

**LEARNING OUTCOME BASED CURRICULUM FRAMEWORK
(LOCF) FOR UNDERGRADUATE PROGRAMMES**

Department of Computer Science and Applications

B.Sc



**LOYOLA COLLEGE (AUTONOMOUS)
CHENNAI 600034.**

PREFACE

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

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

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

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

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

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

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

CONTENTS

S. No	Table of Contents	Page
1.	Vision and Mission of Loyola college	1
2.	Vision and Mission of the Department	1
3.	Programme Educational Objectives (PEOs)	2
4.	Programme Outcomes (POs)	3
5.	Programme Specific Outcomes (PSOs)	4
6.	UG CBCS Curriculum Template	5
7.	UG Overall Course Structure	6
8.	Course Descriptors (Offered by the Department)	
(1)	UCS 1501 Web Programming Lab	9
(2)	UCS 1502 Computer Organization and architecture	12
(3)	UCA 1301 Mathematics for Computer Science	15
(4)	UCS 2501 Object oriented Programming using C++	18
(5)	UCS 2502 Object oriented Programming using C++ Lab	21
(6)	UCS 2503 Operating Systems	24
(7)	UCA 2301 Microprocessor	27
(8)	UCS 3501 Relational Database Management Systems	30
(9)	UCS 3502 Relational Database Management Systems Lab	33
(10)	UCS 3503 Data structures	36
(11)	UCS 4501 Programming in Java	39
(12)	UCS 4604 Internet of Things / UCS 4603 Cloud computing/ UCS 4605 Ruby on rails/ UCS 4606 DevOps	42 45 48 51
(13)	UCS 5501 PHP and MYSQL	54
(14)	UCS 5502 PHP and MYSQL Lab	57
(15)	UCS 5503 Web Programming with ASP.Net	60
(16)	UCS 5504 Web Programming with ASP.Net Lab	63
(17)	UCS 5505 Software Engineering	66
(18)	UCS 5601 Cyber Security / UCS 5604 Data Communication and Networks UCS 5602 Introduction to Big Data / UCS 5603 Artificial Intelligence	69 72 75 78
(19)	UCS 6501 Software Architecture	81
(20)	UCS 6502 Mobile App Development Lab	84
(21)	UCS 6503 Project	87
(22)	UCS 6701 Advanced JAVA programming UCS 6706 Advanced JAVA programming Lab	88 91
(23)	UCS 6702 Data Science using Python UCS 6707 Data Science using Python Lab	94 97
(24)	UCS 6705 Internship	

9.	Course Descriptors (Offered to other Departments)	
(1)	UCS 3401 Data Analytics using MS-Excel / UCS 3402 Digital Marketing Lab	100 103
(2)	UCS 3801 Introduction to Data Analytics	106
(3)	UCS 4402 Software Testing Lab/ UCS 4401 Java programming Lab	109 113
(4)	UCS 4801 PC Trouble shooting	116
10.	CL and CO Based CIA Question Paper Format for UG Theory Courses (MC, AR, AO, MS, ME, NME and GL)	119
11.	Sample CIA Question Paper for a UG Theory Course	120
12.	CL and CO Based End of Semester Examination Question Paper Format for UG Theory Courses (MC, AR, AO, MS, ME and GL)	121
13.	Sample End Semester Examination Question Paper for a UG Theory Course	122
14.	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)	124
15.	CL and CO Based Marks Distribution for Direct Assessments of UG Courses (MC, AR, AO, MS, ME and GL)	124
16.	CL and CO Based CIA and End Semester Question Paper Format for UG Lab Courses (MC, AR, AO, ME)	125
17.	Sample CIA and End Semester Question Paper for Lab Courses	126
18.	Component III Assessments and Rubrics	128

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	<p>LEARNING ENVIRONMENT AND LIFE LONG LEARNING</p> <p>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.</p>
PEO2	<p>GLOBALLY RELEVANT CURRICULUM AND SCIENTIFIC TEMPERAMENT</p> <p>To think innovatively, analyze scientifically and make decisions appropriately, for handling contemporary global concerns through the knowledge earned in the computational sciences curriculum.</p>
PEO3	<p>ACADEMIC EXCELLENCE AND CORE COMPETENCY</p> <p>To excel in modern computational techniques and compete in higher studies/career, for addressing contemporary challenging problems with ease.</p>
PEO4	<p>SKILL DEVELOPMENT AND ENTREPRENEURSHIP</p> <p>To develop analytical, logical and critical problem solving skills for executing professional work and become experts/entrepreneurs in the field of computational sciences.</p>
PEO5	<p>ENVIRONMENT AND SUSTAINABILITY</p> <p>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.</p>
PEO6	<p>PROFESSIONALISM AND ETHICS WITH SOCIAL RESPONSIBILITY</p> <p>To equip themselves with the necessary competency towards professionalism in the computational sciences maintaining ethical standards in addressing the needs of industry and society.</p>

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 endeavors.
PO3	SUSTAINABLE SOCIAL AND ENVIRONMENTAL CONSCIOUSNESS To realize social and environmental problems and contribute the computational expertise to face the challenges and provide sustainable solutions.
PO4	CRITICAL THINKING, ANALYTICAL REASONING & PROBLEM SOLVING To critically reason out, analyze and develop solutions through various computational techniques for real time problems.
PO5	SCIENTIFIC REASONING AND 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)
(Department of Computer Science)

PSOs	STATEMENTS
PSO1	To apply the acquired knowledge and competence to identify the real world problems scientifically and develop a system to provide a complete solution in a professional way.
PSO2	To inculcate critical thinking and skills to excel in technologies and its services used ethically in Public and Private Sectors, Teaching and Research.
PSO3	To adopt creative frameworks for sustainable development in their career with virtuous standards to become a successful entrepreneur or application developer.
PSO4	To be capable of upgrading and advancing knowledge through innovation and technology as evidenced by current developments.
PSO5	To embrace an admirable and commendable life with environmental concern. Perform professionally with social and ethical responsibility as an individual and a successful team player.
PSO6	To assimilate computational techniques to acquire required skills on multidisciplinary areas to meet the standards and global demands.
PSO7	Tend to work in a collaborative environment through application of scientific reasoning and communicate effectively to the stakeholders.

B.Sc Restructured CBCS curriculum with effective from June-2019

PART	SEMESTER I	SEMESTER II	SEMESTER III	SEMESTER IV	SEMESTER V	30 D a y s	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)	Object oriented programming using c++(4h/4c)	Relational Database Management Systems (4h/4c)	Programming in Java (6h/6c)	PHP &Mysql (4h/4c)		Internship (4 weeks during Christmas Holidays (30 Days)	Software architecture (6h/6c)	84	
	Computer organization and architecture (5h/5c)	Object oriented Programming using C++ Lab (4h/4c)	Relational Database Management Systems Lab (4h/4c)		PHP &Mysql Lab(5h/5c)			Mobile App Development (6h/6c)		
		Operating Systems (4h/4c)	Data Structures (4h/4c)		Web Programming with ASP.Net (4h/4c)			Project (6h/6c)		
					Web Programming with ASP.Net Lab (5h/5c)					
					Software Engineering (6h/6c)					
AR/ AO	Mathematics for Computer Science (6h/3c)	Microprocessor (6h/3c)	Data Analytics using MS-Excel / Digital Marketing (5h/3c)	Software Testing/Java programming (5h/3c)						12
ME				DevOps/Ruby on rails/Cloud computing/IOT(6 h/6c)	Cyber Security / Introduction to Big Data /Artificial Intelligence/Data Communication and Networks (6h/6c)					12
MS								Advanced JAVA/Data Science using Python. (12h/15c)	15 (MS&TP)	
BT/AT /NME					MOOC/SSP					4
			Introduction to Data Analytics (3h/2c)	PC Trouble shooting (3h/2c)						
FC	FC (3/1)	FC (3/2), EVS	FC (2/1)	FC 2(1)					5	
CCA	CC	CCA(90/1)							1	
ORA			OR	OR (120/2)				2		
Hr/C	30h/22c	30h/(23+1c)	30/24c	30h(24+2c)	30h/30		30h/33c	180(159)		

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI
DEPARTMENT OF COMPUTER SCIENCE
(2019 - Restructured Curriculum)

