieval of data- Sorting Case structure-DCL and DTL. SQL Queries-Arithmetic operations- Restricting with where clause-Built-in Functions - Number functions- Character functions- Conversion functions- Date functions-Grouping data -Distinct function-Null value function- Decode- Case- Joins- Set operation- Sub queries- Correlated sub queries.	12	CO1 CO2 CO3	K1,K2, K3,K4, K5,K6
IV	PL / SQL Fundamentals Block Structure - data types Variable Declaration-Anchored declaration-Assignment operation- Bind variables Printing in PL/SQL Control structures- IF statement and LOOP statements-Case statement- Nested blocks - DML in PL/SQL - PL/SQL cursors- Cursor For loop- Built-in Exceptions-User Defined Exceptions.	12	CO1 CO2 CO3	K1,K2, K3,K4, K5,K6
V	Creating and managing views- creating Sequences, indexes and synonyms-.Composite data types-Records-Tables- Varray - Creation and usage of Procedures, Functions, Packages and Triggers-Instead of Trigger-Overloading packages-Data dictionary views. Case study: Preparing SSLC marks statement using Packages.	12	CO1 CO2 CO3	K1,K2, K3,K4, K5,K6

Text Books

1. Atul Kahate , Introduction to database management System, Pearson Education, First Edition, 2004.
2. Nilesh Shah, Database Systems Using Oracle, Pearson Education, Second Edition, 2011.

Suggested Readings

1. Steven Feuerstein and Bill Pribyl, Oracle PL/SQL Programming, O'Reilly, Fourth Edition, 2014.
2. Kevin Loney, Oracle 11g, The Complete reference, Oracle Press, First Edition, 2009.

Web Resources

1. https://docs.oracle.com/cd/E11882_01/server.112/e40540.pdf
2. https://www.oracletutorial.com/
3. https://www.javatpoint.com/oracle-tutorial

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To understand the basics of backend programming with data storages.	K1, K2
CO 2	To construct statements to validate the data storage schemas and ensure the effective retrieval.	K3, K4
CO 3	To recommend blocks of codes to solve real world problems	K5, K6

Course Code	**UCS3MC02**
Course Title	**Relational Database Management Systems Lab**
Credits	4
Hours/Week	4
Category	MC
Semester	III
Regulation	2024

Course Overview

1. This course provides the skill to design and develop databases to keep the real word data.
2. This course provides back-end programming s kills.
3. The aim of the course is to write efficient queries to retrieve data based on the requirement.
4. This will also provide skills in stored objects and back-end validations.

Course Objectives

1. To create and manipulate tables (Data Storages).
2. To write simple queries to fetch data from the databases.
3. To perform back-end programming through PL/SQL and perform error handling.
4. To create stored objects and validate through constraints.

Prerequisites	Fundamental Programming Skill.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	1. Creating, modifying and dropping Tables 2. Inserting, modifying and deleting rows of a table. 3. Creating tables with Adding, Dropping, disabling /enabling constraints	12	CO1 CO2 CO3	K1,K2, K3,K4, K5,K6
II	4. Retrieving rows with Character functions. 5. Retrieving rows with Number and Date functions. 6. Retrieving rows with aggregate functions.	12	CO1 CO2 CO3	K1,K2, K3,K4, K5,K6

III	7. Retrieving values through multiple tables. 8. Fetching rows through Sub queries. 9. Using Case and Decode.		CO1 CO2 CO3	K1,K2, K3,K4, K5,K6
IV	10. PL/SQL blocks with control structures. 11. PL/SQL blocks with Cursors. 12. Working with Exception Handling. 13. Working with Functions, Procedures, and Packages. 14. Working with triggers	12	CO1 CO2 CO3	K1,K2, K3,K4, K5,K6
V	15. Working with Sequences, Synonyms, views and indexes. 16. Lock the tables in different modes. 17. Demonstrate deadlocs. 18. Preparing SSLC marks statement using packages. 19. Tracking the deleted transactions in bank automatically using Triggers.	12	CO1 CO2 CO3	K1,K2, K3,K4, K5,K6

Text Book

Nilesh Shah, Database Systems Using Oracle, Pearson Education, Second Edition, 2011.

Suggested Readings

1. Steven Feuerstein and Bill Pribyl, Oracle PL/SQL Programming, O'Reilly, Fourth Edition, 2014.
2. Kevin Loney, Oracle 11g, The Complete reference, Oracle Press, First Edition, 2009.

Web Resources

1. https ://docs.oracle. com/cd/E 1 1 882_0 1/server. 1 12/e40540.pdf
2. https://www.oracletutorial.com/
3. https://www.javatpoint.com/oracle-tutorial

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To infer the basics of backend programming with data storages, with validations.	K1, K2
CO 2	To discover the appropriate methodologies to get desirable output through queries.	K3, K4
CO 3	To develop a block of codes to solve real world problems, with ethical usage through stored objects.	K5, K6

Course Code	**UCS3MC03**
Course Title	**Data Communication and Networks**
Credits	4
Hours/Week	4
Category	Major Core
Semester	III
Regulation	2024

Course Overview

1. This course outlines the fundamental techniques of computer networks.
2. This course deals with the network architecture and the functionalities of different layers.
3. It also focuses on network principles, data transmission standards and transmission media.
4. It familiarizes error detection and correction mechanisms.

Course Objectives

1. To understand the layered architecture and protocols of computer networks.
2. To elaborate the background concepts, and functionalities of application layer, transport layer, and network layer.
3. To Study and analyze the flow and error control schemes.
4. To Present ample details about the protocols, technologies and standards that are used by each layer as it relates to the internet.

Prerequisites	Basics concepts of communication, digital electronics and computers.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	**Introduction:** Data Communications, Networks, Network Types, Protocol Layering, TCP/IP Protocol Suite, OSI Model.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	**Physical Layer:** Signals, Signal impairment, Digital Transmission, Analog Transmission, Multiplexing, Transmission Media.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	**Data Link Layer:** Introduction, Data Link control, Media Access control, Link layer addressing. **Network layer:** Services, Packet Switching, Performance, Routing Algorithm, Unicast routing protocol, Broadcast routing protocol, Multicast routing protocol, IGMP.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	**Transport Layer:** Transport layer Services, Transport layer protocols, User datagram protocol, Transmission control protocol	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	**Application Layer:** Introduction, client/server paradigm, standard applications: WWW and HTTP, FTP, Electronic Mail, TELNET – Firewalls – Network Management System – SNMP, Socket interface programming.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Book

Behrouz A. Forouzan, "Data Communication and Networking with TCP/IP Protocol Suite", Sixth Edition, McGraw Hill Publisher, 2022.

Suggested Readings

1. Dr.RajKumar, Dr.T.Harikrishna, Dr.Justin Sophia.I, Ms.V.Hema Valpadsau," Data Communication and computer Network for Beginners", NTL Technology, First Edition, 2023.
2. Doug Lowe,"Networking All-in-One For Dummies", Wiley board, Eight Edition, 2021.
3. Business Data Communi Jerry FitzGerald, Alan Dennis, Alexandra Durcikova, "Business Data Communications and Networking, Fourteenth Edition, 2020.
4. James F Kurose and Keith W Ross "A Top-Down Approach: Computer Networking", Pearson Education , 2012.

Web Resources

1. https://dokumen.pub/qdownload/ise-data-communications-amp-networking-with-tcp-ip-protocol-suite-6nbsped-1260597822-9781260597820.html.
2. https://nptel.ac.in/courses/106105082
3. https://ocw.mit.edu/courses/6-263j-data-communication-networks-fall-2002/
4. https://www.classcentral.com/course/data-communication-network-services-9160

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To understand and explore the basics of Computer Networks and Various Protocols.	K1, K2
CO 2	To explain and analyze the transmission of data through network communication using layered concepts.	K3, K4
CO 3	To assess error free data transmission using the transmission techniques and to construct optimal network connections for effective data transmissions	K5, K6

Course Code	**UCS3AO01**
Course Title	**Data Analytics using MS-Excel Lab**
Credits	3
Hours/Week	5
Category	AO
Semester	III
Regulation	2024

Course Overview

1. Data analytics course is designed to equip students with the skills to transform and model data, enabling them to uncover valuable insights and support data-driven decision-making.
2. The course provides in-depth knowledge of MS Excel and focuses on its statistical applications.
3. It delves into the various operations and functions of different chart types and helps students effectively visualize and interpret data.
4. It enhances data analysis capabilities through the use of pivot tables and statistical measures.

Course Objectives

1. To grasp the importance and applications of MS Excel.
2. To learn the various operations and functions within MS Excel.
3. To explore the capabilities of charts, tables, and statistical measures.
4. To develop basic skills in visualizing and interpreting charts and tables.

Prerequisites	Basic knowledge in computers.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction to MS Excel: MS Excel Options – Ribbon - Sheets - Saving Excel File as PDF, CSV and Older versions - Using Excel Shortcuts - Copy, Cut, Paste, Hide, Unhide, and Link the Data in Rows, Columns and Sheet - Using Paste Special Options- Formatting Cells, Rows, Columns and Sheets, Protecting & Unprotecting Cells, Rows, Columns and Sheets with or without Password. 1. Implement the basic operations of MS Excel. 2. Practice basic functions: SUM, AVERAGE,	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

	MIN, MAX, and COUNT. 3. Formatting cells and ranges (e.g., font, borders, number formats).			
II	Functions: Logical Functions - Date and Time Functions - Information Functions -Math and Trigonometry Functions - Statistical Functions - Text Functions. 4. Perform descriptive statistics (mean, median, mode, standard deviation). 5. Manipulate data with Date and Time Functions. 6. Manipulate data with Logical and Math Functions. 7. Implement match and Offset	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
III	Charts: Simple Bar Chart – Multiple Bar Chart – Subdivided Bar Chart – Pie Chart – Donut Chart - Line Chart – Histogram – Scatter Plot - Radar Chart – Bubble Chart – BiAxis chart. 8. Create different types of charts (e.g., bar, line, pie, scatter). 9. Customize chart elements like titles, axes, data labels, and legends. 10. Analyze trends and patterns by applying chart options like trend lines and data series. 11. Visualize the data with various types of charts.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Create and format tables, Sort data in a table, Filter data in a table. Lookup function, Index, Address, Match, Offset, Transpose - conditional Formatting - Data Sorting and Filtering- Implement Vlookup and Hlookup. 12. Address, Offset, and Transpose Functions 13. Apply Conditional formatting on data. 14. Implement sorting and filtering concepts.		CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

V	Pivot Tables - Chart Template, Statistical measures – Mean, Median, Mode, Variance, Percentiles - Macros- Data Validation - What-If Analysis-Power Query. 16. Create pivot tables. 17. Creating and Customizing Charts from Pivot Tables. 18. Calculating Statistical Measures for mean, median, mode and percentile. 19. Applying Statistical Measures to Pivot Tables. 20. Create a macro. 21. Import data from external sources.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Curtis Frye," Microsoft Excel 2016 Step by Step", Microsoft Press, First edition, 2016.
2. Bernd Held," Microsoft Excel Functions & Formulas", Word ware Publishing, 2015.

Suggested Readings

1.Wayne L Winston, Microsoft Excel 2010 Data Analysis and Business Modeling Paperback, Prentice-Hall of India Pvt. Ltd, Third Edition, 2011.

2.Bernd Held." Excel Functions and Formulas Paperback", Word ware Publishing, Second Edition, 2015.

Web Resources

1.https://www.educba.com/data-analysis-tool-in-excel/

2.https://www.contextures.com/PowerPivot-for-Excel-2010-Lab.html

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To identify and apply basic mathematical operations and functions of MS-Excel.	K1, K2
CO 2	To explore the possibilities of mathematical solutions to solve business problems using various functions of MS-Excel.	K3, K4
CO 3	To create solutions using statistical measures, data representation and visualization for real time problems.	K5, K6

Course Code	**UCS3AO02**
Course Title	**DIGITAL MARKETING LAB**
Credits	3
Hours/Week	5
Category	Allied Optional (AO)
Semester	III
Regulation	2024

Course Overview

1. This course gives in-depth knowledge of digital marketing strategies and techniques.
2. It explores the various open source softwares available to implement different types of digital marketing.
3. It focuses on the need of good content creation.
4. It explores the Search engine optimization concepts and Google analytics.

Course Objectives

1. To understand the fundamentals of digital marketing and content creation.
2. To explore the features of Wordpress and create attractive websites.
3. To understand and use email marketing techniques.
4. To familiarize with creating and customizing YouTube channels and analytics.

Prerequisites	Basic knowledge in Internet.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction of the digital marketing - Digital vs. traditional Marketing - Digital Marketing Channels – Digital Marketing applications and benefits – Internet Marketing. 1. Creation of websites using word press. 2. Creation of websites using word press themes.	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	Digital Marketing Mix – Digital Marketing operations setup – From web page to landing page – Website content development and management - Understanding elements of user experience - Content	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	Marketing: Tools to create and manage content and blog. 3. Usage of Google Analytics and creation of an account. 4. Content creation (Presentation / Videos/ Poster)			
III	Managing digital implementation challenges – Consumer specific security, privacy, ethical and social challenges - Introduction of Social Media Marketing- Facebook Marketing: Business through Facebook Marketing, Creating Advertising Campaigns. 5. Creation of Social Media Account 6. Scheduling Posts.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Mobile Marketing: Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics- E-mail marketing- E-mail marketing plan- E-mail marketing campaign analysis - Keeping up with conversions. 7. Email marketing – Designing email campaign. 8. Creating surveys.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	YouTube content Marketing: Creating business accounts on YouTube • YouTube Advertising - YouTube Analytics - Introduction to SEO, SEM, Web Analytics -SEO Optimization. 9. Creation of Youtube channels. 10. Customizing YouTube channel. 11. Uploading videos.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Book

Puneet Singh Bhatia, "Fundamentals of Digital Marketing", 2nd Edition, Pearson Education, 2019.

