LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (LOCF) FOR UNDERGRADUATE PROGRAMMES

Department of Computer Science and Applications
B.C.A

LOYOLA COLLEGE (AUTONOMOUS)
CHENNAI -600034

PREFACE

BCA (Bachelor of Computer Applications) is the study of algorithmic processes, computational machines, and computation itself. As a discipline, BCA spans a range of topics from theoretical studies of algorithms, computation, and information to the practical issues of implementing computational systems in hardware and software.

The curriculum is expected to assist in the maintenance of the standards used in Hardware and Software Technologies across the country by reviewing and revising a vast set of frameworks of agreed/expected graduate attributes, qualification descriptors, and programming learning outcomes. These subjects must be studied by the students of all the branches of Computer Science.

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 BCA level. Based on Computer science technology, the curriculum involves implementations of all the above-mentioned languages and tools.

The curriculum is designed based on some of the important skill-sets outlined by employers. Good knowledge and understanding of these subjects are critical for any exposure in the IT Industry. Each subject is of critical importance considering the future of the students in the field given that the advancement from here might be into research and development, IT professionals, or an entrepreneur.

The students are expected to learn the curriculum with advanced tools and technologies like graphical representations and available online tools for implementing the written code. The curriculum has been designed in such a way that students are exposed to modern tools. In this curriculum, more emphasis is given to content related to sustainability, skill acquisition, and entrepreneurship.

This curriculum and the knowledge of the practical application of the subjects will help students to apply their knowledge in the future course of their higher education, career or research. To cope with the industry needs, demands, and the advancement of technology the students are expected to have expertise in each subject.

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.

CONTENTS

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 prepares them for the future.
- To kindle in young minds the spirit of social and environmental justice with a blend of 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)

PEOs	STATEMENTS
PEO1	**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.
PEO2	**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.
PEO3	**ACADEMIC EXCELLENCE AND CORE COMPETENCY** To excel in modern computational techniques and compete in higher studies/career, for addressing contemporary challenging problems with ease.
PEO4	**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.
PEO5	**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.
PEO6	**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)

POs	STATEMENTS
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 endeavours.
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 COMMUNICATION SKILLS** To apply scientific reasoning in the approach to handle professional matters, communicate the solutions to stakeholders and enable them to understand and appreciate the outcomes.
PO6	**PROFESSIONALISM; TEAMWORK AND ETHICS** To manifest the core competencies, adhere to collaborative efforts within ethical frameworks and emerge as professionals holding key positions in the respective domains.
PO7	**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)
B.C.A (Computer Applications)

PSOs	STATEMENTS
PSO1	To acquire adequate knowledge and gain theoretical and practical competence in programming languages, free and open source platforms to meet the global demands and challenges in the future.
PSO2	To develop creative on-demand ethically sound software applications to solve the real world problems in a systematic and professional way.
PSO3	To facilitate lifelong learning, critical thinking, analytical reasoning, zest for higher studies and innovations resulting in holistic development.
PSO4	To exhibit proficiency in globally relevant multidisciplinary areas of computing with due environmental considerations.
PSO5	To cater to the needs of the industry and the society in the context of rapid technological changes by providing sustainable solutions.
PSO6	To employ a contemporary and comprehensive curriculum resulting in creating innovative successful career paths to be a socially responsible entrepreneur with core principles and ethics.
PSO7	To collaborate and work as a team to assess the goals scientifically with common objectives and agile communication skills to meet performance expectations leading to effective decision making.

B.C.A Restructured CBCS curriculum with effective from June, 2019

PART	SEMESTER I	SEMESTER II	SEMESTER III	SEMESTER IV	SEMESTER V		SEMESTER VI	CREDITS
I	G. Language (3h/3c)	G. Language (3h/3c)	G. Language (3h/3c)	G. Language (3h/3c)				12
II	General English (6h/3c)	General English (6h/3c)	General English (5h/3c)	General English (5h/3c)				12
III MC	Web Programming (7h/7c)	Programming Techniques and C (4h/4c)	Relational Database Management Systems (4h/4c)	Programming in Java (6h/6c)	Web Programming using PHP &Mysql (4h/4c)		Database Administration (6h/6c)	84
	Introduction to Data Analytics and AI (5h/5c)	Programming Techniques and C Lab (4h/4c)	Relational Database Management Systems Lab (4h/4c)		Web Programming using PHP &Mysql Lab(5h/5c)		Data Mining (6h/6c)	
		Operating Systems (4h/4c)	Data Structures (4h/4c)		Visual programming (4h/4c)		Project (6h/6c)	
					Visual programming Lab (5h/5c)			
					Software Engineering (6h/6c)			
AR/ AO	Operation Research (6h/3c)	Enterprise Resource Planning (6h/3c)	Web Design / Web Analytics Lab (5h/3c)	Data Analytics using R/Web Development (5h/3c)				12
ME				Android Programming - Lab /Network Administration / Cloud computing/Cyber Security (6h/6c)	Data Communication & Networks / Mobile Computing/Machine Learning/Virtual Reality (6h/6c)			12
MS							Business Analytics using Python. (12h/15c)	15 (MS&TP)
BT /AT /NME			Animation (3h/2c)	Web Design (3h/2c)	MOOC/SSP			4
FC	FC (3/2), EVS		FC (2/1)	FC 2(1)				5
CCA	CC	CCA(90/1)						1
ORA			OR	OR (120/2)		30 Days		2
Hr/C	30h/22c	30h/(23+1c)	30/24c	30h(24+2c)	30h/30		30h/33c	180(159)

InternshIp (4 weeks durIng ChrIstmas HolIdays) (30 Days)

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI
DEPARTMENT OF COMPUTER SCIENCE
(2019 - Restructured Curriculum)
UG OVERALL COURSE STRUCTURE

Sem	Subject Code	Course Title	T/L	Category	Cr.	Hrs.
I	UTL1101	General Tamil-I	T	GL	3	3
	UFR1101	French for Beginners - I				
	UOL1101	Hindi Prose -I				
	UOL1104	General Sanskrit-I				
I	UEL 1201	General English- I (Advanced)	T	GE	3	6
	UEL 1202	General English- I (Intermediate)				
	UEL 1203	General English- I (Basic)				
I	UCA 1501	Web Programming Lab	L	MC	7	7
I	UCA 1502	Introduction to Data Analytics and AI	T	MC	5	5
I	UCS 1301	Operation Research	T	AR	3	6
II	UTL 2101	General Tamil-II	T	GL	3	3
	UFR 2101	French for Beginners - II				
	UOL 2101	Hindi Prose -II				
	UOL 2103	General Sanskrit-II				
II	UEL 2201	General English- II (Advanced)	T	GE	3	6
	UEL 2202	General English- II (Intermediate)				
	UEL 2203	General English- II (Basic)				
II	UCA 2503	C Programming Lab	L	MC	4	4
II	UCA 2501	Operating Systems	T	MC	4	4
II	UCS 2301	Enterprise Resource Planning	T	AR	3	6
III	UTL 3101	General Tamil-III	T	GL	3	3
	UFR 3101	French for Beginners - III Hindi Poetry -III				
	UOL 3101	General Sanskrit-III				
	UOL 3102					
III	UEL 3201	General English- III (Advanced)	T	GE	3	5
	UEL 3202	General English- III (Intermediate)				
	UEL 3203	General English- III (Basic)				
III	UCA 3501	Relational Database Management Systems	T	MC	4	4
III	UCA 3502	Relational Database Management Systems Lab	L	MC	4	4
III	UCA 3503	Data structures	T	MC	4	4
IV	UTL 4102	General Tamil-IV	T	GL	3	3
	UFR 4101	French for Beginners - IV				
	UOL 4101	Hindi Poetry -IV				
	UOL 4102	General Sanskrit-IV				
IV	UEL 4201	Introduction to Technical Translation Soft skills	T	GE	3	5
	UEL 4202	for Professional Development				
	UEL 4203	Professional Content Writing				
	UEL 4204	English for Technical Writing English for				
	UEL 4205	Employability Skills				
	UEL 4206	Essential skills for group Communication				

	UEL 4207	Theatre Performance and Film Review				
IV	UCA 4501	Programming in Java	L	MC	6	6
IV	UCA 4603	Cloud computing	T			
	UCA 4604	Cyber Security	T	ME	6	6
	UCA 4605	Android Programming Lab	L			
	UCA 4607	Network Administration	L			
V	UCA 5501	Web Programming using PHP and MYSQL	T	MC	4	4
V	UCA 5502	Web Programming using PHP and MYSQL Lab	L	MC	5	5
V	UCA 5503	Visual programming	T	MC	4	4
V	UCA 5504	Visual programming Lab	L	MC	5	5
V	UCA 5505	Software Engineering	T	MC	6	6
V	UCA 5601	Data Communication and Networks	T			
	UCA 5602	Mobile Computing	T	ME	6	6
	UCA 5603	Machine Learning	L			
	UCA 5604	Virtual Reality	L			
VI	UCA 6501	Database Administration	L	MC	6	6
VI	UCA 6502	Data Mining	T	MC	6	6
VI	UCA 6503	Project	L	MC	6	6
VI	UCA 6701	Business Analytics using Python	L	MS	5	6
VI	UCA 6706	Business Analytics using Python Lab	L	MS	5	6
VI	UCA 6705	Internship	I	MS	5	

COURSES OFFERED TO OTHER DEPARMENTS

III	UCA 3401/ UCA 3402	Web Design/ Web Analytics Lab	L	AO	3	5
III	UCA 3801	Animation	L	NME	2	3
III	UCA 4401/ UCA 4402	Data Analytics using R/ Web Development	L	AO	3	5
IV	UCA 4801	Web Design	L	NME	2	3

COURSE DESCRIPTORS

Course Code	UCA 1501
Course Title	Web Programming Lab
Credits	07
Hours/Week	07
Category	Major Core (MC)
Semester	I
Regulation	2019

Course Overview

1. Web Programming course enables standard website design using HTML, CSS, JavaScript and Angular JS.
2. The aim of the course is to introduce planning and designing syntactically correct effective web pages.
3. JavaScript commonly utilized on the client side to improve user experience and associated capabilities is highlighted.
4. The different elements of the course explore the various page layout techniques, text formatting, graphics, images and producing a functional multi-page website.
5. This course also focuses on the developing web elements using Angular JS that can be incorporated in the web pages.

Course Objectives

1. To develop dynamic web pages using HTML,CSS, Java script and Angular JS
2. To perform client side validation using Java Script.
3. To effectively build a frame work using Angular JS

Prerequisites	Basic Knowledge of technology.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**Cos**	**COGNITIVE LEVEL**
I	Introduction to HTML5:2.3 First HTML5 - Headings-Images-Using Images as Hyperlinks- and Horizontal Rules-Lists-Tables- Forms- Internal Linking-meta Elements. Exercises: 1. Various text formatting tags. 2. Linking documents and images. 3. Creation of frames, targeting the named frames. 4. Creation of Lists. 5. Table tags, 6. Form elements, 7. Develop a website using HTML.	**20**	CO1 CO2 CO3 CO4 CO5	K1, K2,K3 K4, K5, K6
II	Introduction to Cascading Style Sheets: Inline Styles- Embedded Style Sheets-Linking External Style Sheets. Exercises: 8. Internal CSS with the style elements.	**20**	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

	9. Inline CSS with style elements. 10. External CSS with style element.			
III	JavaScript: Introduction to Scripting-Decision Making: Equality and Relational Operators-Assignment Operators- Increment and Decrement Operators- Control Statements - Functions-Arrays. Exercises: 11. Simple programs (Arithmetic operations) 12. Working with arrays. 13. User defined functions.	20	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
IV	JavaScript: Events – Objects – Forms Exercises: 14. Popup boxes. 15. Objects. 16. Validation of Forms.	22	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
V	Introduction to Angular: TypeScript: Built-in Types – Classes – Utilities – Working with Angular CLI – Building Blocks of Angular: Modules – Components – Templates – Metadata – Data Binding – Directives. Exercises: 17. Introduction to Angular. 18. Using Command Line Interface to create new application. 19. Create navigation from one page to another page. 20. Develop a simple webpage using Angular.	23	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

Text Books
1. DT Editorial Services, HTML 5 Black Book Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery, 2Ed. Paperback – 1 January2016.
2. Sridhar Rao Chivukula,Aki Iskandar, Web Development with Angular and Bootstrap,Packt Publishing, 3rd Edition,2019.

Suggested Readings
1. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites, O'Reilly Media, Third edition,2018.
2. Sergey Akopkokhyants, Stephen Radford· Web Development with Bootstrap 4and Angular 2 ,Packt Publishing, 2016.

Web Resources
1. https://www.youtube.com/watch?v=YP2Y-Rebtl4
2. https://www.youtube.com/watch?v=BI2BsmDvIyM
3. https://www.youtube.com/watch?v=-BynRAhw0UE
4. https://www.youtube.com/watch?v=v0IgI8vYD_o

Course Outcomes (COs) and Cognitive Level Mapping

UCA 1501 WEB PROGRAMMING LAB		COGNITIVE LEVEL
CO 1	To understand the use of HTML tags and JavaScript programming principles and techniques.	K1, K2
CO 2	To illustrate the use of HTML and CSS in designing a web page.	K3
CO 3	To analyze the aesthetics of design.	K4
CO 4	To evaluate the techniques behind responsive web design.	K5
CO 5	To develop a dynamic and functional complete website	K6

Course Code	UCA 1502
Course Title	Introduction to Data Analytics and AI
Credits	05
Hours/Week	05
Category	Major Core (MC) – Theory
Semester	I
Regulation	2019

Course Overview
1. Data Analytics and Artificial Intelligence focuses on introductory knowledge about monetization of data.
2. The course aims to recognize the significance of Data Analytics and AI in various industrial applications.
3. The different elements of the course explore AI-driven transformation across sectors.
4. This course also focuses on the implications of using data analytics in business decision-making.

Course Objectives
1. To understand the significance of Data Analytics and AI in decision-making.
2. To explore the real-world applications of Data Analytics and AI.
3. To relate to case studies and identify business-critical needs that are addressed using data analytics.
4. To apply the different analytic techniques to solve business problems.

Prerequisites	Basic Knowledge of technology.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Data Analytics and AI Strategy for Business Transfer** Re-engineering Business to think AI and Analytics – Robust Data Monetization Strategy –Accelerated Decision-making with Real-Time Analytics – Analytics-Led Enterprise Transformation.	13	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

II	**Banking Industry Transformed by Analytics and AI** Redefining Banking Industry – AI powered Financial services – Reorienting Customer Retention and Risk Management – AI-Driven Transformations in Insurance – Adopting Digital B.ased Insurance Model.	13	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
III	**Redefining Healthcare and Life Sciences** AI adoption in Healthcare – Real-world Evidence Based Analytics improving Treatment outcomes – AI : A Boon to the Life Science Industry – Analytics and Genomics.	13	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
IV	**Analytics and AI in Retail** AI-powered shopping experience – Emergence of Smart Consumers – Evolution of Smart Retailers – Omnichannel Experiences – Fluid Supply Chain Transformation.	13	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
V	**Exponential Technologies underpinned by Analytics and AI** Beating Cyber attacks with Analytics – Connected Car Technology reshaping Automotive Industry – IoT Analytics –Cryptocurrency Analytics – Chatbots	13	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

Text Books
  1. Sameer Dhanrajani (2018), AI and Analytics, Wiley

Suggested Readings

  1. Roehrig, P., Pring, B., Frank, M. (2017). What To Do When Machines Do Everything: How to Get Ahead in a World of AI, Algorithms, Bots, and Big Data. Germany:Wiley.
  2. Norvig, P., Russell, S., Russell, S. J., Davis, E. (2009). Artificial Intelligence: A Modern Approach. United Kingdom: PrenticeHall.

Web Resources
  1. www.kaggle.com
  2. https://archive.ics.uci.edu/ml/index.php

Course Outcomes (COs) and Cognitive Level Mapping

UCA 1502 INTRODUCTION TO DATA ANALYTICS AND AI (MC)		COGNITIVE LEVEL
CO1	To identify and discover the applications of AI in various industries.	K1, K2
CO2	To articulate the power of AI in business.	K3
CO3	To analyze and deduce the changes in modern technology with the advent of AI.	K4
CO4	To evaluate the impact of data analytics and AI in leveraging business outcomes.	K5
CO5	To validate the implications of AI and its influence on exponential technologies.	K6

Course Code	UCS 1301
Course Title	OPERATIONS RESEARCH
Credits	03
Hours/Week	06
Category	Allied Required (AR) – Theory
Semester	I
Regulation	2019

Course Overview
1. Operation research is designed to understand the role and need of it in the field of computer applications.
2. This course aims to identify the scope, objectives, and models of operation research.
3. It focuses on understanding, working with various techniques of resource planning and scheduling.
4. The course utilizes and implements methods in project and inventory planning.