OVERALL COURSE STRUCTURE

Sem	Subject Code	Course Title	T/L	Category	Cr.	Hrs.
I	UTL 1101	General Tamil-I	T	GL	3	3
	UFR 1101	French for Beginners - I				
	UOL 1101	Hindi Prose -I				
	UOL 1104	General Sanskrit-I				
I	UEL 1201	General English- I (Advanced)	T	GE	3	6
	UEL 1202	General English (Intermediate)				
	UEL 1203	General English- I (Basic)				
I	UCS 1501	Web Programming Lab	L	MC	7	7
I	UCS 1502	Computer Organization and architecture	T	MC	5	5
I	UCA 1301	Mathematics for Computer Science	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	UCS 2501	Object oriented Programming using C++	T	MC	4	4
II	UCS 2502	Object oriented Programming using C++ Lab	L	MC	4	4
II	UCS 2503	Operating Systems	T	MC	4	4
II	UCA 2301	Microprocessor	T	AR	3	6
III	UTL 3101	General Tamil-III	T	GL	3	3
	UFR 3101	French for Beginners - III				
	UOL 3101	Hindi Poetry -III				
	UOL 3102	General Sanskrit-III				
III	UEL 3201	General English- III (Advanced)	T	GE	3	5
	UEL 3202	General English-III (Intermediate)				
	UEL 3203	General English- III (Basic)				
III	UCS 3501	Relational Database Management Systems	T	MC	4	4
III	UCS 3502	Relational Database Management Systems Lab	L	MC	4	4
III	UCS 3503	Data structures	T	MC	4	4

IV	UTL 4102 UFR 4101 UOL 4101 UOL 4102	General Tamil-IV French for Beginners - IV Hindi Poetry -IV General Sanskrit-IV	T	GL	3	3
IV	UEL 4201 UEL 4202 UEL 4203 UEL 4204 UEL 4205 UEL 4206 UEL 4207	Introduction to Technical Translation Soft skills for Professional Development Professional Content Writing English for Technical Writing English for Employability Skills Essential skills for group Communication Theatre Performance and Film Review	T	GE	3	5
IV	UCS 4501	Programming in Java	L	MC	6	6
IV	UCS 4604/ UCS 4603/ UCS 4605/ UCS 4606	Internet of Things/ Cloud computing/ Ruby on rails/ DevOps		ME	6	6
V	UCS 5501	PHP and MYSQL	T	MC	4	4
V	UCS 5502	PHP and MYSQL Lab	L	MC	5	5
V	UCS 5503	Web Programming with ASP.Net	T	MC	4	4
V	UCS 5504	Web Programming with ASP.Net Lab	L	MC	5	5
V	UCS 5505	Software Engineering	T	MC	6	6
V	UCS 5601 UCS 5604 UCS5602 UCS5603	Cyber Security / Data Communication and Networks / Introduction to Big Data / Artificial Intelligence	T	ME	6	6
VI	UCS 6501	Software Architecture	T	MC	6	6
VI	UCS6502	Mobile App Development Lab	L	MC	6	6
VI	UCS6503	Project	L	MC	6	6
VI	UCS6701/ UCS6702	Advanced Java programming / Data Science using Python	T	MS	5	6
VI	UCS6706/ UCS6707	Advanced Java programming Lab / Data Science using Python Lab	L	MS	5	6
VI	UCS 6705	Internship		I	5	

COURSES OFFERED TO OTHER DEPARMENTS

III	UCS 3401/ UCS 3402	Data Analytics using MS-Excel / Digital Marketing Lab	L	AO	3	5
III	UCS 3801	Introduction to Data Analytics	L	NME	2	3
III	UCS 4401 UCS 4402	Java programming/ Software Testing	L	AO	3	5
IV	UCS 4801	PC Trouble shooting.	L	NME	2	3

COURSE DESCRIPTOR

SEMESTER – I

Course Code	UCS 1501
Course Title	WEB PROGRAMMING LAB
Credits	07
Hours/Week	07
Category	Major Core (MC)
Semester	I
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none">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 is commonly utilized on the client side to improve user experience and its 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 developing web elements using Angular JS that can be incorporated in the web pages.	
COURSE OBJECTIVES	
<ol style="list-style-type: none">1. To develop dynamic web pages using HTML, CSS, JavaScript and Angular JS2. To perform client side validation using JavaScript.3. To effectively build a framework using Angular JS.	
Prerequisites	Basic Knowledge of webpages.

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. 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. 8. Internal CSS with the style elements, 9. Inline CSS with style elements, 10. External CSS with style elements.	20	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4,K5,K6
III	JavaScript: Introduction to Scripting-Decision Making: Equality and Relational Operators- Assignment Operators- Increment and Decrement Operators- Control Statements - Functions- Arrays. 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 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. 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. Paul Deitel, Harvey Deitel, Abbey Deitel, Internet & World Wide Web, how to Program, Pearson International, Revised fifth edition, April 2018.
2. Nathan Murray, Felipe Coury, Ari Lerner and Carlos Taborda, ng-book: The Complete Guide to Angular, Fullstack.io, 2018.

Suggested Readings

1. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites, O'Reilly Media, 3rd edition, 2018.
2. Sergey Akopkokhyants, Stephen Radford · Web Development with Bootstrap 4 and Angular 2, Packt Publishing, 2016.
3. Sridhar Rao Chivukula, Aki Iskandar, Web Development with Angular and Bootstrap, Packt Publishing, 3rd Edition, 2019.

Web Resources

1. <https://www.youtube.com/watch?v=YP2Y-RebtI4>
2. <https://www.youtube.com/watch?v=BI2BsmDvIyM>
3. <https://www.youtube.com/watch?v=-BynRAhw0UE>
4. https://www.youtube.com/watch?v=v0Igl8vYD_o

Course Outcomes (COs) and Cognitive Level Mapping

UCS 1501 WEB PROGRAMMING LAB (MC)		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	UCS 1502
Course Title	COMPUTER ORGANIZATION AND ARCHITECTURE
Credits	05
Hours/Week	05
Category	Major Core (MC) – Theory
Semester	I
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. Computer Organization and Architecture deals with the design of fundamental blocks for building a computer system. 2. The course familiarizes the logic circuits and components, computer architecture, and CPU organization 3. This course delivers Common- bus- system, Instruction cycle, Addressing modes and various instructions. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand computer system architecture and organization. 2. To explore the various functional blocks computer organization. 3. To identify and analyze the concepts of Input/ Output organization. 4. To illustrate the Addressing modes with registers, and storage units. 	
Prerequisites	Basic knowledge on Digital Logic Circuits and Boolean Algebra.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Digital Logic Circuits: Digital Computers-Logic Gates-Boolean algebra -Map Simplification- Product-of-Sums-Simplification-Don't-Care Conditions- Combinational Circuits-Flip Flops- SR, D, JK, T	15	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5,K6
II	Digital Components: Decoders-Encoders- Multiplexers-Registers with Parallel Load-Shift Registers-Bi-directional Shift Registers with Parallel Load-Memory Unit.	15	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5,K6
III	Basic Computer Organization: Instruction codes - Stored Program Organization - Indirect Address - Computer Registers - Common Bus System -Computer Instructions- Instruction Formats.	15	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5,K6
IV	Complete Computer Description: Instruction cycle-Register-Reference Instruction-Memory Reference Instructions-I/O Instructions- Interrupt Cycle.	15	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5,K6
V	Central Processing Unit: General Register Organization-Addressing Modes-Data Transfer and Manipulation: Set of Basic Operations - Data Transfer Instructions-Data Manipulation Instructions-Arithmetic Instructions - Logical and Bit Manipulation Instructions - Shift Instructions –status bit conditions.	15	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5,K6
Text Book M.Morris Mano,Computer System Architecture,Third Edition,Prentice Hall of India, 2007.				
Suggested Readings 1. Andrew S.Tanenbaum, Structured Computer Organization, Fourth Edition, Prentice Hall Of India,1998. 2. William Stallings,"Computer Organization and Architecture",Eighth Edition,Pearson Education,2012. 3. Carl Hamacher, "Computer Organization", Fifth Edition, McGraw Hill International,2011.				
Web Resources 1. https://www.slideshare.net/mekind/basic-computer-organization-and-design 2. https://www.geeksforgeeks.org/computer-organization 3. https://www.youtube.com/watch?v=ISvf4wZ9A6M				