Suggested Readings

1. Perry Marshall, "The Ultimate guide to Digital Marketing", Ultimate Guide series.

2. Puneet Singh Bhatia, "Fundamentals of Digital Marketing", 1st Edition, Pearson Education, 2017.

Web Resources

1.Rochelle Grayson, Foundations in Digital Marketing, www.pressbooks.com

2. Click to success Digital Marketing step-by-step guide for Beginners, Ondrej Svoboda, eway-book

3. https://www.webmarketingacademy.in/beginners-guide-to-digital-marketing-with resources/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To describe and understand the key elements of a digital marketing strategy.	K1, K2
CO 2	To analyze and implement content creation and email marketing using digital marketing techniques.	K3, K4
CO 3	To create social media account, campaigns and youtube channels using digital marketing tools.	K5, K6

Course Code	**UCS3CD01**
Course Title	**Introduction to Data Analytics**
Credits	2
Hours/Week	3
Category	NME
Semester	III
Regulation	2024

Course Overview

1. The Data Analytics Using Excel course is designed to equip students with the skills to transform, model, and analyze data for data-driven decision-making.
2. It provides a comprehensive understanding of MS Excel, focusing on its statistical applications.
3. It explores various chart types, functions, and operations to effectively visualize and interpret data.
4. It strengthens data analysis skills through pivot tables and statistical measures, enabling students to extract meaningful insights from complex datasets.

Course Objectives

1. To understand the significance and applications of MS Excel.
2. To learn various operations and functions within MS Excel.
3. To explore the capabilities of charts, tables, and statistical measures.
4. To develop fundamental skills in visualizing and interpreting data using charts and tables.

Prerequisites	Basic knowledge in computers and Mathematics.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction to MS Excel: MS Excel Options – Ribbon - Sheets - Saving Excel File as PDF, CSV and Older versions - Using Excel Shortcuts - Copy, Cut, Paste, Hide, Unhide, and Link the Data in Rows, Columns and Sheet - Using Paste Special Options- Formatting Cells, Rows, Columns and Sheets,	9	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

	Protecting & Unprotecting Cells, Rows, Columns and Sheets with or without Password. 1. Implement the basic operations of MS Excel. 2. Create a data table of student marks and use basic functions to calculate the sum, average, and total count. 3. Format a dataset of employee details and apply appropriate data types.			
II	Functions: Logical Functions - Date and Time Functions - Information Functions -Math and Trigonometry Functions - Statistical Functions - Text Functions. 4. Perform descriptive statistics (mean, median, mode, standard deviation). 5. Manipulate data with Date and Time Functions. 6. Manipulate data with Logical and Math Functions. 7. Organize a sales dataset by sorting data by region and product category and extract data using text functions (LEFT, RIGHT, MID, CONCATENATE)	9	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
III	Charts: Simple Bar Chart – Multiple Bar Chart – Subdivided Bar Chart – Pie Chart – Donut Chart - Line Chart – Histogram – Scatter Plot - Radar Chart – Bubble Chart – BiAxis chart. 8. Create different types of charts (e.g., bar, line, pie, scatter). 9. Customize chart elements like titles, axes, data labels, and legends. 10. Analyze trends and patterns by applying chart options like trend lines and data series. 11. Visualize the data with various types of charts.	9	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Create and format tables, Sort data in a table, Filter data in a table. Lookup function, Index, Address, Match, Offset, Transpose - conditional Formatting - Data Sorting and Filtering. 12. Implement Vlookup and Hlookup.		CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

	13. Implement Address, Offset, and Transpose Functions 14. Apply Conditional formatting on data. 15. Implement sorting and filtering concepts.			
V	Pivot Tables - Grouping data in Pivot Tables - Creating and modifying Pivot Charts - Chart Template, Statistical measures – Mean, Median, Mode, Variance, Percentiles - Macros. 16. Create pivot tables. 17. Creating and Customizing Charts from Pivot Tables 18. Calculating Statistical Measures for mean, median, mode and percentile. 19. Applying Statistical Measures to Pivot Tables 20. Create macro.	9	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Curtis Frye," Microsoft Excel 2016 Step by Step", Microsoft Press, First edition, 2016.

2. Bernd Held," Microsoft Excel Functions & Formulas", Word ware Publishing, Sixth Edition, 2022.

Suggested Readings

1. Michael Alexander, Richard Kusleika, and John Walkenbach, "Excel 2021 Bible", Wiley, 2021.

2. Greg Harvey, "Excel for Dummies", Wiley, First Edition, 2023.

Web Resources

1.https://www.educba.com/data-analysis-tool-in-excel/

2.https://www.contextures.com/PowerPivot-Identical-Excel-Files.html

3.https://edu.gcfglobal.org/en/excel-tips/how-to-use-excels-vlookup-function/1/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To identify and apply fundamental mathematical operations and functions in MS Excel.	K1, K2
CO 2	To explore mathematical solutions for solving business problems using various functions in MS Excel.	K3, K4
CO 3	To develop solutions for real-time problems using statistical measures, data representation, and visualization.	K5, K6

SEMESTER-IV

Course Code	**UCS4MC01**
Course Title	**WEB PROGRAMMING WITH ASP.NET**
Credits	4
Hours/Week	4
Category	MC
Semester	IV
Regulation	2024

Course Overview

1. This course deals with ASP.NET Server controls, HTML controls, Validation controls and Data controls.
2. It deals with file stream classes and file operations.
3. It introduces database-driven web development with ADO.NET and SQL Server.
4. It covers how to publish and manage ASP.NET web applications using **Azure** for hosting, scaling, and monitoring.

Course Objectives

1. To develop ASP.NET Web applications using standard controls, HTML controls, Validation controls and Data controls.
2. To implement file handling operations and file uploading.
3. To develop database applications using ADO.NET and SQL Server.
4. To publish an ASP.NET web application on Azure.

Prerequisites	Programming skills and basic knowledge of Database.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	The .NET Framework: .NET Languages, Common Language Runtime, .NET Class Library - ASP.NET: Anatomy of a Web Form - Page Directive, Doctype, Writing Code - Code-Behind Class, Adding Event Handlers, Anatomy of an ASP.NET Application -	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	ASP.NET File Types, ASP.NET Web Folders-HTML Server Controls.			
II	Web Controls: Web Control Classes, Web Control Base Class, List Controls, Table Controls, Web Control Events and AutoPostBack, Page Life Cycle State Management: ViewState, Cross-Page Posting, Query String, Cookies, Session State, Configuring Session State, Application State.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Validation: Validation Controls- Rich Controls: Calendar Control, AdRotator Control, MultiView Control.- Files and streams-File Stream classes - File Modes – File Share – Reading and Writing files – Creating, Moving, Copying and Deleting files – File uploading.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	ADO.NET: Data Provider Model, Direct Data Access - Creating a Connection, Commands, DataReader, Disconnected Data Access - Data Binding: Single-Value Data Binding, Repeated-Value Data Binding, Data Controls: GridView, DetailsView, FormView	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Introduction to Microsoft Azure– Hosting a Simple ASP.NET Application - Managing ASP.NET Applications - Publishing an ASP.NET Website - Monitoring and Managing Web Apps - Case study: Creating a Web application and Deploying the Project on Azure (Railway ticket reservation, Online Examination,.).	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Matthew MacDonald, Beginning ASP.NET 4 .5 in C#, APRESS, First edition, 2012.
2. Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill, Standard edition, 2017.
3. Santiago Fernández Muñoz,Exam Ref AZ-204 Developing Solutions for Microsoft Azure,Microsoft Press,1st Edition ,2020.

Suggested Readings

1. Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, I edition, 2015.
2. Imar Spaanjaars, Beginning ASP.NET 4.5.1: in C# and VB,Wrox; 1st edition,2014.
3. Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc. I edition, 2016.
4. Stephen Walther, Kevin Hoffman, ASP.NET 4 Unleashed, Pearson; First Edition ,2010.
5. Tarek S. Sherif, Microsoft Azure for Developers: Implementing Cloud Design Patterns, Apress, 1st Edition, 2017.

Web Resources

1.https://www.javatpoint.com/asp-net-tutorial

2.https://www.w3schools.com/asp/webpages_intro.asp

3.https://www.c-sharpcorner.com/article/introduction-to-Asp-Net/

4. https://www.tutorialspoint.com/asp.net/index.htm

5.https://learn.microsoft.com/en-us/training/azure/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To remember and understand the goals and objectives of the .NET framework and ASP.NET with C# language.	K1, K2
CO 2	To construct and analyze Web applications using server Controls and Data Controls.	K3, K4
CO 3	To choose ASP.NET framework in developing web applications using ADO.NET and SQL SERVER.	K5, K6

Course Code	**UCS4MC02**
Course Title	**WEB PROGRAMMING WITH ASP.NET LAB**
Credits	4
Hours/Week	4
Category	MC
Semester	IV
Regulation	2024

Course Overview

1. This course deals with ASP.NET Server controls, HTML controls, Validation controls and Data controls.
2. It deals with file stream classes and file operations.
3. It introduces database-driven web development with ADO.NET and SQL Server.
4. It covers how to publish and manage ASP.NET web applications using **Azure** for hosting, scaling, and monitoring.

Course Objectives

1. To develop ASP.NET Web applications using standard controls.
2. To create rich database applications using ADO.NET.
3. To handle SQL Server Database using ADO.NET.
4. To publish an ASP.NET web application on Azure.

Prerequisites	Programming skills and basic knowledge of Database.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	1. Create an exposure of Web applications and tools 2. Application using Html Controls 3. Web application using Server Controls 4. Web application using Web controls.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
	5. Web application using List controls	12	CO1	K1,K2,K3,

II	6. Web Page design using Rich control. 7. Working with File concepts. 8.Validate user input using Validation controls.		CO2 CO3	K4,K5,K6
III	9. Implementation of Cookies. 10.Transferring the data from one page to another page using Session variable 11.Transferring the data using View State management. 12. File Uploading using file upload control	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	13.Web application using Data Controls. 14.Data binding with Web controls. 15. Data binding with Data Controls. 16. Database application to perform Commands.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	17. Student Portal using Azure. 18. Online Forum or Community Platform using Azure. 19. Creating a Scalable Ticketing System Using Azure 20. Online examination using Azure.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Matthew MacDonald, Beginning ASP.NET 4 .5 in C#, APRESS, First edition, 2012.
2. Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill, Standard edition, 2015.
3. Santiago Fernández Muñoz, Exam Ref AZ-204 Developing Solutions for Microsoft Azure,Microsoft Press,1st Edition ,2020.

Suggested Readings

1. Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, I edition, 2015.
2. Imar Spaanjaars, Beginning ASP.NET 4.5.1: in C# and VB,Wrox; 1st edition,2014.
3. Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc. I edition, 2016.
4. Stephen Walther, Kevin Hoffman,ASP.NET 4 Unleashed, Pearson; First Edition ,2010.
5. Tarek S. Sherif, Microsoft Azure for Developers: Implementing Cloud Design Patterns, Apress,1st Edition ,2017.

Web Resources

1.https://www.javatpoint.com/asp-net-tutorial

2.https://www.w3schools.com/asp/webpages_intro.asp

3.https://www.c-sharpcorner.com/article/introduction-to-Asp-Net/

4. https://www.tutorialspoint.com/asp.net/index.htm

5. https://learn.microsoft.com/en-us/training/azure/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To remember and understand Web controls for Web applications.	K1, K2
CO 2	To construct and analyze Web applications using server Controls and Data Controls.	K3, K4
CO 3	To choose ASP.NET framework in developing web applications using ADO.NET and SQL SERVER.	K5, K6

Course Code	**UCS4ME01**
Course Title	**Internet Of Things**
Credits	4
Hours/Week	4
Category	ME
Semester	IV
Regulation	2024

Course Overview

1. The course introduces students to the fundamentals of IoT and its applications using the ESP32 microcontroller.

2. It aims to provide hands-on experience in programming the ESP32 and interfacing it with various sensors and actuators.

3. The course covers the implementation of networking and communication protocols, including Wi-Fi, Bluetooth, HTTP, and MQTT.

4. The course highlights the importance of cloud integration and data management techniques for IoT systems with security.

Course Objectives

1. To understand the basic concepts of IoT and the architecture of the ESP32 microcontroller.

2. To develop the ability to interface sensors and actuators with the ESP32 for creating functional IoT systems.

3. To implement networking and communication protocols in IoT projects using the ESP32.

4. To integrate IoT systems with cloud platforms for data storage, analysis, and remote access and apply techniques to protect IoT systems.

Prerequisites	Programming and hardware knowledge.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level

I	Introduction to IoT and ESP32 - Basic IoT Device: LED Control - ESP32 setup, GPIO control, basic web server implementation- Sensor interfacing, data logging - Sensor interfacing, GPIO, basic alarm system concepts. 1. Build an IoT device that controls an LED via button press or web interface. 2. Develop a smart doorbell that sends a notification on button press. 3. Set up an ESP32 to log environmental data (e.g., temperature) on an SD card.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	Introduction to ESP32 Programming and Peripheral Interfacing - GPIO, PWM, sensor interfacing- programming logic-data processing- I2C, data display. 4. Control fan speed with ESP32 based on temperature readings. 5. Create a smart lighting system controlled by motion sensors or a schedule. 6. Build a water level indicator using an ultrasonic sensor and ESP32.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Introduction to ESP32 Networking and Communication Protocols - Wi-Fi, HTTP server, web interface development - Bluetooth, GPIO, communication protocols- HTTP/MQTT, secure communication - data transmission. 7. Develop a smart light system controllable via Wi-Fi/web interface. 8. Implement a Bluetooth-based home automation system with ESP32. 9. Build a door lock system remotely controlled over Wi-Fi.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	Introduction to Cloud Integration and IoT Data Management- real-time monitoring. Data analytics -remote control, Data logging, cloud integration, analytics. 10. Upload temperature data to a cloud platform for monitoring. 11. Create a remote health monitoring system that sends vital signs to the cloud. 12. Design a smart irrigation system with cloud-based control and monitoring.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

V	Advanced IoT Projects and Security – Secure communication, data encryption, IoT security. Secure communication, cloud integration, real-time data transmission. Energy management. 13. Develop a smart door lock system with secure communication protocols. 14. Create a surveillance system that securely transmits camera data to the cloud. 15. Build a smart grid system for energy management with secure data transmission.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Agus Kurniawan, "Internet of Things Projects with ESP32," Packt Publishing, First Edition, 2019.
2. Neil Cameron, "Programming with the ESP32: A Comprehensive Guide to IoT Development," Elektor, First Edition, 2020.