Course Objectives
1. To understand the history and necessity of operation research for scientific way of problem solving.
2. To design and control complex systems and to solve operational problems.
3. To attain optimization in management and inventory problems.
4. To apply decision-making in real-time problems by using scientific methodologies.

Prerequisites	Basics of mathematics and statistics

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to Operations research: Basic definition, Scope, objectives, Phases, models and limitations of Operations research Linear Programming: Formulation of LPP– Graphical solution of LPP and simplex method.	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
II	Transportation problems-unbalanced Transportation Problem-Finding basic feasible solution–North-west corner rule-least cost-Vogel's approximation method. Assignment Problems–Hungarian method for optimal solution-Traveling Salesman Problem.	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

III	Sequencing and scheduling problems: Job sequencing-n-jobs through two machines, N-jobs through three machines, two jobs through machines. Maintenance and replacement problems: Models for routine maintenance and preventive maintenance decision– Replacement models that deteriorate with time and those fail completely.	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
IV	PERT and CPM techniques – Network-activity, node-dummy activity-Fulkerson rule- Constructing the network-Critical path analysis–Three time estimates for PERT.	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
V	Inventory problems: Deterministic model–costs–decision variables– Economic order quality–Instantaneous receipt of goods with and without shortage– Inventory systems–Safety stock– Reorder –Level (ROL), Reorder point(ROP)	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

Text Books
1. Iyer, P.Sankara,"Operations Research", Tata McGraw-Hill, 2008.
2. Gupta, P.K. and Hira,D.S,"Operations Research",S.chand&sons,2000.

Suggested Readings
1. Kalavathy.S, "Operations Research", Vikas publication, fourth edition.
2. Taha.H.A, "Operations research– an introduction" Pearson Prentice Hall, Eighth Edition.

Web Resources
1. http://www.the-science-lab.com/Math/
2. http://botw.org/top/Science/Math/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 1301 OPERATIONS RESEARCH (AR)		COGNITIVE LEVEL
CO 1	To describe and represent the basics of operation research methodologies.	K1, K2
CO 2	To construct models for given problems.	K3
CO 3	To experiment with the outcome of the problems.	K4
CO 4	To evaluate the optimality of the solutions for the given problems.	K5
CO 5	To design the real-time system by using OR techniques.	K6

Course Code	UCA 2502
Course Title	Programming Techniques & C
Credits	04
Hours/Week	04
Category	Major Core (MC) – Theory
Semester	II
Regulation	2019

Course Overview

1. This course aims to provide exposure to basic concepts of C programming.
2. It familiarizes basic syntax, compilation & execution of C programming.
3. It explores Arrays, Functions, Structures and File concepts.
4. It also promotes design, code, test and debug in C programming.

Course Objectives

1. To understand a broad perspective about the uses of computer programming.
2. To explore basic understanding of computers and programming syntax.
3. To implement standard libraries, operators, functions & arrays.
4. To create C programming with features like pointers & structures.
5. To implement various file handling techniques.

Prerequisites	Basic knowledge in programming.

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Numbers and arithmetic-Variables and programs- Informational problems- Types of Errors- Designing programs- Composing functions- Variable definitions- Booleans and Relations-Functions with test conditions- Conditionals and conditional functions- Designing conditional functions- Symbolic information- Structures- Structure definitions-Designing functions for compound data.	**10**	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

II	Syntax and semantics- The scheme vocabulary- Scheme grammar- The meaning of scheme- Errors- Boolean expression- Variable definition- Structure Definition- Lists- Designing functions for self-referential data definitions- Functions that produce lists-List contains structures- Designing complex programs- Recursive auxiliary functions- Structures in structures- Sequences and series- Need for memory – Memory and state variables- Examples of memory usage.	10	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
III	Introduction to C – Sample Code – Debugging - Keywords and Identifiers – Data types – Input/Output Functions – Fundamental Operators – Additional Operators – Bitwise operators- Expressions and Statements – Type Conversions – Loop Statements – Branch and Jump Statements – Reviewing Functions – Recursion.	14	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
IV	Pointers- Arrays – Multidimensional Arrays - Pointers and Arrays –Functions, Arrays and Pointers- Pointer Operations – Pointers and Multidimensional Arrays – String Input String Output – String Functions.	13	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
V	Defining structure variables – Arrays of Structures – Nested Structures – Pointers to Structures – Unions – typedef – Communicating with Files – Standard I/O.	13	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

Text Books

1. Matthias Felleisen, Robert Bruce Findler, Matthew Flatt, Shriram Krishnamurthi, "How to design Programs", MIT press.
2. Stephen Prata, "C primer Plus", 6th Edition, Addison Wesley.

Suggested Readings

1. R.G. Dromey , "How to Solve it by Computer" , PearsonEducation.
2. ReemaThareja, "Programming in C", Oxford UniversityPress.
3. Byron Gottfried and JitenderChhabra, " Programming with C", Schaum's Outlines Series,TMH.

Web Resources

1. https://www.javatpoint.com/c-programming-language-tutorial
2. https://www.tutorialspoint.com/cprogramming/index.htm
3. https://fresh2refresh.com/c-programming
4. https://www.coursera.org/specializations/c-programming

Course Outcomes (COs) and Cognitive Level Mapping

UCA 2502 PROGRAMMING TECHNIQUES & C (MC)		COGNITIVE LEVEL
CO 1	To describe and understand the fundamentals of programming techniques.	K1, K2
CO 2	To implement simple codes using programming concepts in C.	K3
CO 3	To experiment the programming techniques with functions, structures and file handling concepts.	K4
CO 4	To explain the role of pointers using different programming techniques.	K5
CO 5	To develop the solutions for real-world problems.	K6

Course Code	UCA 2503
Course Title	C Programming Lab
Credits	04
Hours/Week	04
Category	Major Core (MC) – Lab
Semester	II
Regulation	2019

Course Overview

1. This course facilitates to acquire complete knowledge of C language.
2. It familiarizes basic syntax and logic that will help to create programs in C.
3. It also deals with Arrays, Functions, Structures, Pointers and file handling concepts
4. The course also promotes industrial programming experience and extensive study of the language.

Course Objectives

1. To understand a broad perspective about the uses of computer programming.
2. To explore basic understanding of computers and programming syntax.
3. To implement standard libraries, operators, functions & arrays.
4. To create C programming with features like pointers & structures.
5. To implement various file handling techniques.

Prerequisites	Basic computer programming knowledge.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	1. Assignments and output statements. 2. Solving expressions. 3. Arithmetic operators. 4. Simple if, if else ladder, nested if statements. 5. Logical operators, Relational operators. 6. Bitwise operators.	**10**	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

II	7. Using input statements. 8. Switch-case statements (multiple choice) 9. Loop statements (While, for and do..while). 10. User defined functions (4types). 11. Recursive functions.	15	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
III	12. Single dimensional array reading andprinting. 13. Sortingnumbers. 14. Multidimensionalarrays. 15. Matrixoperations.	15	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
IV	16. Pointers – simply read and display. 17. Swapping of numbers using call by reference. 18. Swapping two numbers without temporary variable. 19. Passing array arguments to function using pointers. 20. Simple structures creating reading and printing. 21. Structure of arrays. 22. Structure of structures. 23. Passing structure arguments to functions.	15	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
V	24. Union-reading and printing. 25. Union with bit fields. 26. Files-creating reading and printing.	20	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

Text Books

1. Matthias Felleisen, Robert Bruce Findler, Matthew Flatt, Shriram Krishnamurthi, "How to design Programs", MIT press.
2. Stephen Prata, C primer Plus, 6th Edition, Addison Wesley.

Suggested Readings

1. R.G. Dromey , How to Solve it by Computer , Pearson Education.
2. ReemaThareja, "Programming in C", Oxford University Press.
3. Byron Gottfried and JitenderChhabra, "Programming with C", Schaum's Outlines Series,TMH.

Web Resources
1. https://www.javatpoint.com/c-programming-language-tutorial
2. https://www.udemy.com/course/html-css-javascript-certification-course-for- beginners/
3. https://www.homeandlearn.co.uk/WD/WebDesign.html

Course Outcomes (COs) and Cognitive Level Mapping

UCA 2503 C PROGRAMMING LAB (MC)		COGNITIVE LEVEL
CO 1	To describe and understand the fundamentals of programming techniques.	K1, K2
CO 2	To implement simple codes using programming concepts in C.	K3
CO 3	To experiment the programming techniques with functions, structures and file handling concepts.	K4
CO 4	To explain the role of pointers using different programming techniques.	K5
CO 5	To develop the solutions for real-world problems.	K6

Course Code	UCA 2501
Course Title	OPERATING SYSTEMS
Credits	05
Hours/Week	04
Category	Major Core (MC) - Theory
Semester	II
Regulation	2019

Course Overview

1. This course describes the major services, structures and components of Operating system.
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 concepts such as semaphores and cooperating sequential processes.
5. It deals with deadlocks, disk scheduling, file allocation methods and various system-related security issues.

Course Objectives

1. To provide an introduction to the internal operation of the modern Operating Systems.
2. To understand the design and various services provided by the Operating System
3. To acquire basic knowledge of processes, Scheduling and Deadlock concepts.
4. To explore various memory allocation methods and free space management.
5. To focus on Input and Output device structures and organization of the file system

Prerequisites	Basics of computer architecture, data structures and algorithms.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**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 CO4 CO5	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.	12	CO1 CO2 CO3 CO4 CO5	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 CO4 CO5	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.	12	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6
V	File System Structures – Allocation Methods - Free Space Management. I/O System: Introduction - I/O Hardware – Disk Structure – Disk Scheduling.	12	CO1 CO2 CO3 CO4 CO5	K1, K2, K3 K4, K5, K6

Text Books
1. Silberschatz Abraham, Galvin Baer Peter and Gagne Greg, "Operating System Concepts", 8th edition.

Suggested Readings
1. TanenbaumS. Andrew, "Modern OperatingSystems", Third Edition, Prentice- HallInc,2008.
2. Stallings William, "OperatingSystems", Seventh Edition, PearsonEducation, 2011.

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

	UCA 2501 OPERATING SYSTEMS (MC)	COGNITIVE LEVEL
CO 1	To Identify and understand the main components and services of an Operating System	K1, K2
CO 2	To explain the process, memory, file management and various scheduling algorithms.	K3
CO 3	To analyse various issues in Inter Process Communication (IPC) and their solutions and algorithm related with operating system components.	K4
CO 4	To evaluate Memory management algorithms and its allocation methods and virtual memory implementation.	K5
CO 5	To justify various algorithms used in different Operating Systems.	K6

Course Code	UCS 2301
Course Title	ENTERPRISE RESOURCE PLANNING
Credits	03
Hours/Week	06
Category	AL – Theory
Semester	II
Regulation	2019

Course Overview
1. This course describes the functions of ERP and its applications on organization.   2. It covers essential concepts such as ERP tools, technologies for aggregation and integration of data.   3. It deals with data flow throughout the manufacturing, supply chain and entire product life-cycle.   4. It addresses real world business problems associated with ERP usage and implementation.

Course Objectives
1. To understand the various components that helps to computerize the functioning of an enterprise.   2. To understand the issues and decisions that are made on ERP selection and implementation process.   3. To acquire basic knowledge of software modules on the basis of company requirements.   4. To explore various modules of CRM for better quality of services and to enhance the performance**.**

Prerequisites	Basic knowledge on Business organization

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction to ERP – Conceptual model of ERP – Evolution of ERP-Structure of ERP-Reasons for Growth-Advantages of ERP-Enterprise: An overview .ERP and related technologies: Business Process Re-engineering –Management Information System – Decision Support System – Executive Information system – Data Warehousing–Data Mining–OLAP–Supply Chain Management	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Benefits of ERP: Reduction of Lead Time – Reduction of Cycle Time – Improved Resource Utilization – Reduced Quality Costs – Increased Flexibility–Improved Information accuracy and Decision making capability–Risk Management.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	ERP Implementation Lifecycle: Introduction – Per-evaluation screening – Project Planning – Gap Analysis – Reengineering –Configuration – Implementation – Testing – Training – Maintenance. Vendors, Consultants and Users: In-house Implementation-Pros and Cons – Vendors – Consultants–End-users.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Supply chains as Systems - Modelling theSupply Chain – Supply Chain Software - Meeting Demand – Maintaining Supply– Measuring Performance - Forecasting Demand– SchedulingSupply.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Improving performance – Mastering Demand – Designing the Chain. Essentials of Customer relationship management – Designing CRM application - Various modules of CRM application - Advantages of CRM.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books
1. Alexis Leon, "Enterprise Resource Planning "TataMcGraw–Hill Publishing Company Ltd,2004.(Unit1,2,3)
2. Taylor David, Supply chains(A manager guide),Pearson education,(Unit4: Chapters 4, 5, 6, 7, 8, 9,10) (unit 5: Chapters 12, 13,14)

Suggested Readings
1. AmritTiwana, The Essential guide to knowledge management: E-business and CRM applications, Pearsoneducation.
2. Rahul V. Altekar , "Enterprise wide Resource planning Theory andpractice", Prentice Hall of India Pvt. Ltd.
3. Vinod kumargarg and N.K.Venkitakrishnan," Enterprise wide Resource Prentice Hall of India Pvt. Ltd.

Web Resources
1. https://mrcet.com/
2. http://www.sasurieengg.com/
3. https://www.brainkart.com/subject/Enterprise-Resource-Planning_118/

Course Outcomes (COs) and Cognitive Level Mapping

COs	UCS2301 ENTERPRISE RESOURCE PLANNING (AL)	COGNITIVE LEVEL
CO 1	To remember and understand the evolution, components and architecture of Enterprise Systems.	K1, K2
CO 2	To apply the various Enterprise System modules and use them in a business context.	K3
CO 3	To utilize the effective control of inventory and functions of supply chain management.	K4
CO 4	To evaluate ERP implementations on organizations to run their operations more efficiently and effectively.	K5
CO 5	To develop a CRM module for building and managing relationships with customers, and stakeholders.	K6

Course Code	UCA 3501
Course Title	Relational Database Management Systems
Credits	4
Hours/Week	4
Category	Major Core- Theory
Semester	III
Regulation	2019

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.
5. This will also provide skills in back-end validations.

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.
5. To validate the data before storing it in the databases through constraints.

Prerequisites	Basics of programming.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction to Databases- Database management system- Relational database model-Integrity rules-Data modeling and E- R diagrams – Dependency – Normal forms (1NF,2NF,3NF and,BCNF)– Dependency diagrams – Denormalization – Examples to Normalization.	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Client/Server database – Introduction to oracle9i–SQL plus environment–SQL plus commands – 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.	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Arithmetic operations-Restricting with where clause-Built-in Functions -Number functions-Character functions-Conversion functions-Date functions-Grouping data – Distinct function-Null value functions- Decode – Case-Joins- Set operation – Sub quires – TOP – N analysis – Correlated sub queries – Creating and managing views –creating Sequences, indexes and synonyms.	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	PL / SQL – Fundamentals – Block structure – Comments – data types – Variable declaration – Anchored declaration – Assignment operation – Bind variables – Printing in PL/SQL – Control structures-(if, cascaded if, nested if, Unconditional Loop, While Loop, For Loop, case) – Nested blocks–SQL in PL/SQL–DML in PL/SQL – PL/SQL cursors(Explicit, Implicit, inline) –Cursor For loop- Built-in Exceptions-User Defined Exceptions	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Composite data types-Records-Tables-Varray– Procedures, Functions, Packages and Triggers- Creation and usage – Instead of Triggers – Overloading packages – Data dictionary views	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books
1. Nilesh Shah, 2011. Database Systems Using Oracle, Pearson Education, Edition II.

Suggested Readings
1. Steven Feuerstein and Bill Pribyl, Oracle PL/SQL Programming, O'Reilly, Edition IV, 2014.
2. Kevin Loney, Oracle 11g, The Complete reference, Oracle Press Edition I, 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

UCA 3501 RELATIONAL DATABASE MANAGEMENT SYSTEMS (MC)		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
CO 3	To focus on appropriate methodologies to get desirable output through queries	K4
CO 4	To recommend blocks of codes to solve real world problems.	K5
CO 5	To develop stored objects to achieve reusability ethically in a multi-user environment.	K6

Course Code	UCA 3502
Course Title	Relational Database Management Systems - Lab
Credits	4
Hours/Week	4
Category	Major Core-Practical
Semester	III
Regulation	2019

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 back-end validations.
5. This course facilitates to gain expertise in creating stored objects(Procedures, Functions, Packages and Triggers)

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 validate the data through constraints.
5. To create and use stored objects (Procedures, Functions, Packages and Triggers)

Prerequisites	Basics of programming.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**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 CO4 CO5	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 Group functions and HAVING.	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	7. Retrieving rows with Joins and Sub Queries. 8. Working with Case and Decode. 9. Working with Sequences, synonyms, views and indexes	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	10. PL/SQL programs with control structures. 11. PL/SQL programs with Cursors (Explicit, Implicit, Cursor For Loop, Inline Cursor) 12. PL/SQL programs with Exception Handling.	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	13. Creating and Calling Procedures 14. Creating and Calling Functions. 15. Working with Packages	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books
1. Nilesh Shah, 2011. Database Systems Using Oracle, Pearson Education, Edition II.