Course Outcomes (COs) and Cognitive Level Mapping

UCS 1502 COMPUTER ORGANIZATION AND ARCHITECTURE(MC)		COGNITIVE LEVEL
CO 1	To identify and understand the organization of computer and its Architecture.	K1, K2
CO 2	To articulate digital components through sequential and combinational circuits.	K3
CO 3	To organize various data transfer internally with the architecture.	K4
CO 4	To distinguish the various types of instructions and its functions.	K5
CO 5	To construct microprocessor instructions and to address the memory and registers	K6

Course Code	UCA 1301
Course Title	MATHEMATICS FOR COMPUTER SCIENCE
Credits	03
Hours/Week	06
Category	Allied Required (AR) – Theory
Semester	I
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course is designed to understand the mathematical foundations needed for computer science. 2. This course aims to explore the various concepts of numerical and computational techniques for problem solving. 3. This course focuses on the fundamentals of mathematics, statistics, graph theory and numerical methods. 4. The course utilizes the mathematical techniques for solving computational problems. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand matrices and its usage in diverse applications. 2. To acquire basic mathematical and statistical problem-solving skills. 3. To interpret the data through trees and graphs. 4. To apply the numerical methods in programming. 5. To understand the basics of mathematics and apply efficiently in data structures. 	
Prerequisites	Knowledge of Basic Mathematics.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Matrices: Symmetric, Skew Symmetric, Hermitian, Skew Hermitian, Orthogonal, unitary matrices, Rank and consistency of equations. Eigen values, Eigen vectors – Cayley Hamilton theorem (no proof).	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
II	Statistics: Introduction – Nature of statistics – Data collection – Changing definition of Statistics – Sample mean – Deviations – Sample median – Sample mode– Sample variance & Sample Standard Deviation–Sample correlation coefficient.	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
III	Introduction to Graphs- Incidence and adjacency matrices- Isomorphism – Sub graphs- Directed graph- Operations on Graphs-Walks, Paths, Circuits- Euler graphs- Hamiltonian paths - Travelling Salesman problem-Shortest path- Planar Graph.	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
IV	Definition of Trees and forest- Properties of trees- Minimum Spanning trees- Spanning trees in the weighted graph- Fundamental circuits and cut sets- Shortest spanning trees- Cayley's formula.	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
V	Numerical Methods: The solution of numerical, algebraic and transcendental equations using Regula – Falsi, Newton – Raphson's methods –numerical Differentiation- Numerical Integration using simpson's rule, Trapezoidal rule.	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
Text Books				
1. Shanti Narayan, P.K. Mittal, A Textbook of Matrices, S Chand & Co Ltd, 2010.				
2. R. Balakrishnan, Ranganathan, Text book of Graph Theory, Second Edition Springer science, Business Media New York, 2012				
Suggested Readings				
1. Clark J and Holton D.A, A First Look at Graph Theory, Allied Publishers, 1995.				
2. Sheldon M Ross, Introductory Statistics, Third Edition, Elsevier Academic Press, 2010.				
Web Resources				
1. https://www.britannica.com/topic/graph-theory				
2. https://www.tutorialspoint.com/graph_theory/graph_theory_trees.htm				
3. https://www.statisticshowto.com/probability-and-statistics/statistics-definitions/mean-				

Course Outcomes (COs) and Cognitive Level Mapping

UCA 1301 MATHEMATICS FOR COMPUTER SCIENCE (AR)		COGNITIVE LEVEL
CO 1	To remember and understand the basics of Matrices.	K1, K2
CO 2	To apply the statistical methods for data analysis.	K3
CO 3	To analyze graph operations to represent the data.	K4
CO 4	To evaluate the trees and their applications to find an efficient solution.	K5
CO 5	To develop numerical solutions for computational problems.	K6

SEMESTER-II

Course Code	UCS 2501
Course Title	OBJECT ORIENTED PROGRAMMING USING C++
Credits	04
Hours/Week	04
Category	Major Core (MC) – Theory
Semester	II
Regulation	2019
COURSE OVERVIEW <ol style="list-style-type: none">1. This course aims to introduce the Objects Oriented Programming (OOP) concepts.2. The course illustrates to define and use classes and objects.3. It aims to solve the real-world problems using OOPs concepts.4. It facilitates code reusability in programming.5. It describes file and error handling operations.	
COURSE OBJECTIVES <ol style="list-style-type: none">1. To understand Object-Oriented concepts.2. To construct and use Classes and Objects.3. To explore and apply the different types of Inheritances.4. To acquire knowledge on various Stream classes and File handling Operations.	
Prerequisites	Basic programming knowledge.

SYLLABUS

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Principles of Object Oriented Programming: Procedure Oriented Programming –OOP Paradigm- Basic concepts of OOP –Benefits of OOP – Applications of OOP. Beginning with C++, Tokens, Expressions and Control Structure Functions in C++: Introduction-Main function prototyping-call by value and reference, return by reference-inline functions- default, constant arguments.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	Function overloading-friend and virtual functions. Classes and Objects. Defining member functions outside and inside a class, Nesting of member functions, private member functions, static data members, static member functions, Arrays of objects, object as function arguments, Friendly functions, Functions returning objects, CONST member function, Pointers to members.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
III	Constructors and Destructors. Constructors- Parameterized constructors, Multiple Constructors-Dynamic constructors- Destructors, Dynamic constructors. Operator overloading and Type Conversions, Defining operator overloading, Overloading Unary operators, Overloading Binary operators, Rules for overloading operators.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
IV	Inheritance: Extending classes, single, multilevel, multiple, hierarchical and Hybrid inheritance- Pointers– pointers to objects, this pointer, pointers to derived classes, virtual functions and polymorphism.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
V	Managing console I/O Operations: C++ streams-C++ stream classes- Unformatted I/O Operations Formatted console I/O Operations, Working with files: Classes for file stream Operations, Opening and Closing a file – EOF- File modes-File pointers, Sequential I/O Operations, Exception Handling.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6

Text Book

1. Bjarne Stroustrup, The C++ Programming Language, 4th Edition Pearson Education Inc, 2013.

Suggested Readings

1. E. Balagurusamy, Object-Oriented Programming with C++, Tata McGraw-Hill Education, 6th Edition, 2013.
2. Scott Meyers, Effective Modern C++, O'Reilly Media Inc, 2015.
3. Stephan Prata, C++ Primer Plus, Sixth Edition, Pearson Education Inc, 2012.

Web Resources

1. <https://www.javatpoint.com/cpp-overloading>
2. <https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/>
3. https://www.tutorialspoint.com/cplusplus/cpp_object_oriented.htm
4. <https://www.studytonight.com/cpp/cpp-and-oops-concepts.php>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 2501 OBJECT ORIENTED PROGRAMMING USING C++ (MC)		COGNITIVE LEVEL
CO 1	To remember and understand the Object-Oriented Programming concepts.	K1, K2
CO 2	To apply programming constructs to implement reusable objects.	K3
CO 3	To illustrate file and error handling operations.	K4
CO 4	To assess input and output operations through different file modes.	K5
CO 5	To construct solutions to resolve various real-world problems.	K6

Course Code	UCS 2502
Course Title	OBJECT ORIENTED PROGRAMMING USING C++ Lab
Credits	04
Hours/Week	04
Category	Major Core (MC) – Lab
Semester	II
Regulation	2019
COURSE OVERVIEW	
<p>This Lab course aims to acquire skills in C++ programming with Object-Oriented Programming concepts like creating classes and Objects, various types of Functions and operator overloading, Constructors and Destructors, types of Inheritances, Stream classes, File creation, and File handling operations.</p>	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To apply OOPs concepts to solve the real-world problems. 2. To understand the creation of functions and its implementation. 3. To identify and implement various file handling techniques. 	
Prerequisites	Basic programming knowledge.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	1. C++ Program to arrange the given set of numbers in Ascending and Descending order using function. 2. C++ Program to illustrate enumerated data type. 3. C++ Program to illustrate reference variables. 4. To implement call by reference and return by reference concept.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, k5, K6
II	5. To develop and use virtual and inline functions. 6. C++ Program to perform nesting of member functions and static member functions. 7. To find the sum and average of n numbers using friend function.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, k5, K6
III	8. To read two matrices of size m x n and perform addition and subtraction. 9. To read two matrices and perform multiplication if the order satisfies the criteria. 10. To find the sum of two complex number using constructor 11. To read and display the "Employee information" using class. 12. To prepare payroll for 'n' employees using array of objects. 13. To create a String type class and implement the string operations 14. To implement the concept of operator overloading. 15. C++ Program to illustrate the parameterized constructor concept.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, k5, K6
IV	16. C++ Program to implement Single Inheritance. 17. C++ Program to implement Multiple Inheritance. 18. C++ Program to implement Multilevel Inheritance 19. C++ Program to implement Hierarchical Inheritance 20. C++ Program to implement Hybrid Inheritance	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, k5, K6
V	21. C ++ Program to Create files. 22. C ++ Program to Perform file operations. 23. C++ program to perform Exception Handling.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, k5, K6
Text Book Bjarne Stroustrup, The C++ Programming Language, 4th Edition Pearson Education Inc, 2013.				