Suggested Readings

1. Rajesh Singh, "IoT and Smart Cities: The Future of Urban Development," CRC Press, First Edition, 2020.
2. Simon Monk, "Programming the ESP32: Getting Started with the ESP32 Development Board," Maker Media, First Edition, 2021.
3. Chetan K. Dhamangaonkar, "IoT Development with ESP32: Building IoT Solutions Using the ESP32 Microcontroller," Apress, First Edition, 2020.

Web Resources

1. https://www.iotforall.com/what-is-iot
2. https://randomnerdtutorials.com/esp32-arduino-ide-setup/
3. https://www.hackster.io/
4. https://www.instructables.com/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	**CO Description**	**Cognitive Level**
CO 1	To identify and understand the fundamental concepts of IoT and the architecture of the ESP32 microcontroller.	K1, K2
CO 2	To examine and implement sensor and actuator interfacing with the ESP32 and analyze the data collected for IoT applications.	K3, K4
CO 3	To summarize and apply networking and communication protocols for IoT devices, and deploy secure IoT systems integrated with cloud platforms.	K5, K6

Course Code	**UCS4ME02**
Course Title	**Cloud Computing**
Credits	4
Hours/Week	4
Category	ME
Semester	IV
Regulation	2024

Course Overview

1. Ability to understand service delivery models of a cloud computing architecture.
2. The course aims in understanding cloud services.
3. Explores the ideas of cloud management.
4. It highlights service providers and the defined services.

Course Objectives

1. To comprehend various computing paradigms.
2. To understand the services and fundamentals of cloud computing.
3. To deliberate on the architecture and services of cloud.
4. To explore various cloud service providers and models.

Prerequisites	Computer network and Distributed system.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	**Computing Paradigms:** High-Performance Computing: Parallel – Distributed - Cluster - Grid - Cloud - Mobile - Quantum – Optical - Nano computing. Introduction to Amazon Web Services. 1. Introduction to AWS IAM	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	**Cloud Computing Fundamentals**: Motivation for Cloud Computing, The Need - Defining and definition of Cloud Computing, - Cloud Computing Is a Service, Is a Platform - Principles of Cloud computing - Characteristics - Cloud Deployment Models. AWS global infrastructure. 2. Build your own VPC and launch a web server. 3. Introduction to Amazon EC2.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	**Cloud Computing Architecture and Management:** Cloud architecture - Layer - Anatomy of the Cloud - Network Connectivity in Cloud Computing - Applications, on the Cloud, Managing the Cloud Infrastructure - Managing the Cloud application - Migrating Application and approaches of Cloud - Cloud Migration -security. 4. Activity - AWS Lambda 5. Activity - AWS - Elastic Beanstalk	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	**Cloud Service Models:** Infrastructure as a Service - Characteristics and suitability of IaaS - Pros and Cons of IaaS - Platform as a Service - Characteristics of PaaS - Suitability of PaaS, Pros and Cons of PaaS, Providers, Software as a Service - Characteristics and suitability of SaaS - Pros and Cons of SaaS - - Other Cloud Service Models. Network and content delivery - compute and storage., Amazon Elastic Compute Cloud, Amazon Simple Storage Service. 6.Working with EBS 7. Build a Database server.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	**Cloud Service Providers:** EMC, EMC IT, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Microsoft, Windows Azure, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform. 8. Scaling and load balance the architecture 9. Find a procedure to transfer the files from one virtual machine to another virtual machine. 10. Install Hadoop single node cluster and run simple	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

	applications like wordcount.			

Text Book

K. Chandrasekhran, "Essentials of cloud Computing", CRC press, Taylor & Francis Group, 2015.

Suggested Readings

1. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski "Cloud Computing: Principles and Paradigms", Wiley, 2015.
2. Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing", Elsevier, 2014.
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", O'Reilly, SPD, 2015.

Web Resources

1. https://www.techtarget.com/searchcloudcomputing/definition/cloud-computing
2. https://www.acecloudhosting.com/blog/top-10-free-online-resources-to-learn-cloud-computing/
3. https://tutorialsdojo.com/fundamentals-of-cloud-computing/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To define and recognize the fundamentals of cloud computing	K1, K2
CO 2	To relate various services and ethics of cloud storage architectures	K3, K4
CO 3	To expertise diverse service provers models and entrepreneur the same.	K5, K6

Course Code	**UCS4ME03**
Course Title	**UI / UX Design Lab**
Credits	4
Hours/Week	4
Category	Major Elective (ME)
Semester	IV
Regulation	2024

Course Overview

1. To provide students with the knowledge of user -centered methods in graphic design on screens.
2. The students will be given exposure to wireframing and Prototyping software in the UI and UX Design tool.
3. Students will gain essential skills that are in high demand across industries
4. To understand how users interact with the design through surveys, interviews, and usability tests.

Course Objectives

1. To understand user experience and its process.
2. To understand the definition and principles of UI/UX Design.
3. To understand the various components, Tools and methods of UX.
4. To understand the relation between interaction design and user's expectations.

Prerequisites	Basic knowledge on design principles.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction to UI and UX design: User Interface Vs. User Experience- Wireframe-Resolution- Existing UI kit- working with text- basic colors in wireframe- free icons-Adding footers- Lorem Ipsum- new pages- Artboards- Prototyping- adding interactivity- popup modal.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	Exercises: 1. To design a responsive layout for a societal application. 2. To explore various UI interaction patterns.			
II	Stylish UI Kit - Buttons- loading bars- Scrollbars- Fields-Rating-loading icons- tag icon-Search bars- Dropdown- Playback - Pagination- Picture Slider- Newsletter Sign up- Radial loading Bar- Pricing Table -Navigation bar - Radial Progress bars -Sliders- Log in, Rating- Newsletter Sign up- Tabs. **Exercises:** 3. To develop an Interface with Proper UI Style Guides. 4. To develop Wireflow diagram for application using figma 5. To apply the design thinking process for a new product.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Group and symbol Navigation: Working with groups- Isolation mode- symbols usage- video navigation- repeat grids- Time saving- Navigation tricks- Video player. **Exercises:** 6. Brainstorming feature for proposed product 7. Defining the Look and Feel of the new Project.	18	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Color Theory and Typography: Understanding the mood of your color palette- combining colors- Tools for designing color- color resources- Introduction to Typography - Type Origin and use- Serif type Family- Sans Serif type Family- Choosing Typography- Combining Fonts. **Exercises:** 8. Create a Sample Pattern Library for the product (Mood board, Fonts, Colors based on UI principles) 9. Sketch, design with popular tool and build a prototype and perform usability testing and identify improvements.	18	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

V	UI and UX Design: Design for Mobile phone mockup -IOS and Android importance and differences - Mobile APP and website design- Placeholder content and plugins- Assest panel- Voice interactions -User Testing- Exporting. **Exercises:** 10. Create a mockup mobile UI screens for any mobile app. 11. Create a mockup web UI screens for any web application. 12. Create a portfolio for your mockup mobile and web project.	18	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Designing and Prototyping Interfaces with Figma, Packt Publishing, 2nd Edition, 2023.
2. Jesse James Garrett, "THE ELEMENTS of USER EXPERIENCE", PHI, 2011.

Suggested Readings

1. Shneiderman, Ben, and Catherine Plaisant , "Designing the User Interface: Strategies for Effective Human-Computer Interaction",4th ed.Addison Wesley, 2014.
2. Alan Cooper, Robar Riemann and Drave Cronin, About face 3, The essentials of interaction design, 2014.

Web Resources

1. https://bit.ly/3AJ9DIM
2. https://designcode.io/figma-handbook
3. https://uxdesign.cc/
4. https://www.figma.com/resource-library/design-basics/
5. https://designlab.com/figma-101-course/introduction-to-figma

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To understand the differences between usability and user experience	K1, K2
CO 2	To evaluate professional efficiency in UI through a series of practical assignments.	K3, K4
CO 3	To create the industry-standard tools and specific project deliverables in UI/UX.	K5, K6

Course Code	**UCS4ME04**
Course Title	**BLOCKCHAIN TECHNOLOGY**
Credits	4
Hours/Week	4
Category	Major Elective (ME)
Semester	IV
Regulation	2024

COURSE OVERVIEW

1. Blockchain technology encompasses the fundamentals of cryptocurrency security.
2. The aim of the course is to introduce cryptocurrency and investigate its types.
3. The course explores smart contracts and applications.
4. It course highlights the different aspects of Blockchain Security.

COURSE OBJECTIVES

1. To understand cryptocurrencies and explore the uses of Blockchain
2. To be able to explain the different components involved in Blockchain.
3. To analyze the importance of cryptocurrency security.
4. To comprehend the risks involved in distributed ledger technology.

Prerequisites	Basic knowledge on cyber security.

SYLLABUS

UNIT	CONTENT	Hrs.	COs	COGNITIVE LEVEL
I	Origin of Blockchain –Blockchain solution – Components of Blockchain– Block in a Blockchain – Technology and Future – Blockchain Types and Consensus Mechanism: Decentralization and Distribution – Types of Blockchain,	12	CO1 CO2 CO3	K1,K2,K3, K4,K5, K6

II	Cryptocurrency -Bitcoin, Altcoin and Token: Bitcoin and the Cryptocurrency – Cryptocurrency Basics – Types of Cryptocurrencies – Cryptocurrency usage – Public Blockchain System: Public Blockchain – The Bitcoin Blockchain.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Smart Contracts: Smart Contract – Characteristics of Smart Contract – Types of Smart Contracts – Types of Oracles – Smart Contracts in Ethereum –Consortium Blockchain: Introduction –Key characteristics of consortium Blockchain-Hyperledger Platform - Overview of Ripple -Overview of Corda.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	Security in Blockchain: Security Aspects – Security and Privacy challenges – Performance and Scalability – Identity Management and Authentication- Regulatory Compliance and Assurance -Safeguarding Blockchain Smart Contract (DApp) -Security Aspects in Hyperledger Fabric.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
V	Applications of Blockchain: Blockchain in Banking - Finance – Education – Energy – Blockchain and IoT –Limitations and Challenges of Blockchain: Limitations-Challenges. Case Study: Retail -:Health care.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

Text Book

Chandramouli Subramanian, Asha A George, Abhilash K A and MeenaKarthikeyan, "Blockchain Technology", Universities Press, 1st Edition, 2020.

Suggested readings

1. Kumar Saurabh, AshutoshSaxena "Blockchain Technology Concepts and Applications", Wiley, 1st Edition, 2020.
2. Don Tapscott, Alex Tapscott, "Blockchain Revolution" Paperback, 1st Edition, 2018.

Web Resources

1. https://www.javatpoint.com/blockchain-tutorial
2. https://www.tutorialspoint.com/blockchain/index.htm

Course Outcomes (Cos) and Cognitive Level Mapping

Cos	CO Description	COGNITIVE LEVEL
CO 1	To define and understand the concepts of cryptocurrency.	K1, K2
CO 2	To apply the different applications of Blockchain and analyse the smart contracts.	K3, K4
CO 3	To evaluate the security aspects of Blockchain and adopt the various structures of blockchain.	K5, K6

Course Code	**UCS4AO01**
Course Title	**JAVA PROGRAMMING LAB**
Credits	3
Hours/Week	5
Category	AO
Semester	IV
Regulation	2024

Course Overview

1. Learn the core principles of object-oriented programming (OOP) including classes, objects, inheritance, polymorphism.
2. Gain hands-on experience in creating simple Java applications, focusing on practical coding skills and application development.
3. Discover how to effectively use reusability through inheritance and composition to write more modular and maintainable code.
4. Understand and apply Java's exception handling mechanisms to manage and respond to runtime errors.

Course Objectives

1. Develop a solid understanding of OOP principles to build a foundation for writing effective and organized Java code.
2. Develop a strong grasp of Java syntax and semantics, including variables, data types, operators, control structures (if-else, switch, loops), and exception handling.
3. Implement and utilize key OOP principles such as encapsulation, inheritance, and polymorphism.
4. Apply programming techniques to solve real-world problems, integrating concepts learned throughout the course to create functional and efficient solutions.

Prerequisites	Basic knowledge in programming.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Fundamentals of Object-Oriented Programming - Simple java program-Class and object-Implementing a java program -Constants-Variables-Data Types - type conversion casting,, Operator, String Class Exercises:	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	1. Write Java Programs using data types,Conversion casting and operators. 2. Write a Java program using Class and Object. 3. Write Java Program using String method. 4. Java program using Scanner .			
II	Condition Statement, Switch statement, Loops , Break and continue statement. Exercises: 5. Write a Java program using condition. 6. Write a Java program using loops. 7. Write a Java program using Switch.	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Java methods - Java methods parameters- Return values, Java method Overloading. Exercises: 8. Write a Java program using methods, parameters and return values. 9. Java program using Overloading.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Java Constructor – Java Inheritance-Overriding Java Polymorphism. Define Interface-Implementing Interface. Exercises: 10. Java program using Constructor. 11. Java program using Inheritance. 12. Java program using Polymorphism.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	In-Build Package: Java Date - Java Exceptions – Try and Catch –Using Finally-Throwing our own Exceptions, Java Multithreading Exercises: 13. Java program using Date and Time. 14. Java program using Try and Catch statement. 15. Java program to implement Multithreading.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Book

Programming with Java, E. Balagurusamy, Tata McGraw-Hill, Fifth Edition, 2015.