Suggested Readings
1. Steven Feuerstein and Bill Pribyl, Oracle PL/SQL Programming, O'Reilly, Edition IV, 2014.
2. Kevin Loney, Oracle 11g, The Complete reference, Oracle Press Edition I, 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

UCA 3502 RELATIONAL DATABASE MANAGEMENT SYSTEMS –LAB (MC)		COGNITIVE LEVEL
CO 1	To understand the basics of backend programming with data storages.	K1, K2
CO 2	To construct statement to validate the data storage schemas and ensure the effective retrieval	K3
CO 3	To focus on appropriate methodologies to get desirable output through queries.	K4
CO 4	To recommend blocks of codes to solve real world problems.	K5
CO 5	To develop stored objects to achieve reusability ethically in a multi user environment.	K6

Course Code	UCA 3503
Course Title	Data Structures
Credits	04
Hours/Week	04
Category	Major Core (MC) - Theory
Semester	III
Regulation	2019

Course Overview

1. This course introduces the fundamentals of data structures.
2. It deals with the representation and utilization of abstract data types.
3. This aims at designing efficient algorithms to handle the data.
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 familiarize the fundamentals of data structures, abstract data types used in problem solving.
2. To understand the functionality of different data structures.
3. To employ efficient algorithms to handle simple and complex data structures.
4. To understand the fundamental trade-offs in the design of the data structures.

Prerequisites	Basic knowledge on data types.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction and Overview: Concept of data Structures, Data structure operations Arrays- Linear arrays, Representation of Linear arrays in Memory, Traversing Linear Arrays, Inserting and Deleting, Multidimensional Arrays, Pointers, Pointer Arrays, Records- Record Structures	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	Stacks- Operations on stack, Insert, Delete, update, Arithmetic Expressions: Evaluation of a postfix expression, transforming infix expression into postfix, Recursion – Fibonacci series- Queues- Representation of Queues-operations on queues, Insert, Delete, and update	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

III	Linked List- Representation of Linked list in memory, traversing a linked list, Searching, Insertion into a linked list, Insertion Algorithm, Deletion from a Linked List, Deletion Algorithms- Doubly Linked List, Insertion, Deletion.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Trees, Binary Trees, Representation of binary trees in memory, Traversing Binary Trees- Pre order, In-order, Post order, Graphs, Multi graphs, directed graphs, Adjacency matrix, path matrix, Traversing a graph, Breadth first Search, Depth first search.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Sorting – sorting Techniques- Insertion sort, Selection sort, Bubble sort, merge sort Searching- searching Techniques- Linear search, Binary search.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Seymour Lipschutz, Data Structures, Schaum's Outline series, 1st Edition,2013.
2. Seymour Lipschutz, Theory and problems of data structures, Schaum's Outline series, 5st Edition,2009.

Suggested Readings

1. NarasimhaKarumanchi, Data Structures and Algorithms made easy Career Monk Publications, 2nd Edition,2016.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, CliffordStein, Introduction to Algorithms, The MIT Press; 3rd edition (July 31, 2009.

Web Resources

1. https://www.javatpoint.com/data-structure-tutorial
2. https://www.geeksforgeeks.org/data-structures/
3. https://www.studytonight.com/data-structures/
4. https://www.w3schools.in/data-structures-tutorial/intro/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 3503 DATA STRUCTURES (MC)		COGNITIVE LEVEL
CO 1	To recognize and understand the usage of common data structures.	K1, K2
CO 2	To employ the concept of data structure in problem solving.	K3
CO 3	To analyze the various data structures and its operations.	K4
CO 4	To evaluate problems involving complex data structures.	K5
CO 5	To adapt appropriate data structure for creating solutions to real-world problems.	K6

Course Code	UCA 4501
Course Title	PROGRAMMING IN JAVA
Credits	06
Hours/Week	06
Category	Major Core (MC) – Lab
Semester	IV
Regulation	2019

Course Overview
1. This course facilitates the students to acquire knowledge in Java programming. 2. It familiarizes OOP concepts, interface, packages, Exception handling. 3. It also deals with concurrent programming techniques. 4. The course also promotes development of Java applications.

Course Objectives
1. To understand and apply the principles of object-oriented programming paradigm in solving real world problems. 2. To implement reusability for effective usage of code. 3. To create user-defined packages and 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**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Fundamentals of Object-Oriented Programming: Introduction-Object- Oriented Paradigm-Basic Concepts of OOPS-Benefits of OOPS- Applications of OOPS. Java Evaluation: Java Features - Introduction-Simple java program- java tokens -java virtual machine. Constants-Variables-Data Types – Scope of variables-type casting. Exercises: 1. Simple programs using data types and type casting.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Operators and Expressions - Decision Making and Branching: If, If..Else, Nesting of If, Else if Ladder, Switch, ?: Operator . Decision Making and Looping While, do, For Statements. Exercises: 2. Simple programs using operators in java. 3. Java program using all control structures.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Classes, Objects and Methods -- Constructors-Methods overloading- Static Members-Inheritance- Overriding methods-Final variable and methods-Final Class-Finalizer methods-Abstract methods and classes - Arrays, Strings. Exercises: 4. Write a Java program using classes and objects. 5. Write a Java program using Arrays and strings. 6. Implementing the inheritance concepts. 7. Write a Java program with Abstract classes and Static members 8. Write a Java program using method over loading concept. 9. Write a Java program using method overriding concept.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Interfaces: Multiple Inheritance: Defining Interface- Extending Interface-Implementing Interface- Accessing Interface Variable. Packages: Putting Classes Together. Exercises: 10. Write a Java Program with Interfaces. 11. Create and import a package in Java.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

V	Multithreaded Programming: Creating Threads -Extending a Thread class –Lifecycle 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. Exercises: 12. Write a Java Program to implement the concept of Multithreading. 13. Write a Java Program to set the priority for the Threads. 14. Write a Java Program to handle Built-in Exceptions. 15. Write a Java Program to handle user defined Exceptions.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

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

Web Resources

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

Course Outcomes (COs) and Cognitive Level Mapping

UCS 4501 PROGRAMMING IN JAVA (MC)		COGNITIVE LEVEL
CO 1	To describe and understand the fundamental concepts of object-oriented programming in Java.	K1, K2
CO 2	To implement the programming structures in Java.	K3
CO 3	To experiment with the programming constructs with objects, Classes, inheritance, packages and interfaces.	K4
CO 4	To evaluate concurrent programming techniques in Java.	K5
CO 5	To develop applications to solve real world problems.	K6

Course Code	UCA 4603
Course Title	Cloud Computing
Credits	06
Hours/Week	06
Category	Major Elective (ME) – Theory
Semester	IV
Regulation	2019

Course Overview
1. Cloud computing is the delivery of computing services on demand over the Internet.
2. This course helps to understand the concepts and techniques in cloud computing.
3. It provides in-depth knowledge on cloud computing, types of cloud services and models.
4. It explains the different steps involved in security and its usage in various domains.

Course Objectives
1. To identify the basic elements of cloud architecture.
2. To familiarize the different services and models in cloud with examples.
3. To explore the various topics like video streaming, transcoding and multimedia cloud.
4. To understand the basics of security in the cloud.

Prerequisites	Basic knowledge in Computer Science and Internet.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**Cos**	**COGNITIVE LEVEL**
I	Introduction – Characteristics of Cloud Computing – Cloud models -Cloud services Examples – cloud-based Services & Applications - virtualization – Load Balancing – scalability & Elasticity– Deployment– Replication – Monitoring – software Defined Networking – Network Function Virtualization –Map Reduce– Identity and Access Management– Service Level Agreement – Billings.	16	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	Compute Services –Storage Services – Database Services – Application Services – Content Delivery Services– Analytics Services – Deployment & Management Services –Identity & Access Management Services –Open Source Private Cloud Software.	16	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

III	Big Data Analytics :Introduction – Clustering Big Data – Classification of Big Data – Recommendation system Multimedia Cloud **:**Introduction – CaseStudy:LiveVideoStreamingApp – Streaming Protocols – CaseStudy: Video Transcoding App.	**16**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Cloud Application: Workload Characteristics – Application Performance Metrics - Design Considerations for a Benchmarking Methodology – Benchmarking Tools- Deployment- Prototyping – Load Testing & Bottleneck Detection Case Study – Hadoop Benchmarking.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Cloud Security Architecture – Authentication – Authorization – Identify & Access Management - Data Security – Key Management – Auditing. Cloud uses: Cloud Computing for Healthcare – Cloud Computing for Energy Systems – Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry – Cloud Computing for Education.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books
1. Arshdeep Bahhga and Vijay Madisetti, 2017. Cloud Computing Hands on Approach, 1st Edition , University Press.

Suggested Readings

1. KrisJamsa,2014. Cloud computing SaaS, PaaS, Virtualization, Business, Mobile security and more, 1st Edition, Jones & Batrlett StudentsEducation.
2. RajkumarBuyya, Christian Vecchiola, S.Thamaraiselvi, 2013. Mastering cloud computing, 1st Edition, Tata McGrawHill.

Web Resources
1. https://www.javatpoint.com/cloud-computing-tutorial
2. https://www.simplilearn.com/tutorials/cloud-computing-tutorial

Course Outcomes (COs) and Cognitive Level Mapping

UCA 4603 CLOUD COMPUTING (ME)		COGNITIVE LEVEL
CO 1	To remember and understand cloud computing, different cloud services, deployment models and security.	K1, K2
CO 2	To apply and examine different cloud computing services, concepts and techniques.	K3
CO 3	To explore the features involved in cloud computing, big data analytics and cloud security.	K4
CO 4	To evaluate the role of video streaming and video transcoding app and concepts in the cloud.	K5
CO 5	To create different use cases of the applications of cloud in diverse domains.	K6

Course Code	UCA 4604
Course Title	Cyber security
Credits	03
Hours/Week	06
Category	Major Elective(ME)- Theory
Semester	IV
Regulation	2019

Course Overview
1. This course is designed to investigate cybercrime and its characteristics.
2. This helps to identify various kinds of crimes and their nature to take corresponding actions.
3. This also provides fundamentals of investigating and demonstrating forensic approaches.
4. The course familiarizes cyber laws and regulations.

Course Objectives
1. To understand the basics of cyberspace.
2. To acquire knowledge on verification processes.
3. To develop skills in using cryptographic techniques to secure our system
4. To understand the various internet crimes and their causes.
5. To assess the traditional problems associated with computer crimes.

Prerequisites	Basics of the Internet and its uses.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to Internet – Introductionto Cyber Crime – Malware and its types: Adware – Spyware – Virus – Worms – Trojan Horse – Scareware - Kinds of Cyber Crime – Cyber Security Techniques : Authentication – Encryption – Digital Signatures – Antivirus – Firewall – Steganography.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Guidelines for Secure Password, Two Step verification and using free antivirus: Generating Secure password – Using Password Manager – Enabling Two-step verification – Securing Computer using antivirus.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Symmetric cipher model – cryptographic system – substitution techniques – Caesar cipher – mono alphabetic ciphers – Hill ciphers. Transpositiontechniques– steganography – Data encryption standard–The strength of DES–Block Cipher Design principles.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Investigating DoS Attacks: Types of DoS Attacks – Classification of DoS Attacks – Techniques to Detect DoS Attacks – Investigating DoS Attacks – Investigating Internet Crime: Introduction to Investigating Internet Crime – Steps for investigating Crime.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Cyberspace and criminal behavior: Clarification of terms - Traditional problems associated with computer crime - Introduction to Incident Response - Digital Forensics - Contemporary Crimes - Computers as Targets - Contaminants and Destruction of Data - Indian IT ACT 2000.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books
1. Dr.JeetendraPande, 2017. Introduction to Cyber Security, Uttarakand OpenUniversity.
2. William Stallings, 2012. Cryptography and Network security, Wiley.

Suggested Readings
1. Nina Godbole and SunitBelpure, 2011. Cyber Security understanding Cybercrimes, Computer Forensics and legal perspectives, Wiley.
2. J.P.Mishra, 2012. An Introduction to Cyber Laws, Central Laws publications.

Web Resources
1. http://www.uou.ac.in/sites/default/files/slm/Introduction-cyber-security.pdf
2. http://www.cse.iitm.ac.in/~chester/courses/16e_cns/slides/01_Introduction.pdf
3. http://practicalcryptography.com/ciphers/caesar-cipher/
4. https://us.norton.com/internetsecurity-emerging-threats-dos-attacks-explained.html
5. http://www.legalserviceindia.com/legal/article-1019-importance-of-cyber-law-in-dia.html

Course Outcomes (COs) and Cognitive Level Mapping

	UCA 4604 CYBER SECURITY (ME)	COGNITIVE LEVEL
CO 1	To remember and understand the basics of Cybercrime and its malware.	K1, K2
CO 2	To apply the various security strategies.	K3
CO 3	To analyze the ways for secured data transmission.	K4
CO 4	To assess the prevention of unauthorized access.	K5
CO 5	To anticipate the security threats and provide a solutions.	K6

Course Code	UCA 4605
Course Title	Android Programming Lab
Credits	06
Hours/Week	06
Category	Major Elective – Lab
Semester	IV
Regulation	2019

Course Overview
1. This course provides an understanding of Android App Development.
2. It deals with the platforms for developing Android based applications.
3. It explains android features used for code generation, debugging and deployment.
4. It develops maintainable mobile apps comprised of Android components for real time applications.

Course Objectives
1. To provide exposure on the basic android platform architecture.
2. To understand the design concepts of android app development.
3. To use Android SDK's Emulator to test and debug applications with the back end of SQLite.
4. To interact with Servers using Web Services.

Prerequisites	Basic knowledge on Programming.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction to Android Operating System: Android Versions-Android Activity- Features and Architecture of Android. Configuration of Android Environment: Java JDK- Android SDK – ADT –AVDs – Emulators – DVM- Steps to install and configure Eclipse and SDK. Create the first Android Application. Android User Interface. 1. To make use of Text fields. 2. To make use of Text fields.	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	Designing your UI with View: Text View, Button, Image Button, Edit Text, Check Box, Toggle Button, Radio Button and Radio	**15**	CO1 CO2 CO3	K1,K2,K3 K4,K5,K6

			CO4 CO5	

	Group- Progress Bar, Spinner, List View, Grid View, Image View, Scroll View, Time and Date Picker.
	    3. Design your UI with view.
	    4. Apply all the layouts to your design.			

III	Activity: Intent, Intent-Filter - Activity Life cycle- Broadcast Lifecycle-Service.
	Multimedia: Android system Architecture - Play Audio and Video.
	    5. Create images in your application.
	    6. Make use of intents.
		15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

IV	SQLITE Database in Android: SQLite Database- Why SQLite? Creation and Connection of Database, Extracting value from cursors, Transactions
	    7. Create Date and Time widgets in your application.
	    8. Create a database and use it in your application.
		15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

V	Telephoning and Messaging: SMS, Telephony Publishing
	    9. Use graphical images.
	    10. Create a Web View.
	    11. Send SMS from your device.
		20	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Prasanna Kumar Dixit, ANDROID, Vikas Publishing house, 1st Edition 2014.

Suggested Readings
1. Neil Smith, Android Studio Development Essentials, CreateSpace Independent Publishing Platform, 2nd Edition2015.
2. Barry Burd, A. Wiley Brand, Android Application Development All-In-One for Dummies, A Wiley Brand, 2st Edition2015.
3. JohnHorton,AndroidprogrammingforBeginners,HauryPublisher,2stEdition 2015.

Web Resources
1. https://www.tutorialspoint.com/android/index.htm
2. https://developer.android.com/training/basics/firstapp

Course Outcomes (COs) and Cognitive Level Mapping

UCA 4605 ANDROID PROGRAMMING LAB (ME)		COGNITIVE LEVEL
CO 1	To define and understand the process of installation of Android and its applications.	K1,K2
CO 2	To apply the widgets available in Android platform.	K3
CO 3	To illustrate Internet and Multimedia features in mobile application development.	` K4
CO 4	To evaluate the usage of Databases and develop applications based on web view.	K5
CO 5	To create and host Android based mobile applications.	K6

Course Code	UCA 4606
Course Title	Network Administration
Credits	04
Hours/Week	06
Category	Major Elective
Semester	IV
Regulation	2019

Course Overview

1. This course targets at entry level Windows/Linux users pursuing careers in network and system administration.
2. This course guides to configure a server, an Active directory and setting up LAN.
3. It also explores designing of networks and network administration commands in Windows and Linux.
4. It familiarizes network-monitoring tool PRTG.