Suggested Readings

1. E. Balagurusamy, Object-Oriented Programming with C++, TataMcGraw-HillEducation,6th Edition ,2013.
2. Scott Meyers, Effective Modern C++, O'Reilly Media Inc, 2015
3. Stephan Prata, C++ Primer Plus, Sixth Edition, Pearson Education Inc, 2012.

Web Resources

1. <https://www.javatpoint.com/cpp-overloading>
2. <https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/>
3. https://www.tutorialspoint.com/cplusplus/cpp_object_oriented.htm
4. <https://www.studytonight.com/cpp/cpp-and-oops-concepts.php>
5. <https://codescracker.com/cpp/>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 2502 OBJECT ORIENTED PROGRAMMING USING C++ LAB		COGNITIVE LEVEL
CO 1	To remember and understand the Object-Oriented Programming concepts.	K1, K2
CO 2	To apply programming constructs to implement reusable objects.	K3
CO 3	To illustrate file and error handling operations.	K4
CO 4	To assess input and output operations through different file modes.	K5
CO 5	To construct solutions to resolve various real-world problems.	K6

Course Code	UCS 2503
Course Title	OPERATING SYSTEMS
Credits	05
Hours/Week	04
Category	Major Core (MC) – Theory
Semester	II
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course describes the major services, structures, and components of Operating Systems. 2. This course explains Process management, Memory management, Input Output Devices and file management, Resource Management and Communication. 3. It illustrates various memory management techniques and algorithms. 4. It covers essential concepts such as semaphores and cooperating sequential processes. 5. It deals with deadlocks, disk scheduling, file allocation methods, and various system-related security issues. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To provide an introduction to the internal operation of Operating Systems. 2. To understand the design and various services provided by the Operating Systems. 3. To acquire basic knowledge of processes with 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”, 8 th edition.				
Suggested Readings				
1. TanenbaumS. Andrew, “Modern Operating Systems”, Third Edition, Prentice-Hall Inc, 2008.				
2. Stallings William, “Operating Systems”, Seventh Edition, Pearson Education, 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

	UCS 2503 OPERATING SYSTEMS (MC)	COGNITIVE LEVEL
CO1	To identify and understand the main components and services of Operating Systems.	K1, K2
CO2	To explain the process, memory, file management and various scheduling algorithms.	K3
CO3	To analyze various issues in Inter Process Communication (IPC) and their solutions.	K4
CO4	To evaluate the Memory management algorithms, allocation methods and virtual memory implementations.	K5
CO5	To justify various algorithms used in different Operating Systems.	K6

Course Code	UCA 2301
Course Title	MICROPROCESSOR
Credits	03
Hours/Week	06
Category	Allied Required -AR – Theory
Semester	II
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course provides the basics of microprocessor and its components. 2. It also describes the architecture of 8085 microprocessor. 3. It deals with various machine cycles such as memory and I/O read /write. 4. It explains the functionality of instructions and the basic applications of a microprocessor. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1.To impart the basic understanding of the internal architecture of 8085. 2. To understand the basic elements and functions of 8085 microprocessor. 3. To explore the instructions of 8085 microprocessor. 4. To familiarize the applications of Microprocessor. 	
Prerequisites	Basics of computer architecture.

SYLLABUS

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to Microprocessors, Advances in semiconductor technology, Organization of microprocessor -based system, Instruction, Data format and storage- Instruction word size.	12	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
II	Microprocessor Architecture and its Operations, The 8085 MPU with pinout diagram – The 8085 Microprocessor, Demultiplexing the Bus AD7- AD0, Generating control signals, The ALU with types of flags.	12	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
III	The 8085 Machine cycles and Bus timings, - Opcode fetch machine cycle, Memory read machine cycle, Memory write machine cycle, IO read machine cycle, IO Write machine cycle	12	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
IV	Introduction to 8085 Instructions – Data transfer operations, Arithmetic operations, Logic operations, and Branch operations. Counters and Time delays- Time delay using one register, a register pair and loop within a Loop technique.	12	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
V	Stack and subroutines- Stack, Subroutine, Restart, Call and return instructions, Advanced subroutine concepts Microprocessor Based Software Development Systems, Basic applications of Microprocessor.	12	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6

Text Books

1. Ramesh Goankar "Microprocessor Architecture, Programming & Applications with the 8085" 5 th Edition - Penram International — 2011.

Suggested Readings

1. Soumitra Kumar Mandal, "Microprocessors and Microcontrollers Architecture, Programming and Interfacing using 8085, 8086 and 8051", 1st Edition. Tata McGraw-Hill, 2011.
2. Krishna Kant, "Microprocessors and Microcontrollers: Architecture Programming and System Design 8085, 8086, 8051,8096", PHI Learning Pvt. Ltd., 2010.
3. M.Rafiquzzaman "Microprocessors-Theory and Applications", Edition PHI, 2009.
4. D.V.Hall"Microprocessor and Digital System", McGraw Hill Publishing Company, 2008.

Web Resources

1. <https://nptel.ac.in/>
2. <https://www.tutorialspoint.com/>

Course Outcomes (COs) and Cognitive Level Mapping

UCA 2301 MICROPROCESSOR (AR)		COGNITIVE LEVEL
CO 1	To understand and describe the microprocessor architecture, instruction formats and machine cycle.	K1, K2
CO 2	To articulate the ways of identifying the address and transferring the data.	K3
CO 3	To analyze and differentiate the various instructions of microprocessor.	K4
CO 4	To evaluate the various operations of microprocessor.	K5
CO 5	To manage the microprocessor-based systems and applications.	K6

SEMESTER-III

Course Code	UCS 3501
Course Title	RELATIONAL DATABASE MANAGEMENT SYSTEMS
Credits	4
Hours/Week	4
Category	Major Core- Theory
Semester	III
Regulation	2019
COURSE OVERVIEW <ol style="list-style-type: none">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 requirements.5. This will also provide skills in back-end validations.	
COURSE OBJECTIVES <ol style="list-style-type: none">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 oracle 9i – 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, Database Systems Using Oracle, Pearson Education, Edition II, 2011.
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, 2019.
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

UCS 3501 RELATIONAL DATABASE MANAGEMENT SYSTEMS (MC)		COGNITIVE LEVEL
CO1	To understand the basics of backend programming with data storages.	K1, K2
CO2	To construct statements to validate the data storage schemas and ensure the effective retrieval.	K3
CO3	To focus on appropriate methodologies to get desirable output through queries.	K4
CO4	To recommend blocks of codes to solve the real-world problems.	K5
CO5	To develop stored objects to achieve reusability ethically in a multi-user environment.	K6

Course Code	UCS 3502
Course Title	RELATIONAL DATABASE MANAGEMENT SYSTEMS - LAB
Credits	4
Hours/Week	4
Category	Major Core-Lab
Semester	III
Regulation	2019
Course Overview	
<ol style="list-style-type: none"> 1. This course provides the skill to design and develop databases to maintain the real-world data. 2. This course provides back-end programming skills. 3. The aim of the course is to write efficient queries to retrieve data based on the requirements. 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	
<ol style="list-style-type: none"> 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 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, Database Systems Using Oracle, Pearson Education, Edition II, 2011.				
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

UCS 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 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 the real-world problems.	K5
CO 5	To develop stored objects to achieve reusability ethically in a multi-user environment.	K6

Course Code	UCS 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 firstsearch, 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, 1 st Edition, 2013.				
2.Seymour Lipschutz, Theory and problems of data structures, Schaum’s Outline series, 5 th Edition, 2009.				
Suggested Readings				
1.Narasimha Karumanchi, Data Structures and Algorithms made easy Career Monk Publications, 2 nd Edition, 2016.				
2.Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 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

UCS 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 structures 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 the real-world problems.	K6