Suggested Readings

1. Java - The Complete Reference, Schildt Herbert and Peter Naughton, Tata McGraw-Hill, Eleventh Edition, 2019.
2. Programming with Java Dr. C. Muthu Tata McGraw-Hill, Second Edition, 2010.

Web Resources

1. https://www.w3schools.com/java/
2. https://beginnersbook.com/java-tutorial-for-beginners-with-examples/
3. https://www.geeksforgeeks.org/java/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To summarize and understand the fundamentals of object-oriented programming concepts in Java.	K1, K2
CO 2	To develop and to explore programming constructs with objects, classes and inheritance.	K3, K4
CO 3	To develop solutions for real world problems.	K5, K6

Course Code	**UCS4AO02**
Course Title	**SOFTWARE TESTING LAB**
Credits	3
Hours/Week	5
Category	AO
Semester	IV
Regulation	2024

COURSE OVERVIEW

1. This course provides knowledge on the fundamentals of software testing.
2. It aims to introduce analysis of techniques for testing.
3. It also reviews important phases of testing.
4. It explains implementation techniques to locate software defects.

COURSE OBJECTIVES

1. To introduce the construction of test cases.
2. To get an insight about test automation and the tools used for test automation.
3. To understand Ethical and Legal Considerations in Testing.
4. To Collaborate and communicate in a Testing Environment.

Prerequisites	Basic knowledge on software engineering.

SYLLABUS

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Fundamentals of Testing - Objectives of Testing - Fundamental Test Process - Test planning- Structured approach to testing Test Factors and Eleven Steps for software tests processes - Defect Analysis and Prevention Strategies. 1. Develop the test plan for testing an application. 2. Design adhoc test cases to test the system.	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	Test Case Design Strategies - White Box Strategies - Black Box Testing Strategies - Evaluating test adequacy criteria - Case Studies -Applying the suitable White Box Strategy and the suitable Black Box Strategy. 3. Design the test cases to test the given system using the following Black Box testing technique: a. Boundary Value Analysis, Worst Boundary Value Analysis, Robust Boundary Value analysis. b. Equivalence class testing (Input/Output domain) c. Decision table and cause-effect graph	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Levels of Testing - Unit Testing - Integration Testing - Role of use cases in testing - Internationalization testing - Testing Documentation plan - Recording test cases - Reporting and Measurement of Success. 4. For a given program segment using the tool to a. Draw the control flow graph b. Determine the cyclomatic complexity c. Determine the independent paths d. Generate the test cases for each independent path	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	Testing Web applications: Web testing- Functional testing - User interface -Usability testing - Security- Performance testing- Database Testing- Web metrics. Selenium: Introducing Web Driver and Web Elements, Locating Web Elements, Actions on Web Elements, Different Web Drivers, Understanding Web Driver Events. 5. Perform functional testing for the given application/project using the testing tool. 6. Perform web testing for the given application/project using the testing tool. 7. Perform load testing for the given	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	application/project using the testing tool. 8. Automate the testing of e-commerce applications using Selenium.			
V	Test Management and Defect Analysis - Infrastructure Management, Test People -Test Plan Components, Test Plan Attachments - Test Analysis report- Documentation - Analyze reports - Problem tracking - Controlling and Monitoring Test Progress. 9. Perform bug tracking for the given project /application using the tool. 10. Perform test management for the given project / application using testing tools.	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

Text Books

1. Yogesh Singh, "Software Testing", Cambridge University Press, First Edition, 2012.
2. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing – Principles and Practices, Pearson Education, First Edition 2006.
3. Unmesh Gundecha, Satya Avasarala, "Selenium WebDriver 3 Practical Guide" - Second Edition 2018.

Suggested Readings

1. Yogesh singh, Software Testing, Cambridge University Press, 1st Edition 2012.
2. Glenford J. Myers, Corey Sandler, Tom Badgett, The Art of Software Testing, 3rd Edition, 2012, John Wiley & Sons, Inc.
3. Carl Cocchiaro, Selenium Framework Design in Data-Driven Testing, 2018, Packt Publishing.
4. Satya Avasarala, Selenium WebDriver Practical Guide, 2014, Packt Publishing.

Web Resources

1. https://www.coursera.org/courses?query=software%20testing
2. https://www.istqb.org/
3. https://www.edureka.co/blog/what-is-selenium/

Course Outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To define and understand the basic process of testing a software and the need for software testing.	K1, K2
CO 2	To explain the concepts of software testing, its types and test cases.	K3, K4
CO 3	To learn Ethical Practices in Testing and Communication and Collaboration skills.	K5, K6

Course Code	**UCS4CD01**
Course Title	**PC TROUBLESHOOTING**
Credits	2
Hours/Week	3
Category	NME
Semester	IV
Regulation	2024

COURSE OVERVIEW

1. This course deals with knowing the hardware components of a PC and their functionalities.
2. It focuses on resolving hardware problems.
3. It aims to assess the existing configuration of the computers and peripherals.
4. It familiarizes on network troubleshooting and assistance through the web.

COURSE OBJECTIVES

1. To understand the ROM BIOS and POST.
2. To acquire knowledge on the functionalities of various components of a PC.
3. To get exposure in identifying the various issues and troubleshoot them.
4. To gain competence in fault identification and recovery.

Prerequisites	Basic knowledge on Computer system and its peripherals.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Motherboard: Motherboard Controllers and System Resources, I/O System Bus: ISA, MCA, ELSA, VESA local bus, PCI, AGP, PCIX, Onboard I/O devices, Chipsets, ROM BIOS, ROM POST, CMOS settings, Motherboard Form factor: AT and ATX Motherboard, LPX and NLX form factor. 1.Identify Major Components of Motherboard 2. Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards. 3. Configure BIOS setup program and troubleshoot the typical problems using BIOS utility.	5	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	Device Drives and Peripherals: Magnetic Storage: Reading/Writing, hard disk drives, Floppy disk drives, Optical Storage devices: CD-ROM drive, DVD-ROM drive, Keyboard: layouts, interfaces, Pointing devices, Mouse, Monitors, Printers, Troubleshooting of device drivers and peripherals. 4. Front panel indicators & switches and Front side & rear side connectors. 5. Install Hard Disk and configure to the Pc's 6. Identify Common Peripheral ports, associated cables and their connectors.	6	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Hardware Management in Windows and Online Support: Adding hardware to windows, installing devices, Updating data drivers, Rolling back driver update, Working with driver manager, Online help for troubleshooting, Using World Wide Web for support, Cautions about Online Support. 7. Installation of Device drivers 8. Perform driver updates. 9. Troubleshoot through online Support.	6	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	Troubleshooting the PC and Network issues: Troubleshooting PC problems, General Troubleshooting Rules, Six Steps for troubleshooting, Troubleshooting tips for emergency, Understanding network components, Networking Software, Connecting and extending the network, Setting up wireless network, Network Troubleshooting, 10. Troubleshoot a PC with issues.	6	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	11. Apply troubleshooting tips at emergency. 12. Setup Wireless network and troubleshoot the network.			
V	Interfaces and I/O Ports: Floppy Disk interface: Controller, Power cable, Control/Data cable, IDE interfaces: ATA standards, Master/Slave Configuration, Data transfer modes, SCSI interface: Bus, Standards, Hardware's, which is better SCSI or IDE, Serial ports, Parallel ports, USB, Troubleshooting. 13. Troubleshooting motherboard. 14. Troubleshooting the serial port. 15. Troubleshooting printer problem.	**7**	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

Text Books

1. PC Maintenance, Troubleshooting and Tools, Anonymous, John Wiley & Sons, First edition, 2018.
2. The Complete PC upgrade & Maintenance guide, Mark Minasi and Faithe Wempen, Wiley, Sixteenth Edition, 2007.

Suggested Readings

1. PC Troubleshooting Pocket Book, Howard Anderson and Mike Tooley, Newnes, Third edition, 2003.
2. How computers work and what to do when they don't, G. Mathew R Barker, 2019.

Web Resources

1. https://support.hp.com/in-en/help/hp-pc-hardware-diagnostics.
2. https:// imatsrl.org/assets/hardware-pc-upgrade-and-repair-bible.pdf
3. https://vptbgh.odishavikash.com/assets/files/notes/PdfFiles/COMPUTER%20HARDWARE&%20MAINTENANCE.pdf

Course Outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To understand and recognize the computer components.	K1,K2
CO 2	To know about the process of BIOS and POST error messages.	K3,K4
CO 3	Test and troubleshoot various faults related to computer hardware and its peripherals.	K5,K6

SEMESTER-V

Course Code	**UCS5MC01**
Course Title	**PHP AND MYSQL**
Credits	4
Hours/Week	4
Category	MC
Semester	V
Regulation	2024

Course Overview

1. PHP is a widely-used free, open source and server side scripting language for web development.
2. MYSQL is a free and open source popular RDBMS to store and access data.
3. This course helps in understanding the PHP and MYSQL connectivity and Database accessibility
4. This also gives in-depth knowledge of developing dynamic web page and real time web application using PHP and MYSQL.

Course Objectives

1. To understand the overview of web development.
2. To learn the basics of PHP and MYSQL.
3. To understand the concept of database management and accessibility.
4. To enable the students to develop dynamic web pages and real time applications.

Prerequisites	Basic Knowledge of HTML5, CSS, Database functionality.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction to Dynamic web content - HTTP –HTML -Benefits of PHP, MySQL, Introduction to CSS, HTML5, Apache Web Server –XAMP – Introduction to PHP : Incorporating PHP within HTML – The structure of PHP - Expressions and Control Flow in PHP : Expressions – operators – conditionals – looping – Casting – PHP Dynamic Linking .	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	PHP functions and objects: PHP functions – Including and Requiring Files.Declaring a class – Objects: creating – accessing – cloning. Constructors – PHP Destructors – writing methods – Declaring: properties, constants – Static properties and methods – Inheritance.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	PHP Arrays: Basic Access – foreach…as loop – Multidimensional arrays – Array Functions. Practical PHP: Using Printf – Date and Time Functions. – File handling functions: create-read – copy – move – delete- update- upload.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	My SQL basics – MY SQL commands - Data Types – Working with tables –Indexes- Querying a MYSQL Data base – Joins – subqueries –backup and restore - Accessing MYSQL using PHP – Querying a MySQL Database with PHP - Preventing SQL injection – using placeholders.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
V	Form Handling: Building forms – retrieving submitted data – input types – Cookies: setting, accessing, destroying. – HTTP Authentication – Sessions: starting – ending – setting timeout – security. Developing dynamic web pages and real time applications using PHP and MYSQL.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

Text Books

1. Robin Nixon," Learning PHP, MySQL JavaScript, CSS & HTML5",A step by step guide to creating Dynamic Websites.3rd Edition, O'Reilly, 2014.
2. Kogent Learning Solutions Inc., "HTML5 BLACK BOOK:COVERS CSS3, JAVASCRIPT, XML, XHTML, AJAX, PHP AND JQUERY", Wiley India Pvt. Limited, July 2011, ISBN:9789350040959, 9350040956.
3. Vaswani Vikram,"The Complete reference MYSQL", McGraw Hill Education India, ISBN: 9780070586840, 9780070586840.

Suggested Readings

1. Vikram Vaswani, How to do everything with PHP and MySQL, 1st Edition, Tata McGraw Hill, 2005.
2. Vikram Vaswani, A beginner's guide PHP, 1st Edition, McGraw Hill Education, 2017.
3. Luke Welling, PHP and MySQL web development, 5th Edition, Pearson Education, 2017.
4. Steven Holzner,The Complete Reference, PHP,Mc GrawHill Education, 2017.

Web Resources

1. https://www.w3schools.com/php/default.asp
2. https://www.udemy.com/course/php_mysql_tutorial/
3. https://www.php.net/docs.php
4. https://www.guvi.in/courses/tamil/web-development/php/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To observe and understand the structure of PHP, Control Flow, functions, arrays, object oriented programming concepts in PHP and database creation using MYSQL.	K1, K2
CO 2	To implement programming techniques in PHP and queries in MYSQL and Database connectivity and accessibility	K3, K4
CO 3	To analyze file handling, cookies, sessions and database management and develop dynamic web pages and applications	K5, K6

Course Code	**UCS5MC02**
Course Title	**PHP AND MYSQL LAB**
Credits	4
Hours/Week	4
Category	MC
Semester	V
Regulation	2024

Course Overview

1. PHP is a widely-used free, open source and server side scripting language for web development.
2. MYSQL is a free and open source popular RDBMS to store and access data.
3. This course helps in understanding the PHP and MYSQL connectivity and Database accessibility
4. This also gives in-depth knowledge of developing dynamic web page and real time web application using PHP and MYSQL.

Course Objectives

1. To understand the overview of web development.
2. To learn the basics of PHP and MYSQL.
3. To understand the concept of database management and accessibility.
4. To enable the students to develop dynamic web pages and real time applications.