Course Objectives

1. To understand network administration commands using Windows and Linux.
2. To explain the network or system administrator's role.
3. To acquire knowledge on installation of operating systems and managing users.
4. To analyze the connections using a network monitoring tool

Prerequisites	Basic knowledge on Networks.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**

I	Purpose of computer network – Network Hardware- LAN, WAN, Wireless Networks – Network connection hardware- Router, switch, Hub, NIC, Repeaters. Network administration Commands in Microsoft: PING-TRACERT-PATHPING- NETSTAT -AT -NET - ROUTE-ARP - IPCONFIG – NETSH.
	1. Basic Network administration commands.
	   a)PING b) TRACERT c) PATH PING
	   d)NETSTAT e)AT f) NET g) ROUTE
	   h)ARP i) IPCONFIG j)NETSH
	2. Installation of windows 2016 server and windows 10
	3. Configuring server/client setting in windows 2016 server.
		18	CO1
			CO2
			CO3
			CO4
			CO5
				K1,K2,K3
				K4,K5,K6

II	Network Configuration – Server – server hardware, client and server OS Configuration, Maintaining data integrity Services – single and multiple services, client requirements, operational requirements - DHCP –DHCP server. 4. Assigning IP Address to remote user. 5. Setting up simple LAN network in Microsoft. 6. Configuring windows 2016 as a DHCP server and client.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Designing Network – Accessing Network Needs, Applications, Users, Network Services, Security and Safety, Growth and Capacity Planning, Meeting Network Needs – Choosing Network Type, Choosing Network Structure, Choosing Servers. 7. Adding new user/new group in windows 2016server. 8. Setting passwords in windows.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Network management and debugging in Linux system: IFCONFIG – IP – PING - TRACEROUTE - NETSTAT -Packet Sniffers-CSI Netalysr-Basic network configuration in Linux. 9. Network management and debugging in Linux system. (i)Ping(ii) SmokePing (iii)TraceRoute (iv) NETSTAT (v)Packet Sniffers (vi)ICSINetalysr 10. Installation of Linux server Fedora31 11. Basic network configuration in Linux.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Adding new users –Login name, encrypted password, UID, setting password, setting permission and ownerships-Configuring roles and administrative privileges. - Sharing printers in network- Configuring the system to connect internet.	**18**	CO1 CO2 CO3 CO4 CO 5	K1, K2, K3, K4 ,K5,K6

12. Adding new users –Login name, encrypted password, UID, setting password, setting permission and ownerships. 13. Configuring roles and administrative privileges. 14. Sharing printers in network 15. Configuring the system to connect internet. 16. Network Monitoring using PRTG(Paessler Router Traffic Grapher)	

Text Books

1. William Stallings , computer networking with internet Protocol and Technology,Persons,Edition-1,2004
2. Olaf Kirch, Terry Dawson Stanek, Linux network administrator's Guide.O'ReillyMedia,Edition-2,2000

Suggested Readings

1. William Stanek, Windows server-2016:The Administrator's Reference,stanek and associates, 2016,Edition-1
2. Jay La croix , Mastering Linux network ,Pack publishing,2015,Edition-1

Web References

1. https://www.wintips.org/how-to-install-windows-server-2016-step-by-step/
2. https://www.server-world.info/en/note?os=Fedora_31&p=download

Course Outcomes (COs) and Cognitive Level Mapping

UCA 4606 NETWORK ADMINISTRATION (ME)		COGNITIVE LEVEL
CO 1	To identify and understand the network administration commands and services.	K1, K2
CO 2	To implement network services and optimal network designs.	K3
CO 3	To analyze the network needs, Client requirements and data packets using PRTG.	K4
CO 4	To explain the functions of network connection devices and the role of network administrator.	K5
CO 5	To construct LAN, Active directory and DHCP server.	K6

Course Code	UCA 5501
Course Title	Web Programming using PHP and MySQL
Credits	04
Hours/Week	04
Category	Major Core (MC) – Theory
Semester	V
Regulation	2019

Course Overview

1. PHP is the most popular free, open source and server side scripting language.
2. MySQL is a Relational Database Management System (RDBMS) which is free and open sources.
3. This course gives in-depth knowledge of developing web applications using PHP as the front-end technology.
4. This course also serves to understand the management of tables in MySQL.
5. It explains the connectivity between PHP and MySQL thereby allowing access to the data stored in database.

Course Objectives

1. To understand the complete overview of Web development.
2. To know the basics of PHP and MySQL.
3. To explore the various features like classes, sessions and cookies in PHP.
4. To understand the basics of handling tables, executing queries and to connect PHP and MySQL.

Prerequisites	Basic knowledge in HTML.

SYLLABUS				
UNIT	CONTENT	HOURS	Cos	COGNITIVE LEVEL
I	Introduction to Dynamic web content – HTTP and HTML – Benefits of PHP, MySQL, Javascript and CSS–Apache Web Server – Introduction to PHP – Calling PHP Parser – Structure of PHP – Control flow in PHP –Conditional, Looping Statements – PHP Dynamic Linking.	11	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	PHP functions and objects – Defining a function, Returning a value, Returning an array, Passing by Reference, Returning Global variables- Including and requiring files – PHP objects- Declaring a class, Creating an object, Accessing objects, Constructors, Writing methods, Declaring properties, constants, Inheritance.	10	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	PHP arrays – Basic Access – Numerically Indexed – Associative – array keyword – foreach loop – Multidimensional arrays – Array functions – Date and time functions – File handling functions – XHTML – XHTML Validation.	10	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Form Handling - Building forms– Retrieving submitted data – Using cookies in PHP – Setting, Accessing and Destroying a cookie - HTTP authentication – Storing usernames and passwords – Using Sessions – Starting and Ending a session – Session Security.	10	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Practical MySQL – Creating a table with key constraints, dropping a table, adding, retrieving, updating data, deleting data – Performing additional queries (Joins and subqueries)– Accessing MySQL using PHP– Connecting to MySQL - Querying MySQL database with PHP.	11	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

RobinNixon, "A step by step guide to creating dynamic website. Learning PHP, MySQL, Javascript and CSS", 2nd Edition ,O'Reilly, 2012.

Suggested Readings

1. Vikram Vaswani, 2005. How to do everything with PHP and MySQL, 1stEdition, Tata McGrawHill.
2. Vikram Vaswani, 2017. A beginner's guide PHP, 1st Edition, McGraw Hill Education.
3. Luke Welling, 2017. PHP and MySQL web development, 5th Edition, Pearson Education.

Web Resources

1. https://www.w3schools.com/php/
2. https://www.udemy.com/course/php-mysql-tutorial/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 5501 WEB PROGRAMMING USING PHP AND MYSQL (MC)		COGNITIVE LEVEL
CO 1	To observe and understand the role, structure, control flow, classes and concepts in PHP and tables in MySQL.	**K1, K2**
CO 2	To implement the concepts in PHP and queries in MySQL.	**K3**
CO 3	To analyze functions for data and file handling in PHP and data management in MySQL.	**K4**
CO 4	To evaluate the programming concepts in PHP to develop interfaces and manipulate data using MySQL.	**K5**
CO 5	To create applications using PHP and MySQL.	**K6**

Course Code	UCA 5502
Course Title	Web Programming using PHP and MySQL LAB
Credits	05
Hours/Week	05
Category	Major Core (MC) – Lab
Semester	V
Regulation	2019

Course Overview

1. PHP is the most popular free, open source and server side scripting language.
2. MySQL is a Relational Database Management System (RDMS), which is free and open source.
3. This course gives in-depth knowledge of developing web applications using PHP as the front-end technology.
4. This course also serves to understand the management of tables in MySQL.
5. It explains the connectivity between PHP and MySQL thereby allowing access to the data stored in the database.

Course Objectives

1. To explore the concepts and techniques of Web development.
2. To implement the features of PHP and MySQL.
3. To experiment building interfaces and creating databases.
4. To develop applications using PHP and MySQL.

Prerequisites	Basic knowledge in HTML.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**Cos**	**COGNITIVE LEVEL**
I	1. To implement Conditional control statements. 2. Looping control statements. 3. Nested control statements.	10	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	4. User defined functions returning single value /arrays. 5. User defined functions with pass by reference. 6. Implementing classes and objects. 7. Usage of constructors. 8. Implementing inheritance using classes.	**16**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	9. Implement different types of PHP arrays. 10. Built-in functions 11. File handling functions. 12. Design a simple XHTML program.	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	13. Designing forms with different input types. 14. Creating and destroying sessions. 15. Creating and destroying cookies.	**12**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	16. Create, alter and drop tables (using constraints) in MySQL. 17. Implement insert, update, delete and select queries inMySQL. 18. Storing sensitive data in MySQL using encryption functions. 19. Join and sub queries. 20. Implement connectivity of PHP with MySQL with insert, update, select and delete queries.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

RobinNixon, 2012.A step by step guide to creating dynamic website. Learning PHP, MySQL, JavaScript and CSS, 2nd Edition ,O'Reilly.

Suggested Readings

1. VikramVaswani, 2005. How to do everything with PHP and MySQL, 1st Edition, Tata McGrawHill.
2. VikramVaswani, 2017.A beginner's guide PHP,1stEdition, McGraw Hill Education.
3. Luke Welling, 2017. PHP and MySQL web development, 5th Edition, Pearson Education.

Web Resources

1. https://www.w3schools.com/php/
2. https://www.udemy.com/course/php-mysql-tutorial/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 5502 WEB PROGRAMMING USING PHP AND MYSQL LAB (MC)		COGNITIVE LEVEL
CO 1	To observe and understand the role, structure, control flow, classes and concepts in PHP and tables in MySQL.	K1, K2
CO 2	To implement the concepts in PHP and queries in MySQL.	K3
CO 3	To analyze functions for data and file handling in PHP and data management in MySQL.	K4
CO 4	To evaluate the programming concepts in PHP to develop interfaces and manipulate data using MySQL.	K5
CO 5	To create applications using PHP and MySQL	K6

Course Code	UCA 5503
Course Title	Visual Programming
Credits	04
Hours/Week	04
Category	Major Core (MC) – Theory
Semester	V
Regulation	2019

Course Overview
1. Visual programming is a language with object-oriented programming principles.
2. This gives in-depth knowledge of developing console, windows and web applications.
3. It also handles event-driven programming methods to create user-friendly applications.
4. This course also promotes design, code, test and debugging of Visual Programming in C# & ASP.NET.

Course Objectives
1. To explain the basic concepts of .NET framework and C# fundamentals.
2. To explore the features of OOPS, arrays and functions.
3. To familiarize structures & files concepts in C# programming language.
4. To develop web applications using ASP.NET.

Prerequisites	Basic computer programming knowledge.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Creation of C#: C# family tree - .NET framework – Overview of C# - Object oriented programming- Data types, Literals and Variables – Operators – Control statements – Looping statements.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	Classes, Objects and methods: Class fundamentals – Creation of objects – Constructors and Destructors - Arrays and Strings: One-dimensional array, Multi-dimensional array, jagged arrays – Strings – Operator Overloading.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

III	Inheritance: Basics, Member access & inheritance, Virtual Methods and overriding, Abstract Classes: interfaces, interface references, interfaces can be Inherited; Structures – Interfaces – Structures and Enumerations –Exception handling.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Using I/O: Stream classes – Console I/O –File Stream and Byte-Oriented File I/O – Character based File I/O - ADO.NET Overview – Database Connections – Commands – Data Reader-DataAdapter-DataSets-Data Controls and its Properties - Data Binding.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Introduction to ASP.NET - IDE-Languages supported Components -Working with Web Forms - Web form standard controls: Properties and its events – Validation controls - Creating Web application.	12	CO 1 CO 2 CO 3 CO 4 CO 5	K1, K2, K3, K4, K5, K6

Text Books
1. Herbert Schildt , The Complete Reference C# 4.0, Tata McGraw-Hill, 1st Edition 2017
2. Mathew,MacDonald,TheCompleteReferenceASP.NET,TataMcGraw-Hill,1st Edition 2015.

Web Resources
1. https://www.javatpoint.com/c-sharp-example
2. https://www.w3schools.com/asp/webpages_intro.asp
3. https://www.c-sharpcorner.com/csharp-tutorials
4. https://docs.microsoft.com/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 5503 VISUAL PROGRAMMING (MC)		COGNITIVE LEVEL
CO 1	To define and understand the fundamentals of the C#, .NET framework and ADO.NET.	K1, K2
CO 2	To illustrate the various concepts of C#.	K3
CO 3	To analyze the concepts of inheritance, file handling functions and other class methods.	K4
CO 4	To explain the role of functions and classes in C# with ADO.NET programming.	K5
CO 5	To create applications in Visual programming.	K6

Course Code	UCA 5504
Course Title	Visual Programming Lab
Credits	03
Hours/Week	05
Category	Major Core (MC) – Lab
Semester	V
Regulation	2019

Course Overview
1. C#.NET allows developers to create console, windows and web applications.
2. It deals with OOPS and .NET class framework with programming methods.
3. It introduces the usage of Inheritance and implementation of interfaces.
4. It also handles ASP.NET and data management for creating and deploying web applications.

Course Objectives
1. To explain the basic concepts of .NET framework and C# fundamentals.
2. To explore the features of OOPS, arrays and functions.
3. To familiarize structures & files concepts in C# programming language.
4. To develop web applications using ASP.NET

Prerequisites	Basic knowledge in computer programming.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	1. Console Application – Working with Variables &Operators 2. Console Application – Program with Control statements 3. Console Application –Program with Looping statements	10	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	4. To create an exposure of windows applications and tools. 5. Implement classes and objects. 6. Working with Operator overloading.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

III	7. Implement inheritance and polymorphism concepts. 8. Working with Constructors, Destructors and Interfaces. 9. Implementing Arrays, Jagged Arrays and String handling functions. 10. Implement Exception handling and Enumerations.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	11. Working with File concepts and Structures 12. Database application to perform insert, update and delete operations. 13. Data binding with Web and Data Controls.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	14. Create an exposure of Web applications and tools List and Data controls. 15. Validate user input using Validation controls. 16. Develop a web application using ASP.NET.	20	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Herbert Schildt, "The Complete Reference C# 4.0",Tata McGraw-Hill,1stEdition 2017.
2. Mathew, MacDonald, "The Complete Reference ASP.NET", Tata McGraw-Hill, 1st Edition 2015.

Suggested Readings

1. Paul Dietel, Harvey Deitel, "C# 2012 for Programmers", Prentice Hall, 5th Edition 2013.
2. Nash Trey, Accelerated C# 2010, A Press, Delhi, 1st Edition2010.
3. Denielle Otey, Michael Otey, "ADO.NET: The Complete reference", McGraw Hill, 1st Edition 2008.
4. Matthew MacDonald, "Beginning ASP.NET 4 in C# 2010", APRESS, 1st Edition 2010.

Web Resources

1. https://www.javatpoint.com/c-sharp-example
2. https://www.w3schools.com/asp/webpages_intro.asp
3. https://www.c-sharpcorner.com/csharp-tutorials
4. https://docs.microsoft.com/

Course Outcomes (COs) and Cognitive Level Mapping

	UCA 5504 VISUAL PROGRAMMING LAB (MC)	COGNITIVE LEVEL
CO 1	To define and understand the fundamentals of the C#, .NET framework and ADO.NET.	K1,K2
CO 2	To illustrate the various concepts of C#.	K3
CO 3	To analyze the concepts of inheritance, file handling functions and other class methods.	K4
CO 4	To explain the role of functions and classes in C# with ADO.NET programming.	K5
CO 5	To create applications in Visual programming.	K6

Course Code	UCA 5505
Course Title	SOFTWARE ENGINEERING
Credits	06
Hours/Week	6
Category	Major Core (MC)
Semester	V
Regulation	2019

Course Overview
1. Software Engineering is the process of analyzing user requirements designing, building and testing software applications.
2. The course provides in-depth knowledge in developing systems.
3. This course helps to understand the software development models, System Engineering, design concepts.
4. It elucidates project management, estimation and scheduling concepts.
5. It explicates software testing, implementation and configuration management.

Course Objectives
1. To understand the significance of process models.
2. To familiarize on system engineering and data modeling concepts.
3. To explore the various design process.
4. To analyze project management, estimation software quality and testing strategies.