SEMESTER-IV

Course Code	UCS 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, interfaces, 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. Java program using classes and objects. 5. Java program using Arrays and strings. 6. Implementing the inheritance concepts. 7. Write a program using Abstract classes and Static members in Java. 8. Write a program using method over loading concept in Java. 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 Program using Interfaces in Java. 11. Create and import a package in Java.	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4,K5, K6

V	<p>Multithreaded Programming: Creating Threads- Extending a Thread class- Life cycle of a Thread- Thread Priority- -Implementing Runnable Interface. Managing errors and Exceptions: Exceptions - Exception Handling Code-Multiple Catch Statements- Using Finally-Throwing our own Exceptions.</p> <p>Exercises:</p> <p>12. Write a Java Program to implement the concept of Multithreading.</p> <p>13. Write a Java Program to set the priority for the Threads.</p> <p>14. Write a Java Program to handle Built- in Exceptions.</p> <p>15. Write a Java Program to handle user defined Exceptions.</p>	18	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
<p>Text Books</p> <p>1. Programming with Java, E. Balagurusamy, Tata McGraw-Hill, 2015, Fifth Edition.</p>				
<p>Suggested Readings</p> <p>1. Java - The Complete Reference, Schildt Herbert and Peter Naughton, Tata McGraw-Hill, 2019, Eleventh Edition.</p> <p>2. Programming with Java, Dr. C. Muthu, Tata McGraw-Hill, 2010, Second Edition, University of Chicago Press and Ivy Press Ltd.</p>				
<p>Web Resources</p> <p>1. https://www.tutorialspoint.com/java/index.htm</p> <p>2. https://www.javatpoint.com/java-tutorial</p>				

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 concepts in Java.	K3
CO 3	To experiment with programming constructs like 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	UCS 4604
Course Title	INTERNET OF THINGS
Credits	06
Hours/Week	06
Category	Major Elective (ME)
Semester	IV
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. Internet of Things is an interdisciplinary subject integrating the fields of electronics, communication and internet. 2. This gives basic knowledge about the structure and function of emerging technologies with internet. 3. It also deals with advanced data collection, connectivity and analysis of information. 4. It familiarizes with sensors and different types of boards. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand and explore the significance of Internet of Things. 2. To acquire the knowledge on architecture, operation, and business benefits of an IoT solution. 3. To identify the potential business opportunities that IoT can uncover. 4. To develop solutions through the latest devices and tools in the market. 	
Prerequisites	Basic knowledge on Electronics.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	INTERNET OF THINGS: Overview: Internet of things(IoT)–IoT Conceptual Framework – IoT Architectural View – Technology behind IoT – Sources of IoT – M2M Communication.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	DESIGN PRINCIPLES FOR CONNECTED DEVICES: Introduction – IoT/ M2M Systems Layers and Designs Standardization – Communication Technologies. INTERNET CONNECTIVITY PRINCIPLES: Introduction –Internet Connectivity –Internet-Based Communication – IP Addressing in the IOT.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	DATA ACQUIRING, ORGANISING, PROCESSING & ANALYTICS :Introduction to Data Acquiring and Storage – Organizing the Data – Transactions, Business Processes, Integration and Enterprise Systems – Analytics – Knowledge Acquiring, Managing and Storing Processes.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
IV	SENSOR TECHNOLOGY and PROTOTYPING: Introduction on Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks – Participatory Sensing, Industrial IoT and Automotive IoT – Actuator. Introduction - Embedded computing Basics – Embedded platforms for prototyping – Arduino - IntelGalileo-Intel Edison-Raspberry Pi-BeagleBone-Computing systems.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
V	IOT PHYSICAL DEVICES: Basic building blocks of an IOT Device – Exemplary device: Raspberry Pi-About the board – Raspberry Pi interfaces-controlling LED with Raspberry Pi- Interfacing an LED and switch with Raspberry Pi- Interfacing a Light sensor LDR with Raspberry Pi- Other IOT devices.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
Text Books				
1.Raj Kamal, Internet of Things Architecture and Design Principal, McGraw Hill Education 1st Edition, 2017. 2.Arshdeep Bahga, Internet of Things, Universities Press 1st Edition, 2016.				
Suggested Readings				
1. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, John Wiley and Sons Limited.[UK] 1rst edition, 2014. 2. Rajkumar Buyya, Amir Vahid Dastjerdi, Internet of Things: Principles and Paradigms, Elsevier 1st edition, 2016.				
Web Resources				
1. https://data-flair.training/blogs/iot-tutorial 2. https://nevonprojects.com/top-6-smart-simple-iot-projects-on-arduino-raspberry-pi				

Course Outcomes (COs) and Cognitive Level Mapping

UCS 4604 INTERNET OF THINGS (ME)		COGNITIVE LEVEL
CO 1	To define and understand the design technologies and protocol of IOT and its devices.	K1, K2
CO 2	To implement IOT protocols with latest standards.	K3
CO 3	To analyze the collected data through IoT devices.	K4
CO 4	To explain the role of sensors in dynamic data capturing and activation.	K5
CO 5	To create IOT applications on need basis.	K6

Course Code	UCS 4603
Course Title	CLOUD COMPUTING
Credits	06
Hours/Week	06
Category	Major Elective (ME) – Theory
Semester	IV
Regulation	2019
Course Overview	
<ol style="list-style-type: none"> 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	
<ol style="list-style-type: none"> 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 cloud. 	
Prerequisites	Basic knowledge in Computer 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 –MapReduce – 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 – Case Study: Live Video Streaming App – Streaming Protocols – Case Study: 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 Madiseti, 2017. Cloud Computing Hands on Approach, 1st Edition , University Press.				
Suggested Readings				
1.Kris Jamsa, 2014. Cloud computing SaaS, PaaS, Virtualization, Business, Mobile security and more, 1st Edition, Jones & Batrlett Students Education.				
2.Rajkumar Buyya, Christian Vecchiola, S.Thamaraiselvi, 2013. Mastering cloud computing, 1st Edition,Tata McGraw Hill.				
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

UCS 4603 CLOUD COMPUTING (ME)		COGNITIVE LEVEL
CO1	To remember and understand cloud computing, different cloud services, deployment models and security.	K1, K2
CO2	To apply and examine different cloud computing services, concepts and techniques.	K3
CO3	To explore the features involved in cloud computing, big data analytics and cloud security.	K4
CO4	To evaluate the role of video streaming and video transcoding app and concepts in cloud.	K5
CO5	To create different use cases of the applications of cloud in diverse domains.	K6

Course Code	UCS 4605
Course Title	RUBY ON RAILS
Credits	06
Hours/Week	06
Category	Major Elective – Practical
Semester	IV
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. Ruby on Rails deals with a full-stack web application framework using Ruby and MySQL. 2. This course aims to introduce planning and designing effective web pages and server-side applications. 3. The different elements of the course explore the various web designing techniques and ways to create and manage server-side applications using the MVC pattern. 4. This course also focuses on creating and maintaining a MySQL database where all the application data are stored. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the principles of server-side applications to process and save the data. 2. To learn the techniques of effectively handling the data with MySQL. 3. To develop embedded web pages using HTML and CSS. 4. To acquire skills to create server-side applications. 	
Prerequisites	Basic Programming skills.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Working with numbers, strings – Variables, constants – Reading text on the command line– Operators – Operator precedence- arrays – hashes – ranges. 1. Working with Input –Output functions in Ruby 2. Using Number, String and Ranges data types in Ruby 3. Working with Arrays 4. Working with hashes	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3 K4,K5,K6
II	Conditionals- Loops- Methods and Blocks: If, If... else, If.. elseif, Unless, If and unless as modifiers, case, while loop, until loop, while and until as modifiers, for loop, Ruby iterators,break, redo and next in loops, retry statement. 5.Conditional Statements [if and case] 6.Loop Statements [Unconditional, For, While]	15	CO1 CO2 CO3 CO4 CO5	K1,K2, K3, K4,K5,K6
III	Creating and calling a method - working with blocks- Creating a class – object - Object Access – Overriding - class variables – methods - modules and mixins. Creating the application framework - running the Application. 7.Regular expression. 8.Blocks and Iteraters. 9.Creating and using classes. 10.Using Inheritance. 11.Messages and Mixin.	16	CO1 CO2 CO3 CO4 CO5	K1,K2, K3, K4K5,K6
IV	Creating the controller - MVC Architecture - Ruby Code and HTML - Escaping Sensitive text -Adding a second action Accessing Data the user provides – Working with models – tying controls to models - initializing data in controls- storing data in sessions. 12. Using Virtual attributes. 13.Using Class variables. 14. Reading and Writing files. 15. Exception handling. 16. Creating and Manipulating threads. 17. Command line arguments. 18. CGI scripts using Ruby. 19. Embedding Ruby in HTML. 20. Writing Ruby programs for C.	16	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6