Prerequisites	Basic Knowledge of HTML, CSS, Database functionality.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	1. To implement conditional statements. 2. Looping statements 3. User defined functions	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	4. Implementing class and object 5. Constructor and destructor 6. Class and Object 7. Implementing Inheritance	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	8. Implementing the Array concepts			
III	9. Built in functions 10. File handling 11. Working with simple HTML5 programs 12. Designing page using HTML5	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	13. Working with DDL commands using constraints in MYSQL. 14. Working with DML commands in MYSQL. 15. Implementing encryption functions. 16. Working with joins and subqueries. 17. Database connectivity between PHP and MYSQL and executing simple queries.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	18. Designing forms 19. Working with Sessions 20. Implementing Cookies	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Robin Nixon," Learning PHP, MySQL JavaScript, CSS & HTML5",A step by step guide to creating Dynamic Websites.3rd Edition, O'Reilly, 2014.
2. Kogent Learning Solutions Inc., "HTML5 BLACK BOOK:COVERS CSS3,JAVASCRIPT,XML,XHTML,AJAX,PHP AND JQUERY", Wiley India Pvt. Limited, July 2011, ISBN:9789350040959, 9350040956.
3. Vaswani Vikram,"The Complete reference MYSQL", McGraw Hill Education India, ISBN: 9780070586840, 9780070586840.

Suggested Readings

1. Vikram Vaswani, How to do everything with PHP and MySQL, 1st Edition, Tata McGraw Hill, 2005.
2. Vikram Vaswani, A beginner's guide PHP, 1st Edition, McGraw Hill Education, 2017.
3. Luke Welling, PHP and MySQL web development, 5th Edition, Pearson Education, 2017.
4. Steven Holzner,The Complete Reference, PHP,Mc GrawHill Education..2017

Web Resources

1. https://www.w3schools.com/php/default.asp
2. https://www.udemy.com/course/php_mysql_tutorial/
3. https://www.php.net/docs.php
4. https://www.guvi.in/courses/tamil/web-development/php/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To observe and understand the structure of PHP, Control Flow, functions, arrays, object oriented programming concepts in PHP and database creation using MYSQL.	K1, K2
CO 2	To implement programming techniques in PHP and queries in MYSQL and Database connectivity and accessibility.	K3, K4
CO 3	To analyze file handling, cookies, sessions and database management and develop dynamic web pages and applications.	K5, K6

Course Code	**UCS5MC03**
Course Title	**FULL STACK WEB DEVELOPMENT LAB**
Credits	6
Hours/Week	6
Category	MC
Semester	VI
Regulation	2024

Course Overview

1. Full Stack Web Development is a foundational course designed to provide students with a basic understanding of web development.
2. The course covers essential front-end technologies like HTML, CSS, and JavaScript, and introduces students to basic back-end development using Node.js and Express.
3. Students will also learn how to work with databases using MongoDB and will gain experience in building simple, functional web applications.
4. The different elements of the course explore the various web designing techniques.

Course Objectives

1. To understand the basics of front-end web development, including HTML, CSS, and JavaScript.
2. To learn the fundamental concepts of back-end development using Node.js.
3. To get introduced to database management using MongoDB.
4. To build basic web applications combining front-end and back-end technologies.

Prerequisites	Basic programming skills.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction to HTML & CSS: HTML: Structure of an HTML document, Basic tags (headings, paragraphs, links, images, forms) - CSS: Basic styling, Selectors, Colors, Fonts, Margins, Padding, and Borders - Introduction to CSS Flexbox for simple layouts. 1. Create a basic webpage using HTML and style it with CSS. 2. Build a simple contact form with HTML and CSS. 3. Use CSS Flexbox to create a responsive layout.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	Introduction to JavaScript: Variables, Data Types, Operators, Functions, Loops, Events - Basic DOM Manipulation: Selecting elements, changing content, handling events - Simple form validation using JavaScript. 1. Create a simple JavaScript programs. 2. Implement form validation using JavaScript. 3. Build a application with basic DOM manipulation.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Introduction to Node.js: Setting up Node.js environment - Basic server creation using Node.js - Introduction to the Express framework: Handling requests and responses - Serving static files with Express. 1. Set up a Node.js server that serves a simple page. 2. Create an Express-based server to handle basic GET and POST requests. 3. Serve static HTML and CSS files using Express.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	Introduction to MongoDB: Setting up basic CRUD operations - Connecting a Node.js application to a MongoDB database - Basic schema design and validation. 1. Set up MongoDB and perform basic CRUD operations through the MongoDB shell. 2. Connect a Node.js application to MongoDB and perform CRUD operations. 3. Design a simple schema for a user registration system.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
V	Building a Simple Web Application: Simple authentication: Register and login functionality - Basic error handling and form validation - Deploying the application locally. 1. Create a simple Web application using Node.js, Express, and MongoDB. 2. Implement form validation and error handling in the web application. 3. Deploy the application on a local server and test its functionality.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

Text Books

1. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, Mastering HTML, CSS & JavaScript Web Publishing, BPB Publications, First Edition, 2016.
2. Shama Hoque, Full-Stack React Projects, Packt, Second Edition, 2020.

Suggested Readings

1. Chris Northwood, The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer, Apress Publications, First Edition, 2018.
2. John Duckett, HTML and CSS: Design and Build Webs, Wiley, First Edition, 2011.
3. Kristina Chodorow, MongoDB: The Definitive Guide, O'Reilly Media, Third Edition, 2019.

Web Resources

1. https://www.w3schools.com/whatis/whatis_fullstack.asp
2. https://www.freecodecamp.org/news/tag/full-stack/
3. https://developer.mozilla.org/en-US/
4. https://nodejs.org/en/docs/
5. https://docs.mongodb.com/

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To describe and understand the basic concepts in HTML, CSS, and JavaScript.	K1, K2
CO 2	To apply and analyze HTML, CSS, and JavaScript effectively to create interactive and dynamic websites.	K3, K4
CO 3	To create and evaluate a full-stack web application.	K5, K6

Course Code	**UCS5MC04**
Course Title	**OPERATING SYSTEM**
Credits	4
Hours/Week	4
Category	MC
Semester	V
Regulation	2024

Course Overview

1. This course describes the major services, structures, and components of Operating Systems.
2. This course explains Process management, Memory management, Input Output Devices and file management, Resource Management and Communication.
3. It illustrates various memory management techniques and algorithms.
4. It covers essential concepts such as semaphores and cooperating sequential processes.

Course Objectives

1. To gain knowledge about the operating system and various services provided by it.
2. To acquire basic knowledge of process management with scheduling, and deadlock concepts.
3. To explore various memory allocation methods and free space management.
4. To focus on Input and Output device structures.

Prerequisites	Basics of computer organizations.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction: OS Structure - Components – Services – system calls -Virtual Machines. Process Management: Introduction - Process - Process Scheduling – Operations on processes -Cooperating Process-Inter process communication.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	CPU Scheduling: CPU Schedulers - Scheduling Criteria - Scheduling Algorithms. Process Synchronization: Critical Section Problem – Semaphores. Deadlocks: Characterization - Methods for Handling Deadlocks – Deadlock Prevention - Avoidance - Detection - Recovery. Case study: Linux- Scheduling Algorithms.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

III	Memory Management: Introduction - Dynamic Loading and Linking – Overlays - Logical and Physical Address Space – swapping - Contiguous Allocation - Internal and External Fragmentation. Non-Contiguous Allocation: Paging and Segmentation Schemes.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Virtual Memory: Demand Paging - Page Replacement - Page Replacement Algorithms. File System: Introduction - File Concepts - Access Methods - Directory Structures – Protection. Case Study: Windows- Memory Management.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	File System Structures - Allocation Methods - Free Space Management. Disk Structure – Disk Scheduling. Multicore Operating Systems- Virtualization.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Silberschatz Abraham, Galvin Baer Peter and Gagne Greg, "Operating System Concepts", 9th edition.2013.
2. Tanenbaum S. Andrew, "Modern Operating Systems", Third Edition, Prentice-Hall Inc, 2008.

Suggested Readings

1. Shayan Roy, 'Operating System for Beginners',Kindle edition, 2016.
2. Stallings William, "Operating Systems", Ninth Edition, Pearson Education, 2019.

Web Resources

1. https://codex.cs.yale.edu/avi/courses/CS-423/slides/index.html
2. https://www.cs.ccu.edu.tw/~pahsiung/courses/os/notes/slides.html
3. http://fivedots.coe.psu.ac.th/~cj/os/slides/slide-ppt.html
4. https://www.tutorialspoint.com/operating_system/index.htm

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To identify and understand the main components and services of Operating Systems.	K1, K2
CO 2	To explain the process, memory, file management and various scheduling algorithms and analyze various issues in Inter Process Communication (IPC) and their solutions.	K3, K4
CO 3	To evaluate the Memory management algorithms, allocation methods and to justify various algorithms used in different Operating Systems.	K5, K6

Course Code	**UCS5MC05**
Course Title	**SOFTWARE ENGINEERING**
Credits	4
Hours/Week	4
Category	MC
Semester	V
Regulation	2024

Course Overview

1. Analyze and model customer's requirements and with suitable model its software design.
2. Estimate cost and efforts required in building software.
3. Analyze and compute impact of various risks involved in software development.
4. Design and build test cases, and to perform software testing.

Course Objectives

1. To understand the significance of various process models.
2. To familiarize on Software Requirement specification, data modeling concepts, and design process..
3. To understand the importance of software quality aspects and software risks.
4. To analyze testing fundamentals, test cases and testing strategies.

Prerequisites	Basic knowledge in software development process

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Software Engineering - A Layered Approach; Software Process – Framework, Umbrella Activities-Process Models – Waterfall Model, Incremental Model-Evolutionary Prototyping model-Spiral Model. Introduction to Agile – Agility Principles, Agile Model – Scrum.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	Human aspects of software engineering: The Software team-Core principles- Requirment engineering: Eliciting requirements- Requirment analysis-Creating use case-Writing formal use case.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
	Design Concepts: The Design Process-Architectural design-software Architecture-Componentlevel design-Cohesion -Coupling-User Interface design-	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

III	Design issues-Pattern based design-Mobileapp design.			
IV	Quality Concepts-Software Quality-MCcall's QualityFactors-Risks-ReviewTechniques-AnalyzingMetrics-Formal Technical review-Software Quality Assurance-SQA tasks-Software safety- ISO 9000 Qualtiy standard-SQA Plan,	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Software Testing Strategies: Testing Fundamentals Black-Box and White Box Testing-Testing object oriented applications-web applications-mobile applications-security engineering- Software Configuration management. **Case study**: Ticket Reservation System.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Roger Pressman, Bruce Maxim,Software Engineering: A Practitioner's Approach, 9th edition. Tata McGraw Hill, 2023.
2. K.K Aggarwal, Yogesh Singh Software Engineering, 4th Edition, New Age International Publishers, 2023.

Suggested Readings

1. Richard Fairley, "Software Engineering Concepts", McGraw-Hill, 2014.

2. Rajib Mall." Fundamentals of Software Engineering", PHI, 2018.

3. Sommerville, Software Engineering. 10th edition. Addison Wesley, 2019.

Web Resources

1.http://www.javapoint.com

2.http://www.tuorialpoints.com

3.http://www.guru99.com

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO1	To identify and understand various software processing models and requirement engineering.	K1, K2
CO2	To determine the requirements and design the process.	K3, K4
CO3	To analyze project estimation, software quality and software testing	K5, K6

Course Code	**UCS5ME01**
Course Title	**ROBOTIC PROCESS AUTOMATION LAB**
Credits	4
Hours/Week	4
Category	Major Elective (ME)
Semester	V
Regulation	2024

Course Overview

1. This course provides the basic concepts of Robotic Process Automation.
2. It helps to familiarize the RPA tools and domains that are most relevant in the industry.
3. It explores the various options/tools available in UiPath Studio.
4. It facilitates the creation of Assistant Bots.

Course Objectives

1. To understand the fundamentals of Robotic Process Automation.
2. To offer comprehensive knowledge on developing software robots.
3. To explore the challenges and risks when implementing RPA.
4. To familiarize the creation of bots and implement simple bots.

Prerequisites	Basic Knowledge in Programming.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Scope and techniques of automation – Robotic Process Automation – Components of RPA – RPA platforms – About UIPath – Learning UIPath Studio-Sequence. 1.Using sequence 2.Accepting the input and display in a messagebox	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	Activities – Using activities with workflows – Control flow – Assign, Delay, Break, while, do while, for each, if, switch activity – Data manipulation – Variables and scope, Data table usage with examples. 3.Implementing activities with workflows (Assign, delay, break) 4. Implementing activities with workflows (while, do while, if ,switch)	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Data collection – Variables and scope -collections – Arguments – Data table usage. 5.Building a data table 6.Reading an excel file and creating a data table by using data from Excel.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Taking control of the controls – Finding and attaching windows – Finding the control – Act on controls – mouse and keyboard activities – Working with UIExplorer – Handling events – Screen scraping. 7.Implementing the attach window activity 8.Mouse and keyboard activities 9.Screen scraping	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Handling user events and assistant bots – monitoring system event triggers – launching an assistant bot on a keyboard event – Exception handling – common exceptions and ways to handle them – Debugging techniques – Error reporting. 10. Creating assistant bots. 11. Monitoring image and element triggers.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Book

Alok Mani Tripathi, 2018. Learning Robotic Process Automation, 1st Edition, Packt Publishers.

Suggested Readings

1. Tom Taulli, 2020. The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems,O'Reilly.
2. Gerardus Blokdyk, 2020. Robotic Process Automation RPA – A complete guide, Kindle edition.
3. Nandan Mullakara, Arun Kumar Asokan , 2020. Robotic Process Automation Projects, Packt Publishing.

Web Resources

1. https://www.automationanywhere.com/rpa/robotic-process-automation
2. https://enterprisersproject.com/article/2019/5/rpa-robotic-process-automation-how-explain
3. https://www.cio.com/article/227908/what-is-rpa-robotic-process-automation-explained.html

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To understand the fundamentals of automation.	K1, K2
CO 2	To analyze and interpret an RPA implementation plan.	K3, K4
CO 3	To develop the competence to design a software robot.	K5, K6

Course Code	**UCS5ME02**
Course Title	**DEVOPS LAB**
Credits	4
Hours/Week	4
Category	Major Elective
Semester	V
Regulation	2024

Course Overview

1. DevOps is a course used for collaboration between development and IT operations to make software production and deployment in an automated way.
2. The course aims to give basic knowledge about DevOps tools for agile software development.
3. This course facilitates different areas of software development and deployment.
4. This course also examines the methods to build hands-on projects using configuration management tools.