Prerequisites	Basic knowledge in software development process.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction to Software Engineering: The Evolving Role of Software-The changing nature of software-Software Myths. A generic View of Process: A Layered technology-process models: The Waterfall Model Evolutionary Process Models.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	System Engineering: Computer-Based Systems-Hierarchy-Requirements Engineering Tasks Initiating the Requirement Engineering Process - Eliciting Requirements- Building the Analysis Model-Requirement Analysis- Data Modelling Concepts-Flow Oriented Modelling-Class based Modelling- Creating Behavior Model.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Design process and Design Quality- Design Concepts - The Design Model- Software Architecture Data Design-Architectural Design-Mapping Data Flow - Modelling component level design: Designing class based components- Performing User Interface Design: The Golden Rules- Analysis and Design-Interface Analysis-Interface Design Steps- Design Evaluation.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Project Management Spectrum-The People-The Product -The Process-The Project. Estimation: The Project Planning Process Resources-Software Project Estimation-Decomposition Techniques - Empirical Estimation Models. Project Scheduling: Project scheduling Quality Management: Quality Concepts-Software Quality-Assurance-Formal Technical Reviews.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Software Testing-Test strategies for Conventional Software and Object- Oriented Software-Validation Testing System Testing-The art of Debugging. Testing Tactics: Software Testing Fundamentals-White Box Testing-Basis Path Testing-Control Structure Testing-Black Box Testing-Object Oriented Testing Methods.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books
1. Roger S Pressman," Software Engineering", McGraw-Hill, 2019, 8th edition.

Suggested Readings
1. Richard Fairley, "Software Engineering Concepts", Mc Graw-Hill, 2014.
2. Rajib Mall, "Fundamentals of Software Engineering", PHI, 2014.

Web Resources
1. https://www.javatpoint.com/software-engineering-tutorial
2. https://www.tutorialspoint.com/software_engineering/index.htm

Course Outcomes (COs) and Cognitive Level Mapping

	UCA 5505 SOFTWARE ENGINEERING (MC)	COGNITIVE LEVEL
CO 1	To identify and understand various software processing models and requirement engineering.	K1, K2
CO 2	To determine the requirements and design process	K3
CO 3	To analyze Project Estimation, Scheduling, Software Quality.	K4
CO 4	To evaluate various models and post development activities.	K5
CO 5	To design software application that satisfies user requirements.	K6

Course Code	UCA 5601
Course Title	DATA COMMUNICATION AND NETWORKS
Credits	05
Hours/Week	05
Category	Major Elective (ME) - Theory
Semester	V
Regulation	2019

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 determine and manage data transmissions and multiplexing methods.

3. To acquire knowledge in detecting and correcting errors in data transmission.

4. To familiarize with encoding and modulation techniques.

Prerequisites	Basic knowledge in communication system.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction: Data communications – Networks – Network types – Internet History–Standards and Administrations– Network Models: TCP/IP Protocol Suite-Layered architecture-Layers in the TCP/IP Protocol suite-Description of each layer-encapsulation and decapsulation - addressing-multiplexing and demultiplexing-OSI Model- OSI versus TCP/IP.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Physical layer: Introduction to physical layer-data and signals:- analog and digital data-analog and digital signals-periodic and non periodic-periodic analog signals-sine wave-phase-wavelength-time and frequency domains-composite signals-bandwidth-digital signals-Bit rate-Bit Length-Digital Signal as a Composite Analog Signal-Transmission of Digital Signals transmission impairment: Attenuation-Distortion-Noise.	**18**	CO 1 CO 2 CO 3 CO 4 CO 5	K1, K2, K3, K4, K5,K6
III	Digital Transmission: – Digital- to-Digital Conversion-Line Coding-Line Coding Schemes-Blockcoding-Analog to digital conversion-Pulse Code Modulation-Delta Modulation–Transmission-modes-Parallel-transmission-Serial-Transmission-Analog-to-Analog Conversion-Amplitude Modulation-Frequency Modulation-Phase Modulation.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Multiplexing: Frequency division multiplexing-wavelength division multiplexing-time division multiplexing-Transmission Media- guided media-Twisted pair cable- Coaxial Cable-Fiber optic cable- Unguided media-Radio waves-Microwaves-infrared-Data Link Layers-Introduction-Nodes and Links- services-Two Categories of links-Two Sub layers.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Introduction-Link Layer Addressing-Three types of address-Address Resolution protocol - Error Detection and correction-Types of Errors-Redundancy-Detection versus Correction-Coding-Block Coding- Error detection-Cyclic codes-Cyclic redundancy check-Polynomials- Checksum-concept.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Behrouz Forouzan, Data Communications and Networking, Mcgraw Hill 5th Edition 2019.

Suggested Readings

1. Andrew s. Tanenbaum, Computer networks, Prentice Hall, 4th Edition2003.
2. DP Nagpal, Data Communication and Networking, S. Chand Publishing, Second Edition 2018.
3. William Stallings, Data and Computer Communications, Pearson Education, 10th Edition2013.
4. PrakashC.Gupta, Data Communications and Computer Networks, Tata McGraw Hill., 2nd Edition2014.

Web Resources

1. https://www.tutorialspoint.com/data_communication_computer_network/
2. http://www.crectirupati.com/sites/default/files/lecture_notes/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 5601 DATA COMMUNICATION AND NETWORKS (ME)		COGNITIVE LEVEL
CO 1	To describe and understand fundamental principles of networking	K1, K2
CO 2	To explain the transmission of data through network communication using layered concepts and signals.	K3
CO 3	To analyze the various types of transmission media and manage the connections.	K4
CO 4	To assess error free data transmission using the transmission techniques.	K5
CO 5	To construct optimal network connections for effective data transmissions.	K6

Course Code	UCA 5602
Course Title	Mobile Computing
Credits	04
Hours/Week	06
Category	Major Elective
Semester	V
Regulation	2019

Course Overview
1. This course explores various generations of mobile technologies.
2. It familiarizes different mobile and multimedia services.
3. It deals with different network architectures and its applications.
4. It focuses on the features and types of Mobile IP and Mobile TCP.

Course Objectives
1. To understand the concepts of mobile technologies and different generations.
2. To explore the applications of different network architectures.
3. To explain the platforms and protocols used in mobile environment.
4. To use different mobile services and compression techniques.

Prerequisites	Basic knowledge on communication.

SYLLABUS				
UNIT	CONTENT	HRS	COs	Cognitive level
I	Mobile Computing Architecture: Architecture for Mobile Computing – Three-tier Architecture- Design Considerations for Mobile Computing- Mobile Computing through Internet – Making Existing Applications Mobile-enabled Emerging Technologies: Bluetooth – Radio Frequency Identification – Wireless Broadband - Mobile IP.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	Global System for Mobile Communications: Global System for Mobile Communications – GSM Architecture – GSM Entities – Call Routing in GSM – GSM Addresses and Identifiers – Network Aspects in GSM -General Packet Radio Service: Introduction – GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Applications for GPRS.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

III	Wireless Application Protocol: Introduction – WAP – MMS –MMS Architecture – MMS Transaction flows – CDMA and 3G: Spread-Spectrum Technology – CDMA versus GSM – Wireless LAN: Introduction – Advantages – Architecture – Mobile Ad hoc Networks and Sensor Networks.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Mobile IP: Overview – Working with Mobile IP Mobile IP Entities – Mobile Agents – Components of Mobile IP – Mobile IPv6 Features. Mobile Transport Layer: Traditional TCP and implications on mobility–Indirect TCP Snooping TCP – Mobile TCP – Selective Retransmission – Transaction oriented TCP- Voice over internet protocol and convergence: voice over IP-H-323 framework for voice over IP-Voice over IP applications.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Multimedia: Introduction-Why Multimedia-Compression and decompression-coder and decoder-popular compression techniques-- Networked multimedia application-Issues in multimedia delivery over the Internet- Multimedia networking protocol. content distribution network- Principles of best effort delivery- Multimedia service creations.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, Mobile Computing – Technology, Applications and Service ,Tata McGraw-Hill,2010,Second Edition.
2. J.Schiller, Mobile Communication. Addition Welley,2008, second Edition.

Suggested Readings

1. Raj kamal, Mobile computing ,Oxford university,2007,Second edition.
2. T.G.Palanivelu, R.Nekkeeran Wirelesss and mobile communication, PHI Learning, 2009

Web Resources

1. https://www.iith.ac.in/~tbr/teaching/docs/gsm.pdf
2. https://web.cs.wpi.edu/~emmanuel/courses/cs525m/S06/slides/mobile_routing.pdf
3. https://www.cse.iitb.ac.in/~sri/talks/mobileinternet.ppt

Course Outcomes (COs) and Cognitive Level Mapping

	UCA 5602 MOBILE COMPUTING (ME)	COGNITIVE LEVEL
CO 1	To define and compare different mobile technologies and architecture.	K1, K2
CO 2	To articulate different services and protocols used in mobile computing.	K3
CO 3	To analyze mobile communication and compression technology.	K4
CO 4	To evaluate the different generations of mobile communication and mobile TCP.	K5
CO 5	To design and integrate different mobile services and compression techniques.	K6

Course Code	UCA 5603
Course Title	Machine Learning
Credits	06
Hours/Week	06
Category	Major Elective (ME) – Lab
Semester	V
Regulation	2019

Course Overview

1. Machine Learning focuses on the development of predictive models that learn automatically.
2. This course covers complex Machine Learning algorithms used for solving real world problems.
3. It enables better decision making, predictive analysis, visualization and pattern discovery.
4. It also explains the basics of Python with libraries like Numpy, Pandas, Matplotlib and SciKit-learn.

Course Objectives

1. To understand the various techniques and concepts of Machine learning.
2. To focus on the libraries and tools that helps to build applications.
3. To implement visualization of solutions for effective understanding and decision making.
4. To explore the Machine Learning algorithms in Python to solve real-world problems.

Prerequisites	Basic knowledge in programming language.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to Machine Learning, Why Machine Learning, Applications of Machine Learning, Key elements of Machine Learning, installing scikit-learn, Essential Libraries and Tools, A First Application: Classifying Iris species: Meet the Data, Measuring success, Building your First Model, Making predictions, Evaluating the Model. 1. Implement basic scikit learn codes. 2. Implement basic codes with iris dataset.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Data Manipulation with Pandas: Installing and Using Pandas - Introducing Pandas Objects Data Indexing and Selection- Operating on Data in Pandas - Handling Missing Data - Hierarchical Indexing - Combining Datasets : Concate and Append - Merge and Join – Aggregation and Grouping - Pivot Table – Working with Time series – High performance Pandas. 1. Practice to extract features from datasets. 2. Implement k – Nearest Neighbors Classification 3. Implement Naïve Bayes Classification	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Visualization with Matplotlib: General Matplotlib Tips - Two Interfaces for the Price of One - Simple Line - Simple Scatter - Visualizing Errors - Density and Contour Plots - Histograms, Binnings and Density - Customizing Plot Legends - Customizing Color bars- Multiple Subplots - Text and Annotation - Customizing Ticks – Customizing Matplotlib: Configuration and style sheets – Three Dimensional plotting in Matplotlib - Visualization with Seaborn. 1. Implement Decision Trees Classification. 2. Implement Ensembles of Decision Trees.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Supervised Learning: Classification and Regression, Generalization, Overfitting and underfitting. Supervised ML Algorithms: k-Nearest Neighbors, Linear models, Naïve Bayes classifiers, Decision Trees, Ensembles of Decision Trees. Unsupervised Learning and Preprocessing: Types and challenges, Preprocessing and scaling, Dimensionality Reduction, Feature Extraction. 1. Implement pre-processing and scaling. 2. Implement dimensionality reduction.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Model Evaluation and Improvement: Cross-Validation, Grid Search, Evaluation metrics and scoring. Algorithm chains and pipelines: Parameter selection with preprocessing, building pipelines, Using pipelines in Grid searches.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

	1. Practice Feature extraction with the dataset. 2. Implement Model selection and evaluation			

Text Books
1. Andreas C.Muller and Sarah Guido, 2016. Introduction to Machine Learning with Python, O'REILLY.
2. Jake VanderPlas, 2016. Python Data Science Handbook - Essential Tools for Working with Data,O'REILLY.

Suggested Readings
1. Samir Madhavan, 2016. Mastering Python for Data Science, PACKT Publishing.
2. Ethem Alpaydin, 2009. Introduction to Machine Learning, The MIT Press.
3. Jake VanderPlas, 2016. Python Data Science Handbook, O'REILLY.

Web Resources
1. https://www.oreilly.com/library/view/practical-machine-learning/9781484241493/html/471189_1_En_5_Chapter.xhtml
2. https://data-flair.training/blogs/machine-learning-tutorial/
3. https://www.geeksforgeeks.org/ml-classification-vs-clustering/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 5603 MACHINE LEARNING LAB (ME)		COGNITIVE LEVEL
CO 1	To describe and understand the requirements of Machine learning.	K1, K2
CO 2	To implement data visualization and machine learning techniques.	K3
CO 3	To analyze the supervised and unsupervised machine learning algorithms and its applications.	K4
CO 4	To compare the performance of various machine learning techniques for real world problems.	K5
CO 5	To propose solutions for real world problems using huge volume of data.	K6

Course Code	UCA 5604
Course Title	Virtual Reality
Credits	06
Hours/Week	06
Category	Major Elective - Practical
Semester	V
Regulation	2019

Course Overview

1. Virtual Reality introduces developing applications for modern virtual and augmented reality systems.
2. It aims to discover the perceptual science behind mixed reality technologies for creating VR experiences.
3. It also explores the creation of game objects and elements.
4. This course also focuses on optimizing the performance of gaming resources.

Course Objectives

1. To understand the concepts of VR technology.
2. To recognize the application of VR in game development.
3. To develop immersive VR applications and capture user actions using Unity 3D.

Prerequisites	Basic Knowledge of Human Computer Interaction.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction to VR and Unity, VR Build and Gaze based control: What is VR - AR vs VR - Applications vs Games - Types of VR Experiences - Getting started with Unity - Creating a Diorama - Measurements - Introduction to Blender Unit build systems and toolkit - JS based VR - 3D world - VR for different platforms: Windows, Android , iOS and google VR.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	Game objects, Interactions, World Space UI and Locomotion :Creating, Positioning, Movements, Destruction - Particle effects - User Interactions - Basic input - - Buttons - Scriptable objects for inputs - Polling - Unity Events - Reusable canvas - Unity components - Unity Assets - Glide locomotion – Teleportation.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

	Exercises: 1. Creating and destructing game objects. 2. Placement of objects in a 3D plane. 3. Place 20 cubes and 15 spheres of varying size on the plane created. 4. Generate simple explosions on the plane, a total of 3 explosions emitting particles.			
III	Physics and Interactive spaces: Physics components - Managing game objects - Implementing object pool - Shooter ball game - Level design - Assembling the scene-Adding Adding pictures to gallery - Displaying art info - Moving around gallery. Exercises: 5. Create a plane in a 3D space with dimension x*x*x 6. Add music to the sprite movement and collisions with Start and Pause button to start and pause the movement	16	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	360 degrees and Animation :360 degree media - Globe - Rendering Photospheres - Skyboxes - Capturing 360 degrees - Composing story - Timelines and Audio tracks - Animation editor - Animation clips and controllers - Animating properties. Exercises: 7. Create a sprite that can move over a plane and physics and rigid bodies to detect game object collisions. 8. Create small sized spheres that drops from space to the plane. 9. Create a maze game	16	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Story telling, Social Meta verse and optimisation :Interactive story - Multiplayer networking - Syncing objects and properties - Networking concepts - Optimising performance - Optimising scene - Optimising code - Optimising the rendering. Exercises: 10. Create a stone, paper, scissors game.	16	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books
1. Linowes, J. (2018). Unity Virtual Reality Projects: Learn Virtual Reality by Developing More Than 10 Engaging Projects with Unity 2018, 2nd Edition. United Kingdom: Packt Publishing.

Suggested Readings
1. Craig, A. B., Sherman, W. R. (2003). Understanding Virtual Reality: Interface, Application, and Design. Netherlands: Elsevier Science.

Web Resources
1. https://www.lncc.br/~jauvane/papers/RelatorioTecnicoLNCC-0603.pdf 2. https://docs.unity3d.com/Manual/VROverview.html/ 3. https://learn.unity.com/course/introduction-to-xr-vr-ar-and-mr-foundations

Course Outcomes (COs) and Cognitive Level Mapping

UCA 5604 Virtual Reality (ME)		COGNITIVE LEVEL
CO 1	To identify and discover the concepts and applications of virtual reality.	K1, K2
CO 2	To illustrate stories and animation clips using various tools.	K3
CO 3	To analyze the different elements and features in Unity 3D.	K4
CO 4	To test storytelling and scene optimization using the components available in Unity 3D.	K5
CO 5	To create virtual reality applications.	K6

Course Code	UCA 6501
Course Title	DATABASE ADMINISTRATION
Credits	06
Hours/Week	06
Category	Major Core(MC)- Practical
Semester	VI
Regulation	2019

Course Overview
1. This course is designed to understand the basics of database administration.
2. It facilitates the performance of fetching rows through tuning the SQL queries.
3. It enables the utilizing the features networking features through SQL *Net.
4. It also provides the expertise in taking backup based on the requirement.