V	<p>Creating the database – running an application– adding records – enhancing the display –sample application: Shopping portal</p> <p>21. Starting Rails Application 22. Working with Bundler 23. Working with Gemfile 24. Model view controller 25. Installing and setup Git 26. Adding files to Git 27. Branch, Edit and Commit 28. Database application in Rail</p>	16	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
<p>Text Books</p> <ol style="list-style-type: none"> Holzner, S, Beginning Ruby on Rails. India: Wiley India Pvt.Limited, 2007. Hartl, M.,Ruby on Rails Tutorial: Learn Web Development with Rails. (n.p.): Pearson Education, 2016. 				
<p>Suggested Readings</p> <ol style="list-style-type: none"> Ruby for Rails: Ruby Techniques for Rail Developers, India: Dreamtech Press, 2006. Wintermeyer, S, Learn Rails 5.2: Accelerated Web Development with Ruby on Rails. United States: Apress, 2018. 				
<p>Web Resources</p> <ol style="list-style-type: none"> https://www.railstutorial.org https://www.codecademy.com/learn/learn-rails https://www.railstutorial.org/book 				

Course Outcomes (COs) and Cognitive Level Mapping

UCS 4605 RUBY ON RAILS		Cognitive Level
CO 1	To describe and understand the basic programming skills in Ruby.	K1, K2
CO 2	To illustrate the programming constructs.	K3
CO 3	To analyze Object oriented programming concepts in Ruby.	K4
CO 4	To assess applications using MVC Model.	K5
CO 5	To create a full-stack web application.	K6

Course Code	UCS 4606
Course Title	DEVOPS
Credits	06
Hours/Week	04
Category	Major Elective (ME)-LAB
Semester	IV
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. DevOps is a course used for collaboration between Development and IT Operations to make software production and deployment in an automated way. 2. The aim of the course is to give basic knowledge about DevOps tools for agile software development. 3. This course facilitates different areas of software development and deployment. 4. This course also examines the methods to build hands-on projects using configuration management tools. 5. This course is a stepping stone to a career in app and web development, data sciences and artificial intelligence. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the purpose and history of DevOps and its architecture. 2. To illustrate the design principles for agile development. 3. To explore the role of version control systems and their tools. 4. To apply the knowledge of software and automation testing framework in the AWS environment. 	
Prerequisites	Basic knowledge on Linux.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p>Introduction to DevOps: Define DevOps, Emergence of DevOps, History, DevOps Architecture, DevOps and SDLC: Waterfall Model, Agile Model, DevOps Goals, DevOps Tools.</p> <p>1. Basic linux commands 2. Changing file permissions and ownership 3.Types of links soft and hard link</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	<p>DevOps Agile Skills Association (DASA): DASA DevOps principles, DevOps skills areas, Knowledge areas and Competence Framework, Dasa Qualification scheme, Mission and Vision.</p> <p>1. Filter commands 2. Linux File system structure 3.Simple filter and advance filter commands</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	<p>Overview of Version Control Systems, Role of version control systems, Types of Control systems and their tools, Continuous Integration and Continuous Deployment</p> <p>1. Start and stop services 2. Find and kill the process with id and name 3. Package installation using RPM and YUM</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
IV	<p>Software and Automation Testing Framework: Software Testing Overview, Testing level approaches and automation tools, Configuration Management tools: Managing infrastructure and types of configuration management Tools</p> <p>1. SDLC Automation 2. Configuration management and Infra structure as code 3.Launch a Linux Virtual Machine.</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
V	<p>Need of Cloud in DevOps: Introduction to Cloud Computing, Cloud's role in DevOps, Cloud services and models, What is AWS? Using AWS in DevOps, Use cases in AWS.</p> <p>1. Logging in to Amazon Web Services Console. 2. Working with AWS code commit on Windows 3.AWS identity and Access management</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6

<p>Text Books</p> <p>1. Gene Kim, Jez Humble, 2016. The DevOps Handbook, IT Revolution.</p>
<p>Suggested Readings</p> <p>1. Emily Freeman, DevOps for Dummies, A Wiley Brand, 2017. 2. Huttermann Micheal, DevOps for developers, APress, 2012.</p>
<p>Web Resources</p> <p>1. https://www.simplilearn.com/cloud-computing/devops-practitioner-certification-training 2. https://www.javatpoint.com/devops 3. https://www.tutorialspoint.com/devops_tutorials.htm</p>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 4606 DevOps (ME)		COGNITIVE LEVEL
CO 1	To understand and recall the emergence, development and architecture of DevOps.	K1, K2
CO 2	To practice and determine the agile skills association.	K3
CO 3	To analyze continuous integration and deployment.	K4
CO 4	To justify the importance of software and automation testing framework.	K5
CO 5	To validate the role of cloud in DevOps.	K6

Course Code	UCS 5501
Course Title	PHP AND MYSQL
Credits	04
Hours/Week	04
Category	Major Core (MC) – Theory
Semester	V
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 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 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	
<ol style="list-style-type: none"> 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

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

Suggested Readings

- 1.Vikram Vaswani, 2005. How to do everything with PHP and MySQL, 1st Edition, Tata McGraw Hill.
- 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>
- 2.<https://www.udemy.com/course/php-mysql-tutorial/>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 5501 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	UCS 5502
Course Title	PHP AND MYSQL LAB
Credits	05
Hours/Week	05
Category	Major Core (MC) – Lab
Semester	V
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 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 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	
<ol style="list-style-type: none"> 1. To explore the concepts and techniques of Web development. 2. To implement the features of PHP and MySQL. 3. To experiment building of 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 in MySQL. 18. Storing sensitive data in MySQL using encryption functions. 19. Join and subqueries. 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

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

Web Resources

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

Course Outcomes (COs) and Cognitive Level Mapping

UCS 5502 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	UCS 5503
Course Title	WEB PROGRAMMING WITH ASP.NET
Credits	04
Hours/Week	04
Category	Major Core (MC) - Theory
Semester	V
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. ASP.NET is a framework to design web applications, web services, and dynamic content-driven websites. 2. It deals with ASP.NET Server Controls, HTML Controls, Validation Controls and Data Controls. 3. This course introduces database-driven web development with ASP.NET and C#. 4. It also handles SQL Server Database using ADO.NET. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To develop ASP.NET Web application using standard controls. 2. To create rich database applications using ADO.NET. 3. To implement file handling operations. 4. To utilize ASP.NET security features for authenticating the web site. 	
Prerequisites	Programming skills and basic knowledge of Database.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library- C# Fundamentals: Primitive types and Variables – Operators - Conditional statements -Looping statements – Creating and using Objects – Arrays – String operations.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	Introduction to ASP.NET - IDE-Languages supported Components -Working with Web Forms – Web form standard controls: Properties and its events – HTML controls -List Controls: Properties and its events.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	Rich Controls: Properties and its events – validation controls: Properties and its events – File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deleting files – File uploading.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
IV	ADO.NET Overview – Database Connections – Commands – Data Reader - Data Adapter - Data Sets - Data Controls and its Properties - Data Binding.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
V	Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files - Website Security - Authentication - Authorization – Creating a Web application.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6

Text Books

1. Svetlin Nakov, Veselin Kolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019.
2. Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill, 2015.

Suggested Readings

1. Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, 2017.
2. Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech press, 2013.
3. Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc. 2016.
4. Denielle Otey, Michael Otey, ADO.NET: The Complete reference, McGraw Hill, 2008.
5. Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, Apress, 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/en-us/dotnet/csharp/tour-of->
5. <https://www.tutorialspoint.com/csharp/index.htm>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 5503 WEB PROGRAMMING WITH ASP.NET (MC)		COGNITIVE LEVEL
CO 1	To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.	K1, K2
CO 2	To develop web application using various controls.	K3
CO 3	To analyze C# programming techniques in developing web applications.	K4
CO 4	To assess a Web application using Microsoft ADO.NET.	K5
CO 5	To develop a software to solve real-world problems using ASP.NET.	K6

Course Code	UCS 5504
Course Title	WEB PROGRAMMING WITH ASP.NET LAB
Credits	05
Hours/Week	05
Category	Major Core (MC) - Lab
Semester	V
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. ASP.NET allows developers to create web applications and windows applications. 2. It deals with ASP.NET Server Controls, HTML Controls, Validation Controls and Data Controls. 3. This course introduces database-driven web development with ASP.NET and C#. 4. It also handles SQL Server Database using ADO.NET. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To develop ASP.NET Web application using various controls. 2. To create rich database applications using ADO.NET. 3. To access data from the database in data controls on the web page. 4. To use ASP.NET security features for authenticating the web site. 	
Prerequisites	Programming skills and basic knowledge of Database.