Course Objectives

1. To understand the purpose and history of DevOps and its architecture.
2. To illustrate the design principles for agile development.
3. To explore the role of version control systems and their tools.
4. To apply the knowledge of software and automation testing framework in the AWS environment.

Prerequisites	Basic knowledge on Linux.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction to DevOps: Define DevOps, Emergence of DevOps, History, DevOps Architecture, DevOps and SDLC: Waterfall Model, Agile Model, DevOps Goals, DevOps Tools. 1. Basic linux commands 2. Changing file permissions and ownership 3.Types of links soft and hard link	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	DevOps Agile Skills Association (DASA): DASA DevOps principles, DevOps skills areas,Knowledge areas and Competence Framework, Dasa Qualification scheme, Mission and Vision. 1. Filter commands 2. Linux File system structure 3.Simple filter and advance filter commands	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Overview of Version Control Systems, Role of version control systems, Types of Control systems and their tools, Git repository, Continuous Integration and Continuous Deployment. 1. Start and stop services 2. Find and kill the process with ID and name 3. Package installation using RPM and YUM	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	Software and Automation Testing Framework: Software Testing Overview, Testing level approaches and automation tools, Configuration Management tools:Managing infrastructure and types of configuration management Tools 1. SDLC Automation 2. Configuration management and Infra structure as code 3.Launch a Linux Virtual Machine.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
V	Need of Cloud in DevOps: Introduction to Cloud Computing, Cloud's role in DevOps, Cloud services and models, What is AWS? Using AWS in DevOps, Use cases in AWS. 1. Logging in to Amazon Web Services Console. 2. Working with AWS code commit on Windows. 3. AWS Identity and Access management.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

Text Book

Gene Kim, Jez Humble, The DevOps Handbook, IT Revolution, First Edition, 2016.

Suggested Readings

1. Emily Freeman, DevOps for Dummies, A Wiley Brand, First Edition, 2017.

2. Huttermann Michael, DevOps for developers, APress, First Edition, 2012.

3. Mikael Krief, Learning DevOps, Packt, Second Edition, 2022.

Web Resources

1. https://www.simplilearn.com/cloud-computing/devops-practitioner-certification-training
2. https://www.javatpoint.com/devops
3. https://www.tutorialspoint.com/devops_tutorials.htm

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To understand and recall the emergence, development and architecture of DevOps.	K1, K2
CO 2	To apply and analyze continuous integration and deployment.	K3, K4
CO 3	To validate the role of the cloud in DevOps.	K5, K6

Course Code	**UCS5RC01**
Course Title	**RESEARCH METHODOLOGY**
Credits	4
Hours/Week	4
Category	RC – Theory
Semester	V
Regulation	2024

Course Overview

1. This course introduces the basic concepts of research.
2. It deals with research design and various types of research.
3. This course provides the systematic approach to the design and formulation of research proposal.
4. It also focuses on the ethical issues in research.

Course Objectives

1. To familiarize the fundamentals of research.
2. To understand the concepts of research design.
3. To explore the methodologies for writing a research report and thesis.
4. To describe the ethical issues in educational research.

Prerequisites	Basic Knowledge in research.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Research Methodology Introduction- Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

II	Defining the Research Problem - selecting the problem - necessity of defining the problem- technique involved in defining a problem – Research design, meaning of research design – Features of a good design- important concepts relating to research design – Different research designs-basic principles of experimental design.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	Writing a Paper – The scope of a paper – Organization – the first draft – From draft to Submission – Co-authoring – A "writing Up" Check list – Other Professional Writing – Scoping the task – Understanding the task- Documentation – Technical Reports – Grant Applications – Non Technical Writing – Structuring a Report – Style – Other Problem area –A "Professional Writing" Checklist.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Presentations – Research talks – Contents – Organization – The Introduction – The Conclusion – Preparation – Delivery – Question Time – slides – Text on Slides – posters – A "Presentations and Posters" Checklist - Writing a research proposal – contents of a research proposal- preamble/introduction – the research problem – objectives of the study – hypothesis to be tested – study design measurement procedures – sampling analysis of data – structure of the report – problems and limitations-work schedule.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Ethics – Intellectual creations – plagiarism – self-plagiarism – misrepresentation – authorship – confidentiality and conflict of interest – an ethics checklist-case study- Quantitative Research on social problems- preparation of white paper.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Kothari, C.R., Gaurav Garg, Research Methodology: Methods and Techniques. New Age International. Publishers, Fourth edition 2019.- unit 1 & 2.
2. Ranjith Kumar, Research Methodology a step-by-step guide for beginners-SAGE publications - Vth edition – 2019- Unit 4
3. Justin Zobel, Writing For Computer Science, Springer -Third Edition 2014.- Unit3, Unit 4, Unit-5.

Suggested Readings

1. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International Publishers (Second revised edition)
2. R. Paneer Selvam (2014), Research Methodology, 4/e. Prentice Hall India Learning Private Limited.
3. C. George Thomas, Research Methodology and scientific writing – Ane Books , Second (International Edition)- 2015.

Web Resources

1. https://www.ugc.ac.in/e-book/ UGC_ GARP_ 2020_ Good%20 Academic%20Research%20 Practices.
2. https://www.ccmb.res.in/newsfiles/year-2020/csir_ethics_2020.pdf

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To recognize and understand the significance of research.	K1, K2
CO 2	To employ and analyze the concepts in research design	K3, K4
CO 3	To adapt ethics and appropriate methodologies in research	K5, K6

SEMESTER-VI

Course Code	**UCS6MS01**
Course Title	**Mobile App Development**
Credits	4
Hours/Week	5
Category	MS
Semester	VI
Regulation	2024

Course Overview

1. This course introduces programming techniques, design and development related to mobile applications.
2. It familiarizes various concepts of mobile programming across platforms.
3. It also utilizes rapid prototyping techniques to design and develop sophisticated mobile interfaces.
4. This course gives practical knowledge to develop and deploy Android applications.

Course Objectives

1. To understand the basics of the Android platform.
2. To acquire knowledge on user interface design to develop frameworks.
3. To develop skills in creating drawables and animation.
4. To implement the Android platform with a database.

Prerequisites	Knowledge on JAVA Programming.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Getting started with Android programming – Android versions – Features – Architecture of Android – Android devices in the market – Android studio – Android SDK – Creating Android Virtual Devices (AVD's) – Using Android studio for Development – Exploring the IDE - Using code completion – Debugging application – Setting break points – Navigating Paused Code – Publishing application. ACTIVITIES – Understanding Activities – Applying Styles and themes to an Activity – Hiding the Activity	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	Title – Displaying a Dialog Window – Displaying a Progress Dialog – Linking Activities using Intents.			
II	FRAGMENTS – Adding fragments Dynamically – Life cycle of a fragment – Interactions between fragments – Understanding the Intent object – Using Intent Filters – ANDROID USER INTERFACE – Components of a screen – Views and View groups – FrameLayout – Linear Layout Horizontal and Vertical TableLayout – RelativeLayout – FrameLayout – ScrollView – Managing changes to screen orientation- Utilizing the action bar – DESIGNING YOUR INTERFACE WITH VIEWS – Using basic Views – TextView – Button, ImageButton, EditText, Checkbox, ToggleButton, RadioButton and RadioGroup Views, ProgressBar View, AutoComplete TextView – Using Picker Views – Using List Views.	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
III	DISPLAYING PICTURES AND MENUS WITH VIEWS – ImageView – ImageSwitcher – GridView – Using Menus – Options Menu, Context Menu – WebView – DATA PERSISTENCE – Persisting Data to Files- Saving to Internal Storage- Saving to External Storage (SD Card) – Choosing the Best Storage Option – Creating and Using Databases – Creating the DBAdapter helper class – Using the data Programmatically.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	CONTENT PROVIDERS – Sharing data in Android – Using a Content Provider – Predefined Query String Constants – Projections – Filtering – Sorting – Creating your own content providers – Using the content provider – MESSAGING – Sending SMS messages programmatically - – Sending SMS messages using Intent – Receiving SMS Messages – Caveats and Warnings – Sending Email.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	LOCATION BASED SERVICES – Displaying Maps – Creating the project – Obtaining the Maps API Key – Displaying the Map – Displaying the Zoom Control – Changing Views – Navigating to a specific Location – Getting the Location that was Touched – Geocoding and Reverse Geocoding – Getting Location Data – Monitoring a Location- NETWORKING – Consuming Web services using HTTP – Downloading Binary Data – Downloading Text Content – Accessing Web Services using the GET method – Consuming JSON Services.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Book

J. F. DiMarzio, Beginning Android Programming with Android Studio, John Wiley & Sons, Inc., Fourth Edition, 2017.

Suggested Readings

1. Chris Stewart, Brian Hardy and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide by Bill Phillips, Big Nerd Ranch, LLC., First Edition, 2015.
2. J. F. DiMarzio, Android A Programmer's Guide, The McGraw-Hill Companies, 2008.
3. Neil Smyth , Android Studio 2.3 Development Essentials – Android 7, Payload Media, Inc.,2017

Web Resources

1. http://developer.android.com/guide/index.html
2. https://www.javatpoint.com/android-tutorial
3. https://www.tutorialspoint.com/android

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To enumerate and understand the concepts of JAVA and DVM platform.	K1, K2
CO 2	To apply and analyze the various mobile application development frameworks.	K3, K4
CO 3	To recommend the role of the database for the android platform.	K5, K6

Course Code	**UCS6MS03**
Course Title	**Mobile App Development Lab**
Credits	4
Hours/Week	5
Category	MS
Semester	VI
Regulation	2024

Course Overview

1. This course facilitates to understand android SDK.
2. It helps to acquire basic knowledge on Android application development.
3. It also utilizes rapid prototyping techniques to design and develop mobile interfaces.
4. This course gives practical knowledge to develop and deploy android applications.

Course Objectives

1. To analyze the features of Android.
2. To configure Android environment and development tools.
3. To understand persistence data storage mechanism in Android.
4. To embed graphics and animation in developing android applications.

Prerequisites	Programming skills in JAVA.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	1. Develop an app to display Hello World on screen. 2. Develop an application that uses GUI components, fonts and colors. 3. Implement linear layout and absolute layout.	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	4. Implement frame layout, table layout and relative layout.	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	5. Develop an application that draws basic graphical primitives on the screen. 6. Implement Text view and Edit Text 7. Implement Auto Complete Text View. 8. Develop an application to create an activity.			
III	9. Implement a login window using UI controls. 10. Implement Checkbox, Radio Button and Radio Group. 11. Implement Progress Bar. 12. Implement List View, Grid View, Image View and Scroll View. 13. Implement Custom Toast Alert.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	14. Implement Date and Time Picker. 15. Implement a content provider. 16. Create a simple app for registration form.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	17. Create a database for your application. 18. Implement an application that creates an alert upon receiving a message. 19. Create an android application to navigate to a web page, send SMS and email using filters.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Book

J. F. DiMarzio, Beginning Android Programming with Android Studio, John Wiley & Sons, Inc., Fourth Edition, 2017.

Suggested Readings

1. Chris Stewart, Brian Hardy and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide by Bill Phillips, Big Nerd Ranch, LLC., First Edition, 2015.
2. J. F. DiMarzio, Android A Programmer's Guide, The McGraw-Hill Companies, 2008.
3. Neil Smyth , Android Studio 2.3 Development Essentials – Android 7, Payload Media, Inc.,2017.

Web Resources

1. http://developer.android.com/guide/index.html.
2. https://www.javatpoint.com/android-tutorial.
3. https://www.tutorialspoint.com/android.

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To enumerate and understand the concepts of JAVA and DVM platform	K1, K2
CO 2	To apply and analyze the various mobile application development frameworks.	K3, K4
CO 3	To recommend the role of the database for the android platform	K5, K6

Course Code	**UCS6MS02**
Course Title	**MACHINE LEARNING USING PYTHON**
Credits	4
Hours/Week	5
Category	MS
Semester	VI
Regulation	2024

Course Overview

1. Machine learning deals with huge volume of data, discover unseen patterns, derive meaningful information, and make business decisions.
2. This course introduces the fundamental concepts of Machine learning and its applications.
3. It also covers complex machine learning algorithms to build predictive models using Python.
4. It enables better decision making, predictive analysis, visualization and pattern discovery.

Course Objectives

1. To understand the various techniques and concepts of Machine learning.
2. To employ the Python libraries for model building.
3. To apply principles of Machine learning to solve predictive tasks.
4. To explore the Machine Learning algorithms in Python to solve real-world problems**.**

Prerequisites	Basic knowledge in Programming language.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction to Machine Learning: Different Forms - Machine Learning Categories - Frameworks for Building Machine Learning Systems - Machine Learning Python Packages. Fundamentals of Machine Learning: Scales of Measurement - Feature Engineering - Exploratory Data Analysis (EDA).	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	Supervised Learning: Regression – Classification: Logistic Regression - Decision Trees - Support Vector Machine (SVM) – k Nearest Neighbors (kNN) – Naïve Bayes Classification.	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

III	Evaluating a Classification Model Performance - ROC Curve - Model Diagnosis and Tuning: Optimal Probability Cutoff Point - Rare Event or Imbalanced Dataset - Bias and Variance - K-Fold Cross-Validation.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	Ensemble Methods – Bagging – Boosting - Ensemble Voting – Stacking - Hyper Parameter Tuning. - Random Forest.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Unsupervised Learning: Types – Challenges – preprocessing and scaling. Clustering: K- Means Clustering – Agglomerative Clustering – DBSCAN – Comparing and Evaluating Clustering Algorithms. Case study: Reducing Air Pollution in Urban Areas Using Machine Learning	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Manohar Swamynathan, Mastering Machine Learning with Python in six steps, Apress, First edition, 2017
2. Jake VanderPlas, Python Data Science Handbook - Essential Tools for Working with Data, O'reilly, First edition, 2016.