Course Objectives
1. To understand the steps involved in installation of Oracle software.
2. To have the effective utilization of the schema objects clusters, indexes and partitions
3. To write efficient queries and improve the performance of SQL queries.
4. To manage the consistency of data through locks and recovery.

Prerequisites	Basic idea in Oracle architecture and SQL queries

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**

I	**Understanding:**
	Oracle 10g Database – Architecture installation steps – Upgradation – Tools for oracle 10g administration – Creating and manipulating database – Initialization parameters – Starting and stopping oracle database – Schema objects – Tables, Views, Indexes – Sequences and Synonyms.
	   1. Installing Oracle10g
	   2. Working with the basic tools of OEM
	   3. Creating and Manipulating databases
	   4. Creating and using Views, Indexes, Sequences, synonyms.
		18	CO1
			CO2
			CO3
			CO4
			CO5
				K1,K2,K3
				K4,K5,K6

II	**Authentication:**
	Partitions – Clusters – Administering table spaces – Administering privileges in oracle 10g – Managing users and privileges - Working with default user account - Implementing password policy – Inspect the database.
	   1. Working with Table spaces.
	   2. Managing users and the privileges.
	   3. Managing Roles.
		18	CO1
			CO2
			CO3
			CO4
			CO5
				K1,K2,K3
				K4,K5,K6

III	**Net Services**:
	Oracle net services and features – Naming methods –Configuring net services Monitoring and tuning the database – Automatic database diagnostic monitor – Running ADDM using command prompt – Using OEM.
	   1. Configuring the Net services.
	   2. Configuring the Client Services.
	   3. Monitoring the database.
	   4. Preparing the database activity
	       report.
	   5. Implementing OEM tuning pack.
		18	CO1
			CO2
			CO3
			CO4
			CO5
				K1,K2,K3
				K4,K5,K6

IV	**Query Tuning:**
	Tuning SQL – using SQL tuning advisor – Running SQL access advisor – Managing automatic workload repository
	   1. Query tuning
	   2. Query optimization
	   3. Managing automatic workload
	       repository
		18	CO1
			CO2
			CO3
			CO4
			CO5
				K1,K2,K3
				K4,K5,K6

V	**Consistency, Backup and Recovery:** Database Consistency and Concurrency – Undo management – Monitoring undo management – Working with undo table spaces – Working with Locks – Resolving lock conflicts – Deadlock management – Types of database features – Database backups – Files involving in Backup – Backing up the data – Recovery of the data. 1. Working with Undo Management 2. Working with Undo Table spaces 3. Working with Lock Conflicts 4. Preparing full backup and incremental backup 5. Perform data recovery using recovery manager.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Book
1. Oracle 10g Administration in Simple Steps, Kogent Solutions, Dreamtech, 2008

Suggested Readings
1. Loggy Fernandez, Beginning Oracle 11g Database Administration for Noviceto Professional,Apres.
2. Kevin Loney, Oracle 11g, The Complete reference, OraclePress.

Web References
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

UCA 6501 DATABASE ADMINISTRATION(MC)		COGNITIVE LEVEL
CO 1	To identify and describe the basic objects of Oracle.	K1,K2
CO 2	To determine the schema storage objects with administering and improving the performance.	K3
CO 3	To analyze the networking features of oracle with the relevant components.	K4
CO 4	To assess and evaluate SQL queries, tune them for better performance.	K5
CO 5	To stimulate the backup and recovery of the database.	K6

Course Code	UCA 6502
Course Title	Data Mining
Credits	06
Hours/Week	06
Category	Major Core (MC) – Theory
Semester	VI
Regulation	2019

Course Overview

1. Data Mining is an interdisciplinary subject integrating the fields of statistics and data discovery science.
2. The aim of the course is to give basic knowledge about the structure and function of knowledge discovery in data.
3. The different modules of the course will explore different techniques of data mining including statistical explanation and other variations in computation.
4. In this course, the alternate methods will also be examined to include or exclude certain techniques to reach the conclusion.
5. The other important aspects of data mining with sample application and proven testing techniques also be introduced to determine a better application for the real world problems.

Course Objectives

1. To describe the concepts, techniques and applications of data mining.
2. To understand classification, clustering and association algorithms.
3. To familiarize mathematical and statistical foundations of the Data Mining algorithms.
4. To solve problems in diverse domains.

Prerequisites	Basic knowledge on computations.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction to Data Mining and Classification - Data Mining Tasks - General Framework for Classification - algorithm to construct a Decision Tree - Model application using Web Robot- Model over-fit - Model selection - Model evaluation - Model comparison – Nearest Neighbor algorithm.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Introduction to Association - Frequent Item set generation in Apriori algorithm - Evaluation of association patterns - Sequential Patterns - Sub graph Patterns - Infrequent Patterns, Negative Patterns, and Negatively correlated Patterns.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Introduction to Clustering - K-means Algorithm – Agglomerative Hierarchical Clustering - Outliers - Cluster Evaluation - Prototype-Based Clustering - Density-Based.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Introduction to Anomaley Detection - Statistical Approaches - Proximity- based Approaches-Clustering-based Approaches - Reconstruction-based Approaches - One-class Classification - Information Theoretic Approaches- Evaluation of Anomaly Detection.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Testing for Mining - Significance Testing - Hypothesis Testing - Statistical Testing for Classification - Statistical Testing for Association Analysis - Statistical Testing for Cluster Analysis - Statistical Testing for Anomaly Detection.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar 2020, Introduction to data mining, Pearson Education,

Suggested Readings

1. K. P. Soman, ShyamDivakar, V. Ajay 2006, Insight in to Data Mining Theory and Practice, PHI Learning Pvt. Ltd

WebResources

1. https://www.javatpoint.com/data-mining
2. https://docs.microsoft.com/en-us/analysis-services/data-mining/data-mining-ssas
3. https://www.intechopen.com/online-first/78106

Course Outcomes (COs) and Cognitive Level Mapping

UCA 6502 DATA MINING (MC)		COGNITIVE LEVEL
CO 1	To define and describe the data mining techniques.	K1, K2
CO 2	To apply the rules and to understand the patterns in data.	K3
CO 3	To analyze and acquire necessary skills to identify the similarities in data.	K4
CO 4	To estimate and apply data mining for the real-world problems	K5
CO 5	To construct various testing strategies for different kinds ofdata mining techniques.	K6

Course Code	UCA 6503
Course Title	Project
Credits	06
Hours/Week	06
Category	Major core (MC)
Semester	VI
Regulation	2019

Course Overview
1. This course aims to implement programming skills for solving real-time problems.
2. Introduce major software engineering techniques and position them to lead and develop medium-sized software projects in the industry.
3. This aims to lean and plan for resource utilization, scheduling, and evaluation.
4. Aim to document, report and present the project progress 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.
5. To understand and develop the software project management skills and their roles and responsibilities.

Prerequisites	Good knowledge in the subject.

Course Outcomes (COs) and Cognitive Level Mapping

UCA 6503 PROJECT (MC)		COGNITIVE LEVEL
CO 1	To choose and understand he basics of software problem identification.	K1, K2
CO 2	To apply and Design standard model and necessary environment.	K3
CO 3	To classify and create the relationships among scheduling and planning process.	K4
CO 4	To appraise and measure the development and implementation process.	K5
CO 5	To check with the adoption and improvement of the developed software.	K6

Course Code	UCA 6701
Course Title	Business Analytics using Python
Credits	05
Hours/Week	06
Category	Major Skill (MS)- Theory
Semester	VI
Regulation	2019

Course Overview
1. This course is designed to understand the basics of data science.
2. It identifies the various python functions and its purpose.
3. It focuses on understanding the fundamentals of python libraries.
4. It also utilizes the data handling techniques for business analytics.

Course Objectives
1. To understand the basics of Python programming.
2. To master the data manipulation techniques.
3. To understand the time series and make use of statistical data analysis.
4. To analyze financial and economic data applications.

Prerequisites	Basic knowledge on computational techniques.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction to Python-Coding styles in Python-Data types and variables- operators and expressions- Numbers and relevant functions-IF statement- While statement-for statement-Break and Continue. Arrays - sequences-lists- stack-queues-Functional Programming- tuples-sequence unpacking-methods- dictionaries -sets.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	User-defined functions-Anonymous functions-Recursive functions- Introduction to modules-creating and importing and modules-Classes and objects-class methods-class properties-static method-constructor-Method overriding-Inheritance- operator overloading-Introduction to PIP- installing packages-using Python packages.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	NumPy Basics: Arrays and Vectorized Computation-Introduction to pandas Data Structures-Series-DataFrame-Index Objects-Indexing, selection, and filtering-Arithmetic and data alignment-Applying functions and mapping-Sorting and ranking- Summarizing and Computing Descriptive Statistics-Correlation and Covariance-Handling Missing Data-Hierarchical Indexing.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Data Wrangling-Combining and Merging Data Sets- -Data Transformation-Detecting and Filtering Outliers-String Manipulation-Vectorized string functions in pandas-Plotting and Visualization- matplotlib API Primer- Colors, Markers, and Line Styles-Ticks, Labels, and Legends- Annotations and Drawing on a Subplot- Saving Plots to File-Plotting Functions in pandas.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Time Series- Date and Time Data Types and Tools- Converting between string and datetime- Time Series Basics-Indexing, Selection, Subsetting- Date Ranges, Frequencies, and Shifting-Generating Date Ranges- Frequencies and Date Offsets-Time Zone Handling-Quarterly Period Frequencies- Time Series Plotting- Financial and Economic Data Applications- Data Munging - Splicing Together Data Sources- Decile and Quartile Analysis- sample applications- Future Contract Rolling- Rolling Correlation and Linear Regression.	**18**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Ch.Satyanarayanan , 2018. M.RadhikaMani,B.N.Jagadesh,Universitypress.

2. Jake VanderPlas, 2017. Python Data Science handbook,O'Reilly.

Suggested Readings

1. Wes McKinney, 2014. Python for DataAnalysis,O'Reilly.

2. Femi Anthony,2018. MasteringPandas.PACKT.

Web Resources

1. https://www.analytixlabs.co.in/big-data-analytics-hadoop-spark-training-course-

2. https://www.cbsi-corp.com/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 6701 BUSINESS ANALYTICS USING PYTHON(MS)		COGNITIVE LEVEL
CO 1	To describe and understand the basics of Python Programming.	K1, K2
CO 2	To practice the usability of python libraries.	K3
CO 3	To analyze the data manipulation techniques.	K4
CO 4	To measure the time series and make use of statistical data analysis.	K5
CO 5	To collaborate financial and economic data applications	K6

Course Code	UCA 6706
Course Title	Business Analytics using Python Lab
Credits	05
Hours/Week	06
Category	Major Skill(MS)- Practical
Semester	VI
Regulation	2019

Course Overview
1. This course is designed to understand the basics of data science.
2. It identifies the various python functions and its purpose.
3. It focuses on understanding the fundamentals of python libraries.
4. It also utilizes the data handling techniques for business analytics.

Course Objectives
1. To understand the basics of Python programming.
2. To master the data manipulation techniques.
3. To understand the time series and make use of statistical data analysis.
4. To analyze financial and economic data applications.

Prerequisites	Basic knowledge on computational techniques.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	1. Python Variables with basic data types 2. Using Input /output statements in Python 3. Using Control Statements in Python 4. Using Built-in Functions in Python 5. Writing and using User -Defined functions in Python	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	6. Working with Lists, stack, Queue in Python 7. Working with Dictionaries and Tuples in Python 8. Import Packages in Pandas 9. Simple programs with Logical Operators.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

III	10. Creating Series 11. Indexing and grouping 12. Perform Aggregation 13. Perform Sorting 14. Handling Missing Data	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	15. Loading data and convert to frames 16. Hierarchical Indexing 17. Arithmetic operation on frames 18. Pivot tables to data frame.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	19. Simple line plots 20. Scatter Plots 21. Histograms 22. Correlation maps 23. 3D plots.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Ch.Satyanarayanan , 2018. M.Radhika Mani, B.N.Jagadesh,University press.

2. Jake VanderPlas, 2017. Python Data Science handbook, O'Reilly.

Suggested Readings

1. Wes McKinney, 2014. Python for Data Analysis,O'Reilly.

2. Femi Anthony,2018. Mastering Pandas.PACKT.

Web Resources

1. https://www.analytixlabs.co.in/big-data-analytics-hadoop-spark-training-course-
2. https://www.cbsi-corp.com/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 6706 BUSINESS ANALYTICS USING PYTHON-LAB (MS)		COGNITIVE LEVEL
CO 1	To identify the basics of Programming languages and describe the usage in business analytics.	K1, K2
CO 2	To determine the data structures and data handling features.	K3
CO 3	To analyse the data transformation and visualization techniques.	K4
CO 4	To assess time series and enrich the statistical data analysis.	K5
CO 5	To integrate the business intelligence in financial and economic data applications.	K6

COURSE DESCRIPTORS

(Offered to other Departments)

Course Code	UCA 3401
Course Title	Web Design
Credits	03
Hours/Week	05
Category	Allied Optional (AO) – Practical
Semester	III
Regulation	2019

Course Overview
1. Web Design course enables standard website design using HTML, CSS, JavaScript and Bootstrap.
2. The aim of the course is to introduce planning and designing syntactically correct effective web pages.
3. The course explores the different elements and features involved in producing a functional multi-page website.
4. It also focuses on developing web elements using Bootstrap that could be incorporated into web pages.

Course Objectives
1. To develop dynamic web pages using HTML, CSS, JavaScript and Bootstrap.
2. To recognize the techniques of responsive web design using Bootstrap.
3. To simplify the development of informative web pages.
4. To validate user inputs through programming techniques of JavaScript.

Prerequisites	Basic knowledge of Information technology.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	HTML 5: Introduction-Basic Tags-formatting and fonts-commenting code- Working with colour. 1. Implementing Background design, Color & Text Tags	13	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Elements of html: Working with Tables- Working with Images-Working with Links, List and Tables-Frame and Frameset-Forms and Controls.
	
	  2. Implementing Image Tags, List Tags, Hot Text using Hyperlink Tags.
	
	  3. Design a home page which will display your information, i.e. Bio data in table, using Image Link and File Link to upload images and necessary documents.
	
	  4. Implementing Frames and Framesets.
	  5. Designing of Forms
		13	CO1
			CO2
			CO3
			CO4
			CO5
				K1,K2,K3
				K4,K5,K6

III	Introduction to Cascading Style Sheet -using CSS background images-colour and properties-Manipulating texts using fonts- border and boxes margins- padding lists -positioning using CSS.-Types of Style Sheets-Class and ID
	selector`-Inline Menu-DIV and CSS layout.
	  6. Implementing Cascading Style Sheets.
	  7. Apply inline CSS to create a menu.
	  8. Use different font styles: In the style definition you define how each selector should work (font, color etc.).
	  9. Demonstrate internal and external CSS
		13	CO1
			CO2
			CO3
			CO4
			CO5
				K1,K2,K3
				K4,K5,K6

IV	Introduction to Javascript-Understanding Variables, Loop and Arrays, Functions- Working with alert, confirm and prompt boxes- -Creating Rollover image-Working with Operators, Events. 10. Implementing JavaScript in HTML. 11. Designing a page using a user defined function to get an array of values and sort them in ascending order and demonstrate Nested loop. 12. Embedding JavaScript in HTML pages design a registration form and validate its field. 13. To design the scientific calculator and make events for each button using JavaScript.	13	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Bootstrap: Bootstrap layout-Bootstrap tables-Bootstrap list-Bootstrap form-Bootstrap object-navigation. 14. Create a web page using bootstrap elements 15. Create a web page using bootstrap objects.	13	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Gopalan, N. P., Adikesavan, T. A. (2014). Web Technology: A Developer's Perspective. India: PHI learning.
2. Html5 Black Book: Covers Css3, Javascript, Xml, Xhtml, Ajax, PHP And jquery",Wiley India Pvt. Limited, 2011.

Suggested Readings
1. Chris Bates, Web Programming: Building Internet Applications, 3rd Ed. (2007). India: Wiley India Pvt. Limited.
2. Akanksha Rastogi, Web Technology, K.Nath & Co Educational Publishers, 1st Edition, 2012.