SYLLABUS

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	1. Create an exposure of Web applications and tools 2. Coding using Html Controls 3. Coding using Server Controls	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	4. Web application using Web controls. 5. Web application using List controls.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	6. Web Page design using Rich control. 7. Validate user input using Validation controls. 8. Working with File concepts.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
IV	9. Web application using Data Controls. 10. Data binding with Web controls. 11. Data binding with Data Controls. 12. Database application to perform insert, update and delete operations.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
V	13. Database application using Data Controls to perform insert, delete, edit, paging and sorting operation. 14. Xml classes. 15. Authentication – Authorization. 16. Ticket reservation using ASP.NET controls. 17. Online examination using ASP.NET controls.	12	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6

Text Book

1. SvetlinNakov, VeselinKolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019.
2. Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill, 2015.

Suggested Readings

1. Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill,2017.
2. Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech pres,2013.
3. Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach& Associates Inc. 2016.
4. DenielleOtey, Michael Otey, ADO.NET: The Complete reference, McGraw Hill,2008.
5. Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS,2010.

Web Resources

1. https://www.w3schools.com/asp/webpages_examples.asp
2. <https://www.javatpoint.com/asp-net-tutorial>
3. <https://www.javatpoint.com/ado-net-tutorial>
4. https://www.w3schools.com/asp/webpages_intro.asp
5. <https://www.c-sharpcorner.com/csharp-tutorials>
6. <https://docs.microsoft.com/en-us/dotnet/csharp/tour-of-csharp/tutorials/?redirectedfrom=MSDN>
7. <https://www.tutorialspoint.com/csharp/index.htm>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 5504 WEB PROGRAMMING WITH ASP.NET LAB (MC)		COGNITIVE LEVEL
CO 1	To identify and understand Web controls for Web applications.	K1, K2
CO 2	To construct Web application using Validation Controls.	K3
CO 3	To analyze Web application using Data Controls.	K4
CO 4	To evaluate windows application for various real-world problems using ASP.NET	K5
CO 5	To design and develop Web applications.	K6

Course Code	UCS 5505
Course Title	SOFTWARE ENGINEERING
Credits	06
Hours/Week	6
Category	Major Core (MC)
Semester	V
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. Software Engineering is the process of analyzing user requirements, designing, building and testing software applications. 2. This course provides in-depth knowledge in developing systems. 3. This course helps to understand the software development models, System Engineering and design concepts. 4. It elucidates project management, estimation and scheduling concepts. 5. It explicates software testing, implementation and configuration management. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the significance of various process models. 2. To familiarize on system engineering and data modeling concepts. 3. To explore the various design processes. 4. To analyze the 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, 8 th edition.				

Suggested Readings

1. Richard Fairley, "Software Engineering Concepts", McGraw-Hill, 2014.
2. Rajib Mall." Fundamentals of Software Engineering", PHI, 2014.

Web Resources

1. <https://www.guru99.com/software-engineering-tutorial.html>
2. https://www.tutorialspoint.com/software_engineering/index.htm
3. <https://www.javatpoint.com/software-engineering-tutorial>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 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 the process.	K3
CO 3	To analyze project estimation, scheduling and software quality.	K4
CO 4	To evaluate various models and post development activities.	K5
CO 5	To design a software application that satisfies user requirements.	K6

Course Code	UCS 5601
Course Title	CYBER SECURITY
Credits	06
Hours/Week	06
Category	Major Elective(ME)- Theory
Semester	V
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course is designed to investigate cybercrime and its characteristics. 2. It helps to identify various kinds of crimes and their nature to take corresponding actions. 3. It also provides the fundamentals of investigating and demonstrating forensic approaches. 4. The course familiarizes on cyber laws and regulations. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the basics of cyberspace. 2. To acquire the knowledge on verification processes. 3. To develop skills in using cryptographic techniques to secure our system. 4. To familiarize the various internet crimes and their causes. 5. To assess the traditional problems associated with computer crimes. 	
Prerequisites	Basics of Internet and its uses.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to Cyber crime: Definition and origins - Cyber crime and information security-Cyber criminals – Classifications of Cyber crime: Cyber crime against individuals, E- Mail Spoofing - Spamming - Internet Time Theft-Industrial Spying - Hacking - Online Frauds - Pornographic offenses - software Piracy - Email bombing - password sniffing - credit card frauds.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	Categories of Cyber crime: Active and Passive attacks. Cyber stalking - types of stalkers - Botnets - Cloud computing - Trends in mobility - Credit card frauds in mobile and wireless computing - Types - Security challenges posed by mobile devices - Authentication service security - Attacks on mobile/cell phones : Mobile phone theft - Mobile viruses - Mishing - Vishing - Smishing- Hacking Bluetooth.	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. Transposition techniques – 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 behaviour: 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. Nina Godbole and Sunit Belpure, Cyber Security understanding Cybercrimes, Computer Forensics and legal perspectives, Wiley, 2011.
2. William Stallings, Cryptography and Network security, Wiley, 2012.

Suggested Readings

1. Dr. Jeetendra Pande, 2017.Introduction to Cyber Security, Uttarakand Open University.
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-india.html>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 5601 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 solutions.	K6

Course Code	UCS 5604
Course Title	DATA COMMUNICATION AND NETWORKS
Credits	05
Hours/Week	05
Category	Major Elective (ME) – Theory
Semester	V
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 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	
<ol style="list-style-type: none"> 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 systems.

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	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	Digital Transmission: – Digital -to- Digital Conversion-Line Coding-Line Coding Schemes-Block coding-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 Sublayers.	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 Edition 2003. 2. DP Nagpal, Data Communication and Networking, S. Chand Publishing, Second Edition 2018. 3. William Stallings, Data and Computer Communications, Pearson Education, 10th Edition 2013.				
Web Resources				
1. http://zai.lecturer.pens.ac.id/Kuliah/Komunikasi%20Data/Buku%20Referensi/Data%20Co 2. https://www.tutorialspoint.com/data_communication_computer_network/ 3. http://www.crectirupati.com/sites/default/files/lecture_notes/				

Course Outcomes (COs) and Cognitive Level Mapping

UCS 5604 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	UCS 5602
Course Title	INTRODUCTION TO BIG DATA
Credits	6
Hours/Week	6
Category	Major Elective (ME)
Semester	V
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course deals the fundamentals of big data and its applications. 2. This course gives in-depth knowledge in big data analytics. 3. This course helps to understand the relevance of big data and cloud environment. 4. It elucidates the database and map reducing techniques. 5. It explicates different data analytics algorithms and tools. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the fundamentals of big data management architecture. 2. To familiarize the distributed computing and big data technology. 3. To manage virtualization of the cloud and big data. 4. To correlate the operational databases and map reduce fundamentals. 5. To acquire knowledge in data visualization techniques. 	
Prerequisites	Basic knowledge about data.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Fundamentals of Big Data: The Evolution of Data Management -Understanding the Waves of Managing Data -Defining Big Data - Building a Successful Big Data Management Architecture -The Big Data Journey. Examining Big Data Types: Defining Structured - Unstructured Data.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	Old Meets New- Distributed Computing: History of Distributed Computing- Understanding the Basics of Distributed Computing- Getting Performance Right. Digging into Big Data Technology Components: Exploring the Big Data Stack- Analytical Data Warehouses -Big Data Analytics -Big Data Applications.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	Virtualization: Understanding the Basics of Virtualization- Managing Virtualization with the Hypervisor- Abstraction and Virtualization- Virtualization to Work with Big Data. Examining the Cloud and Big Data: Defining the Cloud in the Context of Big Data- Understanding Cloud Deployment and Delivery Models.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
IV	Operational Databases: Non relational Databases- Key-Value Pair Databases- Document Databases- Columnar Databases- Graph Databases- Spatial Databases- Polyglot Persistence. Map Reduce Fundamentals: Understanding the map Function- Adding the reduce Function - Putting map and reduce Together - Optimizing Map Reduce Tasks. Hadoop: Explaining Hadoop.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
V	Basic analytics-Advanced analytics-Operationalized analytics-Monetizing analytics-Modifying Business Intelligence Products to Handle Big Data-Data-Analytical algorithms-Infrastructure support- Examples-Orbitz-Nokia-NASA-Text Analytics and Big Data- Exploring Unstructured Data-Understanding Text Analytics-The difference between text analytics and search-Analysis and Extraction Techniques.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
Text Books				
1. Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, ” Big data for dummies”, John Wiley Sons Inc, 2013.				
2. Seema Acharya, Subhasini Chellappan ,” Big Data Analytics”, John Willey & Sons Inc, 2015				

Suggested Readings

1. Bill Franks“Training the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Willey & Sons Inc, 2012.
2. Tom White ,” Hadoop: The Definitive Guide”, O’Reilly Media, 2012, 3rd Edition.