Suggested Readings

1. Dipanjan Sarkar, Raghav Bali, Tushar Sharma, {ractical Machine Learning with Python, First Edition, Aprèss, 2018.
2. 1. Samir Madhavan, Mastering Python for Data Science, PACKT Publishing, First edition, 2015
3. Joel Gurus, Data science from Scratch, O'relly, First edition, 2015

Web Resources

1. https://www.tutorialspoint.com/python_data_science/index.htm

2. https://realpython.com/tutorials/data-science/

3. https://cognitiveclass.ai/learn/data-science-with-python

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To describe and understand the concepts of Machine Learning.	K1, K2
CO 2	To apply and analyze the various Data Science techniques, supervised and unsupervised learning algorithms.	K3, K4
CO 3	To propose solutions for real world problems with huge volume of data.	K5, K6

Course Code	**UCS6MS04**
Course Title	**MACHINE LEARNING USING PYTHON LAB**
Credits	4
Hours/Week	5
Category	MS
Semester	VI
Regulation	2024

Course Overview

1. Machine learning deals with huge volume of data, discover unseen patterns, derive meaningful information, and make business decisions.
2. This course introduces the fundamental concepts of Machine learning and its applications.
3. It also covers complex machine learning algorithms to build predictive models using Python.
4. It enables better decision making, predictive analysis, visualization and pattern discovery.

Course Objectives

1. To understand the various techniques and concepts of Machine learning.
2. To employ the Python libraries for model building.
3. To apply principles of Machine learning to solve predictive tasks.
4. To explore the Machine Learning algorithms in Python to solve real-world problems**.**

Prerequisites	Basic knowledge in Programming language.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	1. Data manipulation with Numpy and pandas 2. Dealing with Missing Data and Handling Categorical Data. 3. Implement Feature selection Techniques. 4. Implement Exploratory Data Analytics Techniques.	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	5. Build the Linear Regression model. 6. Build and validate the logistic regression model. 7. Build a model with Decision Tree. 8. Build a model with Support Vector Machine (SVM)	15	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	9. Build a Model with K Nearest Neighbors (KNN) 10. Build Naïve Bayes Classification.			
III	11. Evaluate a Classification Model Performance. 12. Implement ROC sure Techniques. 13. Implement the Optimal Probability Cutoff Point. 14. Perform K-Fold Cross-Validation.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	15. Implement Bagging method. 16. Implement Boosting method. 17. Implement Stacking method.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	18. Implement K Means clustering 19. Implement Agglomerative clustering. 20. Implement DBSCAN clustering.	15	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Books

1. Manohar Swamynathan, Mastering Machine Learning with Python in six steps, Apress, First edition, 2017
2. Jake VanderPlas, Python Data Science Handbook - Essential Tools for Working with Data, O'reilly, First edition, 2016.

Suggested Readings

1. Dipanjan Sarkar, Raghav Bali, Tushar Sharma, {ractical Machine Learning with Python, First Edition, Aprèss, 2018.
2. 1. Samir Madhavan, Mastering Python for Data Science, PACKT Publishing, First edition, 2015
3. Joel Gurus, Data science from Scratch, O'relly, First edition, 2015

Web Resources

1. https://www.tutorialspoint.com/python_data_science/index.htm
2. https://realpython.com/tutorials/data-science/
3. https://cognitiveclass.ai/learn/data-science-with-python

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To describe and understand the concepts of Machine Learning.	K1, K2
CO 2	To apply and analyze the various Data Science techniques, supervised and unsupervised learning algorithms.	K3, K4
CO 3	To propose solutions for real world problems with huge volume of data.	K5, K6

Course Code	**UCS6MC01**
Course Title	**ARTIFICIAL INTELLIGENCE**
Credits	4
Hours/Week	4
Category	MC
Semester	VI
Regulation	2024

Course Overview

1. Understand basic Artificial Intelligence (AI) concepts and terminology.
2. Learn the techniques, functions and strategies for problem solving.
3. Apply logical agent methods to gain the knowledge and prove the theorems.
4. Use the Computer Vision techniques, Robotic perception and Ethics of AI to learn the classifying the images.

Course Objectives

1. To introduce basic concepts of AI.
2. To provide problem solving techniques to develop the problem solving method and strategies for AI.
3. Learn techniques for logic agents to summarize the theorem and checking agent models.
4. Analyze and interpret the image classification by apply Computer vision techniques for AI and learn robotics, ethics of AI.

Prerequisites	Basic Knowledge of problem solving techniques.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	**Introduction:** What is AI? – The foundation of AI – The History of AI – The State of the Art – Risk and Benefits of AI. **Intelligent Agent:** Agents and Environment –Good Behavior: The Concept of Rationality – The Nature of Environments.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	**Solving Problems by Searching:** Problem-Solving Agents – Example Problems – Search Algorithms – Uniformed Search Strategies – Informed (Heuristic) Search Strategies - Heuristic Functions.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

III	**Logical Agents:** Knowledge-Based Agents – The Wumpus World – Logic – Propositional Logic: A Very Simple Logic – Propositional Theorem Proving – Effective Propositional Model Checking – Agents Based on Propositional Logic.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
IV	**Computer Vision:** Introduction – Image Formation – Simple Image Features – Classifying Images – Detecting Objects – The 3D World – Using Computer Vision.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	**Robotics:** Robots – Robot Hardware – Robotic Perception – Planning and Control – Planning Uncertain Movements. **Ethics of AI:** The Ethics of AI. **Case study:** Classification and Chat bot for customer service.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6

Text Book

Stuart Russel and Peter Norvig, "Artificial Intelligence – A Modern Approach", 4th Edition, Pearson Education, 2010.

Suggested Readings

1. Kevin Knight and Elaine Rich, Nair B, "Artificial Intelligence (SIE)", Tata Mcgraw Hill, 2008.
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
3. Deepak Khemain, "Artificial Intelligence", Tata Mc Graw Hill Education, 2013.

Web Resources

1. https://builtin.com/artificial-intelligence
2. https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/
3. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-ai
4. https://www.javatpoint.com/artificial-intelligence-ai

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	Understand the importance and scope of Artificial Intelligence and methods in intelligent agents.	K1, K2
CO 2	Identify the problems by applying the problem solving algorithms, strategies and functions. Compare the logical agent's technique to gain knowledge in logic.	K3, K4
CO 3	Choose a variety of Computer Vision techniques to classify and develop the learning system. Design the control of Robotics with ethics of AI.	K5, K6

Course Code	**UCS6MC02**
Course Title	**Natural Language Processing**
Credits	6
Hours/Week	6
Category	MC
Semester	VI
Regulation	2024

Course Overview

1. Sensitise to linguistic phenomena and an ability to model with formal grammars.
2. Explores to experiment methodology to train and evaluate empirical NLP systems.
3. Discover to design, implement, and analyse NLP algorithms.
4. Highlights to different language modelling translation and conversion techniques.

Course Objectives

1. To understand Natural Language Processing concepts.
2. To get familiars with its techniques in terms of syntax and semantics.
3. To implementation of various language transformation models and techniques in NLP.
4. To addressing the challenges faced on changing and conversion of the form of language.

Prerequisites	Basic structure of language and content translation techniques.

SYLLABUS

Unit	Content	Hrs	COs	Cognitive Level
I	Introduction to NLP– Models and Algorithms of Language processing- -Regular Expressions Basic Regular Expression Patterns – words-Corpora-tokenization – sentence segmentation and edit distance. 1. Write a python program to perform tokenization by word and sentence using nltk. 2. Write a python program to eliminate stopwords using nltk. 3. Write a python program to perform stemming using nltk.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
	N-grams Models of Syntax – Evaluating language models – sampling and generalization – interpolation - Perplexity relation on entropy. Naïve Bayes classifier – example –	18	CO1	K1,K2,K3, K4,K5,K6

II	language model – evaluation: precision, recall, F-measure. Logistic regression: learning multinomial Logistic regression. 4. Write a python program to perform Parts of Speech tagging using nltk. 5. Write a python program to perform lemmatization using nltk. 6. Write a python program to perform Parts of Speech tagging using nltk.		CO2 CO3	
III	Transformer: attention – transformer blocks – parallelization - language modelling head. Large language model: sampling- pre-training – evaluating – dealing with scale - language modelling scale - Masked language models – Model alignment prompting and in-context learning. 7. Write a python program to perform lemmatization using nltk. 8. Write a python program for chunking using nltk. 9. Write a python program to perform Named Entity Recognition using nltk.	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	Annotating Linguistic Structure: Sequence labelling for parts of speech and Named-Context-free grammar and constituency parsing - Dependency parsing. Information extraction: algorithms – extraction - representation. Lexicons: defining emotions – available sentiments – human labels – using supervised and unsupervised learning. 10. Write a python program to find Term Frequency and Inverse Document Frequency (TF-IDF). 11. Write a python program for CYK parsing (Cocke- Younger-Kasami Parsing) or Chart Parsing. 12. Write a python program to find the probability of the given statement "This is my cat" by taking the example corpus into consideration. 13. Write the python code to develop Spam Filter using NLP	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
V	NLP applications: Machine translation-language divergence and typology- Encoder-Decoder- MT search and evaluation – Bias and ethical issues. Question answering – information retrieval. Chatbots & Dialogue systems – Automatic speech recognition and text-to-speech conversion. **(Case study:** Google Translator - applications of Speech-to- Text converter – OpenAI's Generative Pre-trained Transformers GPTs)	18	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

	14. Use the Stanford named Entity recognizer to extract entities from the documents. Use it programmatically and output for each document, which named entities it contains and of which type. 15. Choose any corpus available and for the corpus, for each document, count how many times each stop word occurs and find out which are the most frequently occurring stop words. Further, calculate the term frequency and inverse document frequency as The motivation behind this is basically to find out how important a document is to a given query. For e.g.: If the query is say: "The brown crow". "The" is less important. "Brown" and "crow" are relatively more important. Since "the" is a more common word, its tf will be high. Hence we multiply it by idf, by knowing how common it is to reduce its weight. 16. Write the python code to perform sentiment analysis using NLP. 17. Write the python code to detect Fake News using NLP.			

Text Book

Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 3rd Edition, 2024.

Suggested Readings

1. Daniel M. Bikel and Imed Zitouni "Multilingual natural Language Processing Applications: From Theory to Practice", Pearson Publication, 2012.
2. Tanvier Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, First edition, 2008.
3. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing", MIT Press. Cambridge, MA, 1999.

Web Resources

1. https://nlp.stanford.edu/fsnlp/
2. https://onlinecourses.nptel.ac.in/noc19_cs56/preview
3. https://www.cs.utexas.edu/~gdurrett/courses/online-course/materials.html
4. https://web.stanford.edu/~jurafsky/slp3/ed3book.pdf

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To outline and understand the basics of language processing.	K1, K2
CO 2	To apply the language parsing and lexical techniques with ethics.	K3, K4
CO 3	To implement and utilize the aspects of NLP in various platforms.	K5, K6

Course Code	**UCS6MC03**
Course Title	**CYBER SECURITY**
Credits	4
Hours/Week	4
Category	MC
Semester	VI
Regulation	2024

COURSE OVERVIEW

1. To study various encryption and decryption algorithms and their applications in cryptography.
2. To gain knowledge in key management and hashing techniques.
3. The course will detail into specifics of cyber security with cyber laws in global and Indian Legal environments.
4. Learn computer forensics techniques for investigating digital crimes and preserve digital evidence.

COURSE OBJECTIVES

1. To explain various protection methods to safeguard from cyber-attacks using cryptography.
2. Describe the basic information and network security fundamentals.
3. Describe various cyber security vulnerabilities and threats such as virus, worms, online attacks, DoS and others.
4. To comprehend the computer forensics tools and techniques.

Prerequisites	Basic knowledge on information security.

SYLLABUS

UNIT	CONTENT	Hrs.	COs	COGNITIVE LEVEL
I	Security goals –threats and attacks. – Services and mechanisms – A model for Network Security– symmetric key cryptography- substitution cipher – transposition cipher - Stream ciphers and block ciphers – Data Encryption Standard.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
II	Public Key cryptography and RSA-Key Management-Diffie Hellman key exchange-Applications of Cryptographic Hash functions– Secure Hash algorithm (SHA)-Digital signatures and message authentication protocols–Digital signature standard.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6

III	Cybercrime and Information Security-Classifications of Cybercrimes-Cyber offenses - How criminals plan the attacks, Cyber stalking – Botnets - Security challenges posed by mobile -Attacks on Mobile phones.Case study: Cyber Pornography & the IT Act.	12	CO1 CO2 CO3	K1,K2,K3, K4,K5,K6
IV	Tools and methods used in Cybercrime-Password cracking - Keyloggers and Spywares-Virus and Worms - Trojan Horses and Backdoors - DoS and DDoS attacks- SQL Injection- Phishing and Identity Theft - The Indian IT Act - Amendments to the Indian IT Act. Case study 1: keylogger to capture login credentials, Case study 2: Digital Signatures in Indian IT Act.	12	CO1 CO2 CO3	K1, K2, K3, K4, K5, K6
V	Understanding Computer Forensics- Cyber forensics and Digital Evidence - Digital Forensics Life Cycle - Computer Forensics and Steganography - Challenges in Computer Forensics - Tools and Techniques - Hand-Held Devices and Digital forensics. Case study: Real life example of Forensics.	12	CO1 CO2 CO3	K1, K2, K3, K4,K5,K6

Text Books

1. William Stallings, "Cryptography and Network Security Principles and Practices", Eighth Edition, 2023. (Unit I and II).
2. Nina Godbole, Sunit Belapure, "Cyber Security", Wiley India Pvt. Limited, Second Edition, 2013. (Unit III, IV and V).