Web Resources
1.https://www.w3schools.com/html/
2. https://www.codecademy.com/
3. https://www.javatpoint.com/html-tutorial

Course Outcomes (COs) and Cognitive Level Mapping

UCA 3401 WEB DESIGN (AO)		COGNITIVE LEVEL
CO1	To define and understand the use of HTML tags and the principles behind Bootstrap framework.	K1, K2
CO2	To illustrate the use of HTML and CSS in designing a web page.	K3
CO3	To analyze the aesthetics of web design.	K4
CO4	To evaluate the techniques behind responsive web design using JavaScript.	K5
CO5	To develop a dynamic and functional complete website.	K6

Course Code	UCA 3402
Course Title	Web Analytics Lab
Credits	03
Hours/Week	05
Category	Allied Optional (AO) – Lab
Semester	III
Regulation	2019

Course Overview
1. Web Analytics is the measurement, analysis, and reporting of Internet data to understand and optimize Web usage.
2. This course gives in-depth knowledge of analyzing website traffic and usage in business strategies.
3. It also explores various categories of Web Analytics.
4. It explains web analytics, Google Analytics and Google Adwords.

Course Objectives
1. To understand the importance of business analytics.
2. To focus on the power of different Web analytics tools.
3. To explore business advertisements using analytics.
4. To familiarize the basics and usage of Google Analytics.

Prerequisites	Basic knowledge on Internet.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to Web Analytics: A brief history of Web Analytics – Current landscape and challenges – Traditional Web analytics –Web Analytics 2.0: Fundamentals- Capturing data – Tools selection – Quality aspects – Implementing best practices. Exercises: 1. Gather the data from the appropriate tools. 2. Tools to analyze data using click path analysis on websites.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Web Data Collection: Clickstream data – Outcomes data – Research data – Competitive data – Qualitative Analysis: Lab Usability testing –Heuristic evaluations – Site Visits – Surveys. Web Analytics Strategy: Customer centric focus – Business problem solving focus – Follow the 10/90 rule – Hire great web Analysts – Identify optimal organizational structure and responsibilities. Exercises: 3. JavaScript based tools for Log file analysis on web servers. 4. Implementation of Page tagging for analyzing web user behavior.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Web Analytics Strategy: Customer centric focus – Business problem solving focus – Follow the 10/90 rule – Hire great web Analysts – Identify optimal organizational structure and responsibilities. Exercises: 5. Competitive data analysis of websites. 6. Content analyzing of social networks on the web. 7. Exploring Search engine tools for content searching.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Emerging Analytics: Social, Mobile and Video – Analyzing offline and Mobile customer experiences – Measuring the success of blogs – Quantifying the impact of Twitter – Analyzing performance of videos – Competitive Intelligence Analysis. Exercises: 8. Metric and pulse analysis of YouTube videos. 9. Tools to analyze event track on Web analytics 10. Using of Visitor map tools on Web analytics	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

V	Google Analytics: Features, benefits and Limitations – Working strategy of Google Analytics – Difference of Google analytics from others - Google analytics and Privacy - Google AdWords. Exercises: 11. Keyword search using Piwik Web Analytics. 12. Interaction with data and tracking purchases in Google Analytics. 13. Google AdWords.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Avinash Kaushik, "Web Analytics An Hour a Day", MIT press, 6th Edition2007.
2. Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability and science of Customer Centricity, Wiley publishing, Inc., 1st Edition2009.
3. Brian Clifton, "Advanced Web Metrics with Google Analytics", Wiley Publishing Inc, 3rd Edition, 2012.

SuggestedReadings

1. Eric Peterson, "Web Analytics Demystified: A Marketer's Guide to understanding How your website affects your business", Celilo Group Media, 1st Edition,2004.
2. Michael Beasley, "Practical Web Analytics for User Experience", Morgan, 1stEdition 2013.
3. Justin Cutroni "Google Analytics", O'Reilly Media, 2nd Edition2010.

Web Resources

1. https://datasciencecmu.wordpress.com/category/04_social-network-analysis/
2. https://www.amazeemetrics.com/en/blog/content-analysis-report-for-google-analytics/
3. https://www.youtube.com/watch?v=sxgDwSto3mM
4. https://www.youtube.com/watch?v=gBeMELnxdIg

Course Outcomes (COs) and Cognitive Level Mapping

UCA 3402 WEB ANALYTICS LAB (AO)		COGNITIVE LEVEL
CO 1	To describe and understand the concepts in web analytics.	K1, K2
CO 2	To implement the metrics to analyze the data in web analytics.	K3
CO 3	To analyze and interpret the content on the web using various analytical tools.	K4
CO 4	To measure the data in Google Analytics.	K5
CO 5	To create strategic and targeted Online advertisements using web analytics.	K6

Course Code	UCA 3801
Course Title	Animation
Credits	02
Hours/Week	03
Category	NME
Semester	III
Regulation	2019

Course Overview
1. Animation deals with the illusion of moving images.
2. This course covers various animation styles and techniques using flash.
3. It focuses on the drawing, designing and applying many effects using animation.
4. It helps to conceptualize design for the media industry.

Course Objectives
1. To understand the concepts and techniques of animation.
2. To explore the 2D animation techniques using flash.
3. To acquire knowledge on traditional and 3D animation methods.
4. To design, develop and transform messages through animated applications.

Prerequisites	Familiarity with drawing skills and basic computer knowledge.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**Cos**	**COGNITIVE LEVEL**
I	Flash workflow & Workspace, Intro to flash, Workspace overview, Customize the workshop Using the stage and tools panel, About the timeline, Using Flash panels, Property inspector Library panel, Movie explorer, History panel, Color panel, Working with Flash documents: About flash files, Create or open a document and set its properties, View a document when multiple documents are open. Working with project, importing art work into flash (working with PSD files-PSD file import preferences)" 1. Adding an item from the Library panel to the stage 2. Using the Text tool to add a title to the animation. 3. Modify the Library folder of the XFL document to make changes to the flash movie.	**06**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Adding media to library, Work with libraries and its items, working with timeline, working with scenes, Find and replace command, about templates, Drawing Basics: About vector and bitmap graphics, Flash drawing module, about overlapping shapes, Using flash drawing and painting tools: Draw with pencil tools, draw straight lines, Reshaping lines and shape outlines, snapping (object snapping, pixel snapping and snap alignment, working with color, strokes and fills. 4. Creating curves using the Pen tool 5. Adding shadows to a coffee cup 6. Adding hyperlinks to text	**06**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Working with graphic objects: Selection objects, moving, copying and deleting objects, Arranging objects (Stack, Align, group, Break apart groups and objects) and Transforming object, Using symbols, instances and library assets: Symbols overview, Types of symbols, Create symbols, Convent animation on the stage into a movie clip, Duplicate symbols, Edit symbols, working with symbol instances. 7. Editing a robot symbol in place 8. Changing the 3D rotation of an object 9. Swapping tween targets	**06**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Creating animation: Animation basics, creating motion, creating key frames, Representations of animation in the timeline, Frame rates, Frame by frame animation, Onion skinning, Extend still images, Mask layers. 10. Creating animations inside movie clip symbols 11. Applying an ease-in tweens to sense of weight and decelerate as real cars would 12. Adding a title and animate it in 3D space	**06**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Using timeline effects, Twinned Animation, Special effects, Filter: Animation filters, Create preset filter libraries, Blend modes in Flash, Working with text, Working with Sound, Working with video. 13. Importing several sound files to the Library panel 14. Converting video files to flash video 15. Exercise to export video from flash.	**06**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Adobe Flash Professional CC, Russel Chun Adobe. 2012 Secondedition.
2. Adobe Photoshop CS6 Bible, Lisa DanaeDayley and Brad Daylay, 2012, Firstedition

Suggested Readings

1. Adobe *Flash* Professional CS6, Russel Chun, Adobe, 2012, Firstedition
2. Computer Modeling& Animation, John M. Blain, Blender, 2016, Thirdedition.

Web Resources

1. https://www.youtube.com/watch?v=Of9SB42D248
2. https://www.youtube.com/watch?v=faYNDCmKWOc
3. https://www.adobepress.com/articles/article.asp?p=2873364&seqNum=10
4. https://www.dvdvideosoft.com/guides/free-video-to-flash-converter.htm

Course Outcomes (COs) and Cognitive Level Mapping

UCA 3801 ANIMATION (NME)		COGNITIVE LEVEL
CO 1	To Identify and understand the basics of flash.	K1, K2
CO 2	To apply various effects in animating the objects in flash.	K3
CO 3	To illustrate the drawing and designing concepts.	K4
CO 4	To assess and implement traditional and computerized animation in flash.	K5
CO 5	To construct and incorporate the audio and video files in developing movies.	K6

Course Code	UCA 4401
Course Title	DATA ANALYTICS USING R
Credits	03
Hours/Week	05
Category	AO – Practical
Semester	IV
Regulation	2019

Course Overview
1. This course facilitates to acquire knowledge in data analysis.
2. It familiarizes the concepts of data organization using spread sheets and statistical functions.
3. The course also focuses on importing data from several sources.
4. It also deals with visualization of data for effective decision making.

Course Objectives
1. To understand and apply various data structures and packages used in R programming.
2. To implement different functions used to import data from various sources.
3. To apply and analyze statistical data and data modeling.
4. To explore various graphical representations and reports.

Prerequisites	Basic knowledge on data handling.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	OVERVIEW OF THE R LANGUAGE : Getting R- R Environment- Generating R codes- Scripts- Comments- Text editors for R- Graphical User Interfaces for R- Packages. Exercise: 1. R functions and packages.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	R OBJECTS AND DATA STRUCTURES : Variable classes- Vectors, Operations on Vectors- matrices, Functions on matrices- Data frames and lists- Factors and Tables. Exercise: 2. R Program using Vector operations. 3. Create and manipulation of R- lists. 4. Create and manipulate frames and Lists. 5. Implementation of factor object.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	MANIPULATING OBJECTS IN R : Math Functions- Mathematical operations- Decision making- loops- R functions- String Manipulations. Exercise: 6. Decision making using R code 7. Implementation of Matrix Operations. 8. String handling functions.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	EXPLORATORY DATA ANALYSIS: Reading from a file- creating and storing R - CSV file- Excel File- Binary file- XML File - R –Mean-Median- Mode- Regression. Exercise: 9. Import data from CSV and Excel file to R. 10. Export data from R to Excel and CSV files. 11. R program to calculate Mean median and mode.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	GRAPHICAL REPRESENTATION: R- Plot() function, R-PIE chart – Bar chart – Box plots- Histograms – line graphs - Scatter plots. Correlation and Covariance, T-tests and ANOVA, Linear Models. Exercise: 12. Draw Bar charts and Pie charts, histogram in R. 13. Make visual representations of data using plotting functions in R. 14. Create a R program using Linear Regression Model.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. Norman Matloff, "The Art of R Programming", No Starch Press, Second Edition, 2012.
2. Jared P. Lander , "R for Everyone: Advanced Analytics and Graphics", Addison-Wesley Data & Analytics Series, First edition, 2015.

Suggested Readings

1. Mark Gardener , " Beginning R – The Statistical Programming Language", Wiley, First Edition, 2013.
2. Robert J. Woz, "Data Analytics for Beginners: A Beginner's Guide to Learn and Master Data Analytics", Second Edition, 2017.

Web Resources

1. https://www.slideshare.net/GRajendra/r-programming-lab-manual
2. https://www.goodreads.com/book/show/35880465-r-projects-for-dummies
3. https://csenotescorner.blogspot.com/

Course Outcomes (COs) and Cognitive Level Mapping

UCA 4401 DATA ANALYTICS USING R (AO)		COGNITIVE LEVEL
CO 1	To define and understand various concepts of R programming.	K1, K2
CO 2	To illustrate and access data from different sources.	K3
CO 3	To explore various R functions and its applications.	K4
CO 4	To assess the different linear and statistical models on data sets	K5
CO 5	To create data visualization using plotting framework	K6

Course Code	UCA 4402
Course Title	Web Development Lab
Credits	03
Hours/Week	05
Category	Allied Optional (AO) – Lab
Semester	IV
Regulation	2019

Course Overview
1. Web Development course enables standard website design using HTML, CSS, JavaScript
2. The aim of the course is to introduce planning and designing syntactically correct effective web pages.
3. It also utilizes JavaScript on the client side to improve user experience and its associated capabilities.
4. It also focuses on developing web elements using enhanced style sheets and bootstrap techniques.

Course Objectives
1. To develop web pages using HTML tags, fonts and colors with CSS style sheets.
2. To explore tables, links and layout concepts.
3. To implement client-side validations using JavaScript.
4. To create forms and lists using bootstrap.

Prerequisites	Basic programming knowledge.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	HTML 5: Introduction-Basic tags formatting and fonts-commenting code- Working with color. Exercises: 1. Implementing Background design, Color & Text Tags 2. Implementing Image Tags, List Tags, Hot Text using Hyperlink Tags.	**10**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

II	Elements of html: Working with tables - Working with Images-Working with Links, List and Tables-Frame and Frameset-Forms and Controls. Exercises: 3. Design a home page which will display your information, i.e. Bio data in table, using Image Link and File Link to upload images and necessary documents. 4. Implementing Frames and Framesets. 5. Designing of Forms.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Introduction to Cascading Style Sheet -using css background images-color and properties-Manipulating texts using fonts- border and boxes margins- padding lists -positioning using CSS.-Types of Style Sheets-Class and ID selector`-Inline Menu-DIV and CSS layout. Exercises: 6. Implementing Cascading Style Sheets. 7. Apply inline CSS to create menu. 8. Use different font, styles: In the style definition you define how each selector should work (font, color etc.). 9. Demonstrate internal and external CSS	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Introduction to Javascript- Understanding Variables, Loop and Arrays - Functions - Working with alert, confirm and prompt boxes- -Creating Rollover image-Working with Operators, Events. Exercises: 10. Implementing JavaScript in HTML. 11. Designing a page using user defined function to get array of values and sort them in ascending order and demonstrate Nested loop. 12. Embedding JavaScript in HTML pages design a registration form and validate its field. 13. Design the scientific calculator and make events for each button using JavaScript.	**15**	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

V	Bootstrap: Bootstrap layout-Bootstrap tables-Bootstrap list-Bootstrap form-Bootstrap object-navigation. Exercises: 14. Create a web page using bootstrap elements 15. Create web page using bootstrap objects.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books

1. N.P.Gopalan, J.Akilandeswari , "Web Technology A Developer'sPerspective(Unit III,IV,V)" PHI Learning, 2011, 4th edition
2. Kogent Learning Solutions Inc , "HTML5 Black Book (I, II)", Dream tech Press, 2011, 1st edition.

Suggested Readings

1. Chris Bates, "Web Programming, building internet applications", WILEY Dreamtech, 2nd edition.
2. **AkankshaRastogi , "Web Technology", K.Nath& Co Educational Publishers, 2012, 1st edition.**

Web Resources

1. https://www.w3schools.com/html
2. https://www.udemy.com/course/html-css-javascript-certification-course-for- beginners/
3. https://www.homeandlearn.co.uk/WD/WebDesign.html

Course Outcomes (COs) and Cognitive Level Mapping

UCA 4402 WEB DEVELOPMENT LAB (AO)		COGNITIVE LEVEL
CO 1	To describe and understand the use of HTML tags and JavaScript programming principles and bootstrap techniques.	K1, K2
CO 2	To illustrate the use of HTML and CSS in designing a web page.	K3
CO 3	To analyze the aesthetics of web design.	K4
CO 4	To evaluate the techniques behind responsive web design.	K5
CO 5	To develop a dynamic and functional website.	K6

Course Code	UCA 4801
Course Title	Web Design
Credits	02
Hours/Week	03
Category	Non Major Elective – Practical
Semester	IV
Regulation	2019

Course Overview
1. Web Design course enables standard website design using HTML, CSS and Bootstrap.
2. The aim of the course is to introduce planning and designing syntactically correct effective web pages.
3. The course explores the different elements and features involved in producing a functional multi-page website.
4. It also focuses on developing web elements using Bootstrap that could be incorporated into web pages.

Course Objectives
1. To develop dynamic web pages using HTML, CSS and Bootstrap.
2. To recognize the techniques of responsive web design using Bootstrap.
3. To simplify the development of informative web pages.
4. To explore different styles using CSS.

Prerequisites	Basic knowledge of technology.

SYLLABUS				
UNIT	**CONTENT**	**HOURS**	**COs**	**COGNITIVE LEVEL**
I	Introduction to html: Creating HTML document-Markup Tags-Headings-Paragraph- Line breaks-Html tags. 1. Design a home page which will display your information i.e. Bio data using html tags. 2. Create a static web page which defines all text formatting tags of HTML.	8	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	Elements of html: Working with text-Working with tables, lists and frames-Working with forms and controls.	8	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

III	CSS: Creating style sheet-CSS properties- CSS styling(background ,text formatting, controlling fonts)-Working with blocks and elements and objects-Working with lists and tables 1. Create webpage using list tags of HTML 2. Create Hyperlinks in the home page i.e educational details, Hobbies, Achievement, My Ideals etc. 3. Design a timetable and display it in tabular format. 4. Design webpage using Frames, Framesets. 5. Design a Registration form in HTML. 6. Create employee registration webpage using HTML form objects.	8	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Elements of css: CSS Id and class-CSS color-Creating page layout and site designs. 1. Design a webpage i.e. Bio-data using CSS. 2. Apply style sheet in Web page. [inline, embedded and linked]	8	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Bootstrap: Bootstrap layout-Bootstrap tables-Bootstrap list-Bootstrap form-Bootstrap object-navigation. 1. Create a web page using bootstrap objects. 2. Creating a complete web page of an institution using html, CSS and bootstrap.	7	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Books
1. Duckett, J. (2011). Beginning HTML, XHTML, CSS, and JavaScript. Germany: Wiley
2. Bootstrap 4 Quick Start: Responsive Web Design and Development Basics for Beginners. (2018). (n.p.): Bootstrap Creative.

Suggested Readings
1. Misra, A., Kumar Singh, A. (2011). Introduction to Web Technology. India: Laxmi Publications.
2. York, R., Pouncey, I. (2011). Beginning CSS: Cascading Style Sheets for Web Design. Ukraine: Wiley.

Web Resources
1. https://www.w3schools.com/html/
2. https://www.codecademy.com/courses/learn-html/lessons/intro-to-html/exercises/intro
3. https://www.javatpoint.com/html-tutorial
4. https://www.w3schools.com/css/default.asp
5. https://www.w3schools.com/bootstrap/bootstrap_ver.asp

Course Outcomes (COs) and Cognitive Level Mapping

	UCA 4801 WEB DESIGN (NME)	COGNITIVE LEVEL
CO1	To understand the use of HTML tags and the principles behind Bootstrap framework.	**K1, K2**
CO2	To illustrate the use of HTML and CSS in designing a web page.	**K3**
CO3	To analyze the aesthetics of web design.	**K4**
CO4	To evaluate the techniques behind responsive web design.	**K5**
CO5	To develop a dynamic and functional website.	**K6**

CL AND CO BASED CIA QUESTION PAPER FORMAT FOR UG THEORY COURSES
MC, AR, AO, MS, ME, GL and NME* (excluding other languages)

SECTION	MARKS	Q. NO	K1	K2	K3	K4	K5	K6
A	Answer ALL (6 x 1 = 6)	1	+					
		2	+					
		3	+					
		4		+				
		5		+				
		6		+				
B	Answer 1 out of 2 (1 x 6 = 6)	7			+			
		8			+			
C	Answer 1 out of 2 (1 x 6 = 6)	9				+		
		10				+		
D*	Answer 1 out of 2 (1 x 12 = 12)	11					+	
		12						+
No. of CL based Questions with Max. marks			3 (3)	3 (3)	1 (6)	1 (6)	1 (12)	1 (12)
No. of CO based Questions with Max. marks			CO 1		CO 2	CO 3	CO 4	CO 5
			6 (6)		1 (6)	1 (6)	1 (12)	1 (12)

- *MC-Major Core, AR–Allied Required, AO–Allied Optional, MS-Major Skill, ME-Major Elective, GL-General Languages, NME-Non Major Elective.

- Section A could have one or more of the following: Fill in the blanks, True or False, Match the following, Definition, Comment on, Reason out etc., But, K1 and K2 should carry equal weightage.

- *In Section D students have choice between K5 and K6. III Component Assessment carries 40% of CIA and the assessment(s) should be for cognitive levels K1 to K4 and all should carry equal weightage.

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI 60034
Department of Computer Science
FIRST CONTINUOUS ASSESSMENT TEST, SEPTEMBER 2021
UCA5503 Visual Programming (MC)

IIIBCA   23.08.2021

Time: 3.00 pm to4.30 pm   Max. Marks : 30

SECTION A			
Answer ALL the Questions in one or two sentences		**(6 x 1 = 6 Marks)**	
1.	State any two advantages of .NET.	K1	CO1
2.	Recall the purpose of CLR.	K1	CO1
3.	Write any two C# Windows forms controls.	K1	CO1
4.	List out the fundamental data types in C#.	K2	CO1
5.	Compare C++ and C#.	K2	CO1
6.	Describe 'Multiple Inheritance'.	K2	CO1
SECTION B			
Answer any ONE of the following in 150 words		**(1 x 6 = 6 Marks)**	
7.	Explain any two Operators in C# with example for each.	K3	CO2
8.	Illustrate the Interface concept.	K3	CO2
SECTION C			
Answer any ONE of the following in 150 words		**(1 x 6 = 6 Marks)**	
9.	Develop a method to compare strings in C#.	K4	CO3
10.	Distinguish Value type and Reference type.	K4	CO3
SECTION D			
Answer any ONE of the following in 200 words		**(1 x 12 = 12 Marks)**	
11.	Summarisethe .NET framework architecture with a neat diagram.	K5	CO4
12.	Create two strings and perform all string manipulation functions in C#.	K6	CO5

CL AND CO BASED END SEMESTER EXAMINATION QUESTION PAPER FORMAT FOR UG THEORY COURSES
(MC, AR, AO, MS, ME and GL)

SECTION		Q. NO	K1	K2	K3	K4	K5	K6
A	(4 x 5 =20) Answer ALL	1	+					
		2	+					
		3		+				
		4		+				
B	(2 x 10 = 20) Answer 2 out of 4	5			+			
		6			+			
		7			+			
		8			+			
C	(2 x 10 = 20) Answer 2 out of 4	9				+		
		10				+		
		11				+		
		12				+		
D	(2 x 20 = 40) Answer 2 out of 4	13					+	
		14					+	
		15						+
		16						+
No. of CL based Questions with Max. marks			2 (10)	2 (10)	2 (20)	2 (20)	2 (40)	2 (40)
No. of CO based Questions with Max. marks			CO 1		CO 2	CO 3	CO 4	CO 5
			4 (20)		2 (20)	2 (20)	2 (40)	2 (40)

- **MC**-Major Core, **AR**–Allied Required, **AO**–Allied Optional, **MS**-Major Skill, **ME**-Major Elective, **GL**-GeneralLanguages.
- **Section A** could have one or more of the following: Fill in the blanks, True or False, Match the following, Definition, Comment on, Reason out, but K1 and K2 should carry equal weightage.
- In Section D students have choice between K5 and K6.

Department of Computer Science

END SEMESTER EXAMINATION, NOVEMBER 2021

UCA5503 Visual Programming (MC)

IIIBCA   15.11.2021

Duration:3hrs   Max. Marks: 100

	SECTION A		
	Answer ALL		
1.	**Multiple Choice Questions** **(5 x 1 = 5Marks)**		
a)	Which of the following does the actual .Net code execute? i)CLS ii) MSIL iii)CTS iv)CLR	K1	CO1
b)	All the following statements are true about variable names except i) Cannot use a reserved word ii) Can be of any length iii)They may include letters, numbers, and underscore iv) The first character must be a letter	K1	CO1
c)	The keyword used to create an object for the class is_____ i)Allocate ii) Create iii)New iv)Instance	K1	CO1
d)	Which object is used to fill a Dataset with query results in ADO.net? i)DataReader ii)DataTable iii) DataAdapter iv) DataQuery	K1	CO1
e)	What is the file extension of web service in ASP.NET? i).ascx ii).asmx iii).aspx iv) .vpbx	K1	CO1
2.	**Fill in the blanks** **(5 x 1 = 5Marks)**		
a)	C# maintains a project file with the extension of_____	K1	CO1
b)	_____list the members of an object with all possible options.	K1	CO1
c)	A Boolean data type can store _____bytes.	K1	CO1
d)	_____ Sql Command execution returns the value of the first column of the first row from a table.	K1	CO1
e)	MVC is_____.	K1	CO1
3.	**Answer all the Questions** **(5 x 2 = 10Marks)**		
a)	List out the different types of applications that can be created in .NET.	K2	CO1
b)	Write about JIT compiler.	K2	CO1
c)	Compare Managed code and Unmanaged code.	K2	CO1
d)	What are the different types of connection providers in ADO.NET?	K2	CO1
e)	Write any two features of ASP.NET.	K2	CO1

	SECTION B		
	Answer any TWO of the following in150 words **(2 x 10 = 20Marks)**		
4.	a) Explain about Jagged arrays. b) Explain the applications of Message box in C#.	K3	CO2
5.	How can you implement multiple inheritance in C#? Explain.	K3	CO2
6.	Develop a code to create, copy and move the files in C# and explain the same in detail.	K3	CO2
7.	a) Illustrate with an example on session management inASP.NET. b) Explain the compilation procedure ofASP.NET.	K3	CO2
	SECTION C		
	Answer any TWO of the following in 150 words **(2 x 10 = 20Marks)**		
8.	Distinguish between while and do-while loop with example for each.	K4	CO3
9.	Develop a console application program using Operator overloading.	K4	CO3
10.	Illustrate with an example to create students record using Structure.	K4	CO3
11.	a) Analyse the role of ADO.NET in C#. b) Compare Dataset and Recordset.	K4	CO3
	SECTION D		
	Answer any TWO of the following in 250 words **(2 x 20 = 40Marks)**		
12.	a) Evaluate the types of array in C# with suitable examples. b) Summarize any five string manipulation functions in C#.	K5	CO4
13.	a) Assess how Interfaces can be inherited? b) Summarize the Exception handling mechanism in C#.	K5	CO4
14.	a) Explain any two data controls and its properties in detail. b) Design a simple web application to maintain Restaurant details. The data must be stored and retrieved from the database.	K6	CO5
15.	a) Summarize any four validation controls in ASP.NET.	K6	CO5

UNIT WISE DISTRIBUTION OF CL AND CO BASED QUESTIONS AND MARKS

FOR END OF SEMESTER QUESTION PAPER SETTING FOR UG COURSES

(MC, AR, AO, MS, ME and GL)

	SECTION A (1 Mark/Question)		SECTION B (10 Marks/Question)	SECTION C (10 Marks/Question)	SECTION D (20 Marks/Question)	
	K1	K2	K3	K4	K5	K6
UNIT I	2 (1)	2 (1)	-	1 (10)	-	
UNIT II	2 (1)	2 (1)	1 (10)	1 (10)	1 (20)	-
UNIT III	2 (1)	2 (1)	1 (10)	1 (10)	1 (20)	-
UNIT IV	2 (1)	2 (1)	1 (10)	1 (10)	-	1 (20)
UNIT V	2 (1)	2 (1)	1 (10)	-	-	1 (20)
No. of CL based Questions with Max. Marks	10 (10)	10 (10)	2 (20)	2 (20)	2 (40)	2 (40)
No. of CO based Questions with Max. Marks	CO1		CO2	CO3	CO4	CO5
	20 (20)		2 (20)	2 (20)	2 (40)	2 (40)

MC-Major Core, **AR**–Allied Required, **AO**–Allied Optional, **MS**-Major Skill, **ME**-Major Elective, **GL**-General Languages.
In **Section D** students have choice between K5 and K6.

CL AND CO BASED MARKS DISTRIBUTION FOR DIRECT ASSESSMENTS OF UG COURSES
MC, AR, AO, MS, ME and GL

SECTION	CL	CO	CIA I	CIA II	III Component	Semester	Total (200)	CL and CO %
A	K1, K2	CO1	6	6	20	20	52	26%
B	K3	CO2	6	6	10	20	42	21%
C	K4	CO3	6	6	10	20	42	21%
D	K5, K6	CO4, CO5	12	12	-	40	64	32%

MC-Major Core, **AR**–Allied Required, **AO**–Allied Optional, **MS**-Major Skill, **ME**-Major Elective, **GL**-General Languages.

CL AND CO BASED CIA AND SEMESTER QUESTION PAPER FORMAT FOR

UG LAB COURSES* (MC, AR, AO, ME)

SECTION	MARKS	Q. NO	K1	K2	K3	K4	K5	K6
A	20	1	+					
		2		+				
B	20	3			+			
C	20	4				+		
D	20	5					+	
E	20	6						+
No. of CL based Questions with Max. marks			1(10)	1(10)	1(20)	1(20)	1(20)	1(20)
No. of CO based Questions with Max. marks			CO 1		CO 2	CO 3	CO 4	CO 5
			2(20)		1(20)	1(20)	1(20)	1(20)

No Comp III for Lab Courses and total marks assigned to CIA is 50

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI 60034
Department of Computer Science
FIRST CONTINUOUS ASSESMENT TEST, SEPTEMBER 2021
UCA 5504 Visual Programming Lab (MC)

IIIBCA   29.09.2021
Time: 1.30 pm to3.00 pm   Max. Marks: 50

SECTION A			(10 Marks)	
1.	Writing the Pseudo code/Algorithm for the given problem.		K1	CO1
2.	Observation Notebook.		K2	CO1
SECTION B			**(10 Marks)**	
3.	Implementation of the Algorithm/ procedure for the given problem. (Source code)		K3	CO2
SECTION C			**(10 Marks)**	
4.	Analysing the Logic and coding techniques.		K4	CO3
SECTION D			**(10 Marks)**	
5.	Evaluating the program through Debugging.		K5	CO4
SECTION E			**(10 Marks)**	
6.	Generating the expected Output.		K6	CO5

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI 60034
Department of Computer Science
END SEMESTER EXAMINATION, OCTOBER 2021
UCA 5504 Visual Programming Lab (MC)

IIIBCA   29.10.2021
Time: 1.30 pm to4.30 pm   Max. Marks: 100

SECTION A			**(20 Marks)**	
	1.	Writing the Pseudo code/Algorithm for the given problem.	K1	CO1
	2.	Record Book, Observation Notebook and Viva.	K2	CO1
SECTION B			**(20 Marks)**	
	3.	Implementation of the Algorithm/ procedure for the given problem. (Source code)	K3	CO2
SECTION C			**(20 Marks)**	
	4.	Analysing the Logic and coding techniques.	K4	CO3
SECTION D			**(20 Marks)**	
	5.	Evaluating the program through Debugging.	K5	CO4
SECTION E			**(20 Marks)**	
	6.	Generating the expected Output.	K6	CO5

COMPONENT III ASSESSMENTS AND RUBRICS

Final Year Project work UG/Mini Project PG

The final year project work is mandatory as part of the curriculum to impart the real-time problem solving skills and to apply the acquired programming and project development skills. This is mandatory for UG. The project guides will be allocated based on selection form the lot. They are encouraged to select any real-world problem from the society or environment to develop is as application. The final document of the project will be evaluated by the External examiner and the students will be presenting their entire work and viva-voce will be conducted for final assessment.

Rubrics for evaluation the project progress (Internal assessment)

S. No.	Criteria	Maximum Marks
1	**Problem Identification, Planning, Specification Preparation** • Problem identification in specific domain • Feasibility study in done on the problem development • Project objectives defining • Planning of the development process • Deciding on the development platform • Specification preparation based on the project analysis	20
2	**Design of System, User Interface and Data** • Overall project duration planning • Design of the project in the optimal modeling • User Interface Design • Database design • Approval of the Designs	20
3	**Design implementation and Construction** • Implantation of UI and DB design • Construction of the modules • Coding for the functional flow of the modules • Coding for Report generation (If any) • Deployment of the coding	20
4	**Software Testing and Implementation** • Test document preparation • Unit testing • Integration testing • Other testing criteria • Test Result analysis • Technical document preparation • Implementation of the project	20

5	**Project Documentation and Modification**	20
	• Project Demonstration	
	• Project documentation	
	• Validation of the document	
	• Project enhancement	
	• Modification done on the developed project	
	Total marks	**100**

Seminar and Assignment

Seminars are optional for UG and mandatory for PG. The course teacher suggests the topics and the students are encouraged to collect information on the latest updated and current trending technological changes exhaustively on the given topic. The will cumulate the information and it will be transformed to a presentation by incorporating the professionalism in the presentation. The same will be presented using visual aids, models, on with any technological tools. The literature will be circulated to the students for reference.

S. no	Criteria	Maximum Marks
1	Topic selection and introduction	10
2	Collection of literature for the topic	10
3	Presentation methodology/tools	20
4	Aesthetics of the presentation	10
5	Articulation and communication skill	10
6	Relevance to Real-world problem	10
7	Time management	10
8	Discussions and Interaction	20
	TOTAL	**100**

Internship/Field visit

Internship allow the students to give real-time exposure of the software industry and hands experience on project development. It also gives them the opportunity to be a part of the project team. This internship process is carried out by the UG students during the Christmas vacation for a maximum period of 15 days. The student will be sent to software industries of their choice or to the industry/organizations with whom the department had signed MoU's. The PG students are also subjected to internship during the summer after their first year. The PG summer internship is for a minimum of 15 days.

S. no	Criteria	Maximum Marks
1	Industry/Organization profile	10
2	Thrust area and technologies of the organization	10
3	Organization structure and role played	20
4	Internship model and participation	10
5	Technical knowledge gained during internship	10
6	Regularity during training	10
7	Documentation/presentation	10
8	Report writing	20
	TOTAL	**100**