Suggested readings

1. Godbole,"Information Systems Security", Willey **ISBN** 10: 8126516925
2. Merkov, Breithaupt," Information Security", Pearson Education ISBN-**10**: **0-7897-5325.**
3. Behrouz A.Forouzan and DebdeepMukhopadhyay, "Cryptography and Network Security", Tata McGraw Hill, 2011.
4. Jennifer L. Bayuk and Jason Healey and Paul Rohmeyer and Marcus Sachs, "Cyber Security Policy Guidebook", Wiley; 1st edition, 2012.

Web Resources

1. https://www.javatpoint.com/encryption-algorithms-in-cryptography
2. https://www.w3schools.com/cybersecurity
3. https://training.apnic.net/wp-content/uploads/sites/2/2016/12/TSEC01.pdf
4. Digital Forensics Tools: www.guidancesoftware.com , www.accessdata.com, www.netwitness.com

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	Identify cryptography algorithms for authentication purposes in the organizational network	K1, K2
CO 2	Illustrate different cyber-attacks with relevant examples	K3,K4
CO 3	Summarize the security challenges on cyberspace and usage of cyber forensic tools.	K5,K6

Course Code	**UCS6MC04**
Course Title	**PROJECT**
Credits	6
Hours/Week	6
Category	MC
Semester	VI
Regulation	2024

Course Overview

1. This course implements major software engineering techniques and position them to lead and develop applications.
2. It also aims to implement programming skills for solving real-time problems.
3. It enables resource utilization, scheduling, and evaluation.
4. It focuses on documentation and presentation of the project progress on par with Industry standards.

Course Objectives

1. To build a new software system based on theory and practical skills.
2. To gain knowledge about various domains, platforms, and software developing environments.
3. To gain confidence in conceptualization, design, and implementation of a working software project.
4. To be accustomed to the various methods and techniques used for effective project management.

Prerequisites	Good programming skills.

Course Outcomes (Cos) and Cognitive Level Mapping

COs	CO Description	Cognitive Level
CO 1	To identify and understand the real-world problem for application development.	K1, K2
CO 2	To apply and analyze a standard model in a necessary environment.	K3, K4
CO 3	To appraise and measure the developed implementation process and validate the developed software.	K5, K6

SCHEME OF EXAMINATIONS

PART- I

GENERAL LANGUAGE (GL) - (TAMIL/HINDI/SANSCRIT/FRENCH)

Language departments shall evolve a common template for Continuous Internal Assessment (CIA) and Semester Examinations of General Language (GL) courses following the guidelines below.

- GL shall focus on learning levels K1, K2, K3, and K4.
- Each Course descriptor (Syllabus) shall have a total number of 3 Course Outcomes (COs).

• **Course Outcomes**	**Learning level (s)**
CO1	K1, K2
CO2	K3
CO3	K4

CIA and semester Question papers shall have only 3 sections (A, B, and C).

Section	**COs**	**Learning level(s)**	**Weightage**
A	CO1	K1, K2	20%
B	CO2	K3	40%
C	CO3	K4	40%

CIA (INTERNAL): Theory / Practical CIA will be conducted for 100 marks.

ERP Configuration:

TEST	**CONDUCTED**	**CONVERTED**	**COMPONENTS (3a& 3b)**	**TOTAL MARKS**
CIA I	50	30	20	50
CIA II	50	30	20	50
			TOTAL	**100**

END SEMESTER (EXTERNAL):

- ❖ Theory / Practical semester Examination will be conducted for 3 Hours for 100 marks.
- ❖ The maximum number of questions in CIA and semester question papers shall be 11 and 22 respectively.
- ❖ Questions under Sections B and C shall have a maximum of 2 sub-divisions only.

Section	COs	Learning level(s)	CIA	Semester	Weightage
A	CO1	K1, K2	5 x 2 =10 Answer ALL	10 x 2 =20 Answer ALL	20%
B	CO2	K3	2 x 10 =20 (2 out of 4)	4 x 10 =40 (4 out of 8)	40%
C	CO3	K4	1 x 20 =20 (1 out of 2)	2 x 20 =40 (2 out of 4)	40%

The minimum pass mark for undergraduate courses is 40 out of 100.

PART- II

GENERAL ENGLISH (GE)

English department shall evolve a common template for Continuous Internal Assessment (CIA) and Semester Examinations of General English (GE) courses following the guidelines below.

- GE shall focus on learning levels K1, K2, K3, K4, K5 and K6.
- Each Course descriptor (Syllabus) shall have a total number of 3 Course Outcomes (COs).
- CO-Learning mapping shall be as follows and each course outcome statement shall be written using corresponding Bloom's action verbs.

Course Outcomes	**Learning level (s)**
CO1	K1, K2
CO2	K3, K4
CO3	K5, K6

CIA and semester Question papers shall have only 3 sections (A, B, and C).

Section	**COs**	**Learning level(s)**	**Weightage**
A	CO1	K1, K2	20%
B	CO2	K3, K4	40%
C	CO3	K5, K6	40%

CIA (INTERNAL): Theory / Practical CIA will be conducted for 100 marks.

ERP Configuration:

TEST	**CONDUCTED**	**CONVERTED**	**COMPONENTS (3A& 3B)**	**TOTAL MARKS**
CIA I	50	30	20	50
CIA II	50	30	20	50
			TOTAL	**100**

END SEMESTER (EXTERNAL):

- Theory / Practical semester Examination will be conducted for 3 Hours for 100 marks.
- The maximum number of questions in CIA and semester question papers shall be 11 and 22 respectively.
- Questions under Sections B and C shall have a maximum of 2 sub-divisions only.

Section	COs	Learning level(s)	CIA	Semester	Weightage
A	CO1	K1, K2	5 x 2 =10 Answer ALL	10 x 2 =20 Answer ALL	20%
B	CO2	K3, K4	2 x 10 =20 (2 out of 4)	4 x 10 =40 (4 out of 8)	40%
C	CO3	K5, K6	1 x 20 =20 (1 out of 2)	2 x 20 =40 (2 out of 4)	40%

PART- III

(Major Core (MC), Allied Required (AR), Allied Optional (AO), Major Elective (ME) and Major Skill)

- MC, AR, AO, ME, and MS shall focus on all learning levels (K1-K6).
- Each Course descriptor (Syllabus) shall have a total number of 3 Course Outcomes (COs).
- CO-Learning mapping shall be as follows and each course outcome statement shall be written using corresponding Bloom's action verbs.

Course Outcomes	Learning level (s)
CO1	K1, K2
CO2	K3, K4
CO3	K5, K6

CIA and semester Question papers shall have only 3 sections (A, B, and C).

Section	Cos	Learning level(s)	Weightage
A	CO1	K1, K2	20%
B	CO2	K3, K4	40%
C	CO3	K5, K6	40%

CIA (INTERNAL): Theory / Practical CIA will be conducted for 100 marks.

ERP Configuration:

TEST	CONDUCTED	CONVERTED	COMPONENTS (3A& 3B)	TOTAL MARKS
CIA I	50	30	20	50
CIA II	50	30	20	50
			TOTAL	**100**

END SEMESTER (EXTERNAL):

- Theory / Practical semester Examination will be conducted for 3 Hours for 100 marks.
- The maximum number of questions in CIA and semester question papers shall be 11 and 22 respectively.
- Questions under Sections B and C shall have a maximum of 2 sub-divisions only.

Section	COs	Learning level(s)	CIA	Semester	Weightage
A	CO1	K1, K2	5 x 2 =10 Answer ALL	10 x 2 =20 Answer ALL	20%
B	CO2	K3, K4	2 x 10 =20 (2 out of 4)	4 x 10 =40 (4 out of 8)	40%
C	CO3	K5, K6	1 x 20 =20 (1 out of 2)	2 x 20 =40 (2 out of 4)	40%

PART-IV

(Purely Internal Papers)

- NME shall focus on learning levels K1, K2, K3 and K4.
- Each Course descriptor shall have a total number of 3 Course Outcomes (COs).
- CO-Learning mapping shall be as follows and each course outcome statement shall be written using corresponding Bloom's action verbs.

Course Outcomes	Learning level (s)
CO1	K1, K2
CO2	K3
CO3	K4

CIA and semester Question papers shall have only 3 sections (A, B, and C).

Section	COs	Learning level(s)	Weightage
A	CO1	K1, K2	20%
B	CO2	K3	40%
C	CO3	K4	40%

CIA (INTERNAL): Theory / Practical CIA will be conducted for 100 marks.

ERP Configuration:

TEST	CONDUCTED	CONVERTED	COMPONENTS (3A& 3B)	TOTAL MARKS
CIA I	50	30	20	50
CIA II	50	30	20	50
			TOTAL	**100**

- Questions under Sections B and C shall have a maximum of 2 sub-divisions only.

Section	COs	Learning level(s)	CIA	Weightage
A	CO1	K1, K2	5 x 2 =10 Answer ALL	20%
B	CO2	K3	2 x 10 =20 (2 out of 4)	40%
C	CO3	K4	1 x 20 =20 (1 out of 2)	40%

- There is no semester examination for CD (NME) courses.

INSTRUCTIONS RELATED TO THE SKILL ENHANCEMENT COURSE TO BE OFFERED IN 5TH SEMESTER

- Skill Enhancement course (SE) shall be offered for 4 hours (4 credits) in the 5th semester.
- It is a purely internal paper and it contains 2 components/courses,
- Research Methodology (RM) is to be offered for 2 hours (2 credits). This course will have only formative assessments (FA1, FA2, C3A and C3B) and no semester examinations. It will be evaluated for 100 marks and converted to 50 marks.
- Seminar & Presentation (SP) is to be offered for 2 hours (2 credits). This course will be evaluated for 50 marks.
- The total marks to be evaluated for the course will be 50 +50 = 100 marks
- Instructions related to the Major Skill course to be offered in the 6th Semester
- Major Skill course (MS) shall be offered for 10 hours (10 credits) in the 6th semester.
- This course will have 2 components: inside and outside the class hours (Evaluated for 50 marks each).
- Inside class hours: It will have 2 courses (with 8 credits each) to be offered under this category (Two theory courses or one theory and one laboratory course).
- Outside class hours:
- Project (PJ) shall be offered under the MS course for 2 credits outside the class hours which shall be a case study/survey/fieldwork / special internship based on skills acquired / group or mini project with a maximum of 5 students/start-up or innovative ideas/model presentation / immersive learning etc.
- It will be evaluated for 50 marks with a minimum of 5 fortnight reports.

(INTERNSHIP)
SEMESTER VI

SUB.CODE	SUBJECT	MAX. MARKS				TOTAL
	INTERNSHIP	Participation / Attendance	Performance & Skills acquired	Internship Report	Viva-Voce Examination	**100**
		25	**25**	**25**	**25**	

SCHEME OF EXAMINATIONS –NON CGBA COURSES

Value-Added Courses

SUB.CODE	SUBJECT	Max. Marks		
		CIA	CIA	Total Marks
	Value-Added Courses	**50**	**50**	**100**

(Foundation Course - SEMESTER I, II, III & IV)

SUB.CODE	SUBJECT	Max. Marks		
		CA I	CA II	Total Marks
	Foundation Courses (Fc)	**50**	**50**	**100**

(Self-Study Paper)

SUB.CODE	SUBJECT	Max. Marks		
		CIA I	CIA II	Total Marks
	Self-Study Paper	**50**	**50**	100

(Club Activity - CC - SEMESTER I & II))

SUB.CODE	SUBJECT	Max. Marks		
		Sem I	Sem II	Total Hours
	Club Activity (CC)	**30**	**30**	**60**

(Outreach - OR - SEMESTER II & III)

SUB.CODE	SUBJECT	Max. Marks		
		Sem III	Sem IV	Total Hours
	Outreach (OR)	**45**	45	**90**

CIA - MODEL QUESTION PAPER

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034.
DEPARTMENT OF ……
CONTINUOUS INTERNAL ASSESSMENT (MONTH & YEAR)
COURSE CODE & TITLE

Class: **Date:**
Time: **Max. Marks:** 50

SECTION A		
Answer ALL the questions (K1 & K2, CO1)		**(6 x 2 = 12)**
1.		
2.		
3.		
4.		
5.		
6.		
SECTION B		
Answer any ONE of the following (K3, CO2)		**(1 x 7 = 7)**
7.		
8.		
SECTION C		
Answer any ONE of the following (K4, CO3)		**(1 x 7 = 7)**
9.		
10.		
SECTION D		

Answer any ONE of the following (K5, CO4)		**(1 x 12 = 12)**
11.		
12.		
SECTION E		
Answer any ONE of the following (K6, CO5)		**(1 x 12 = 12)**
13.		
14.		

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SEMESTER - MODEL QUESTION PAPER

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

U.G. DEGREE EXAMINATION

APRIL 2025

SECTION A - K1 & K2 (CO1)		
Q.No	Levels	**Answer ALL the Questions** **(10 x 2 = 20)**
1	K1	
2		
3		
4		
5		
6	K2	
7		
8		
9		
10		
SECTION B – K3 & K4 (CO2)		
		Answer ALL the Questions **(4 x 10 = 40)**
11		
	K3	**[OR]**
12		
13		
		[OR]
14		
15		
		[OR]

16	K4	
17		
		[OR]
18		
SECTION C – K5 & K6 (CO3)		
	Answer ALL the Questions	**(2 x 20 = 40)**
19	K5	
		[OR]
20		
21	K6	
		[OR]
22		