Web Resources

1. https://www.tutorialspoint.com/big_data_tutorials.htm
2. <https://www.javatpoint.com>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 5602 INTRODUCTION TO BIG DATA (ME)		COGNITIVE LEVEL
CO 1	To describe and understand the fundamentals of big data.	K1, K2
CO 2	To explain Big Data analytics and its applications.	K3
CO 3	To evaluate the virtualization techniques in cloud environment.	K4
CO 4	To compare different methods to establish relation between data and map reducing techniques.	K5
CO 5	To adapt different techniques to define and develop data analytics.	K6

Course Code	UCS 5603
Course Title	ARTIFICIAL INTELLIGENCE
Credits	06
Hours/Week	06
Category	Major Core (MC) - Theory
Semester	V
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. Artificial intelligence emphasizes to realize the intelligent human behaviors on a computer. 2. This course facilitates additional functionalities for a computer to learn, plan, and solve problems autonomously. 3. It explores the concepts of natural language understanding, automatic programming, and machine learning. 4. It deals with basic search algorithms for problem solving. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the basic concepts of Artificial Intelligence. 2. To understand the algorithms to solve the optimization problems 3. To focus on the role of robotics to solve the real-world problems. 4. To deal with game solving using heuristic approach. 	
Prerequisites	Basic knowledge on problem solving.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to AI - The Foundations of AI- AI Technique - Problem characteristics - Production system characteristics - Production systems: 8-puzzle problem. Search strategies – Breadth first search - depth first search.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	Heuristic search techniques: Generate and Test - Hill climbing - Best-first search - Problem reduction : A* algorithm - AO* algorithm - Constraint satisfaction -Means-ends analysis.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	Knowledge representation issues: Representations and mappings - Approaches to knowledge representation - Using predicate logic: Representing simple facts in logic - Representing instance and ISA relationships - The Basis of Resolution - Resolution in predicate logic.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
IV	Game playing: The minimax search procedure-Adding alpha-beta cutoffs - Iterative Deepening - References on specific games. Planning: Components of a planning system - Goal stack planning - Non linear planning using constraint posting - Hierarchical Planning.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
V	Introduction to Robotics : Fundamentals of Robotics - Robot Kinematics - Position Analysis - Dynamic Analysis and Forces - Robot Programming languages & systems: Introduction - The three levels of robot programming - requirements of a robot programming language - problems peculiar to robot programming languages.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6

Text Books

1. Elaine rich, Kevin Knight, Shivashankar B Nair, 2017,Artificial Intelligence, Tata McGraw Hill, 3rd Edition.
2. John J. Craig, 2005, Introduction to Robotics, Addison Wesley publication, 3rd Edition.

Suggested Readings

1. S. Russell and P. Norvig, 2020, Artificial Intelligence: A Modern Approach, Prentice Hall, 4th edition.
2. Mishra R. B, 2011, Artificial Intelligence, Prentice Hall of India, 2nd Edition.
3. Tsuneo Yoshikawa, 2010, Foundations of Robotics, PHI Publication.

Web Resources

1. <https://www.cin.ufpe.br/~tfl2/artificial-intelligence-modern->
2. <https://mitpress.mit.edu/books/introduction-ai-robotics-second-edition>
3. http://www.mech.sharif.ir/c/document_library/get_file?uuid=5a4bb247-1430-4e46-942c-

Course Outcomes (COs) and Cognitive Level Mapping

UCS 5603 ARTIFICIAL INTELLIGENCE (ME)		COGNITIVE LEVEL
CO 1	To understand and describe the applications of artificial intelligence.	K1, K2
CO 2	To explain the different search strategies in problem solving.	K3
CO 3	To analyze the schemes for typical AI problems.	K4
CO 4	To evaluate game playing techniques.	K5
CO 5	To facilitate programming for robotics.	K6

SEMESTER-VI

Course Code	UCS 6501
Course Title	SOFTWARE ARCHITECTURE
Credits	6
Hours/Week	6
Category	Major Core- Theory
Semester	VI
Regulation	2019
COURSE OVERVIEW <ol style="list-style-type: none">1. This course deals with the basics of software Architecture.2. It provides the skill to design various Architectures for process control.3. It facilitates to bridge the gap between software, GUI and databases.4. It supports to gain expertise in model driven design.5. This course helps to convert implicit designs to explicit.	
COURSE OBJECTIVES <ol style="list-style-type: none">1. To understand the basics of software architecture as the core for developing any software application2. To familiarize the different software architecture instrumentation applications and mobile robotics3. To explore the applications of domain driven architecture and model driven.4. To provide the integration insights in software development environments.5. To perform contact mapping for strategic design.	
Prerequisites	Basic knowledge of application softwares.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to Software Architecture – An Engineering discipline for software – The status of software Architecture – Architectural styles – Pipes and Filters – Data abstraction and Object- Oriented Organization – Event-Based, Implicit Invocation – Layered Systems – Repositories –Interpreters.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	Process Control – Process-Control Paradigms – A software Paradigm for Process Control – Other Familiar Architecture – Heterogeneous Architectures – Case Studies: Key Word in Context – Instrumentation Software – Mobile Robotics.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	Shared Information Systems – Database Integration – Integration in Software Development Environments – Integration in the Design of Buildings – Architecture Structures for Shared Information Systems – Guidance for User-Interface Architectures.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
IV	Domain-Driven design –Introduction- Continuous Integration- Model-Driven Design Hands-on Modelers- Layered Architecture –Model expressed in software- Lifecycle of a domain object- Entities- Value Objects-Domain Events – Services –Modules-Aggregates-Repositories-Factories.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
V	Making Implicit concepts explicit- simple design-Maintaining Model integrity- Relationship between Bounded contexts- Context Mapping for Strategic Design-core domain-generic subdomains- Domain vision statement-cohesive mechanism-segregated score- abstract score-deep models distillation.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
Text Books				
1. Mary Shaw, David Garlan, Software Architecture Perspectives on an Emerging Discipline, Pearson Education India, Edition I				
2. Eric Evans, Domain Driven Design Tackling Complexity in The Heart of Software, Kindle, Edition I				
Suggested Readings				
1. Len Bass, Paul Clements, Rick Kazman, Software Architecture in Practice, Pearson Education India Edition III.				
2. Vaughn Vernon, Domain-Driven Design Distilled, Addison-Wesley, Edition I				
Web Resources				
1. https://www.tutorialspoint.com/software_architecture_design/introduction.htm				
2. https://www.wisdomjobs.com/e-university/software-architecture-and-design-tutorial-2531/software-architecture-				

Course Outcomes (COs) and Cognitive Level Mapping

UCS 6501 SOFTWARE ARCHITECTURE (MC)		COGNITIVE LEVEL
CO 1	To identify the factors that influence the structure of a software and describe the software components.	K1, K2
CO 2	To administer well-laid architecture which reduces the business risks.	K3
CO 3	To analyze technical solutions for the software architecture	K4
CO 4	To evaluate domain driven design for architectural problems.	K5
CO 5	To develop process control blocks for instrumentation and mobile robotics.	K6

Course Code	UCS 6502
Course Title	MOBILE APP DEVELOPMENT LAB
Credits	06
Hours/Week	06
Category	Major Core (MC) – Lab
Semester	VI
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course introduces programming techniques, design and development related to mobile applications. 2. It familiarizes various concepts of mobile programming across platforms. 3. It also utilizes rapid prototyping techniques to design and develop sophisticated mobile interfaces. 4. This course gives practical knowledge to develop and deploy Android applications. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the basics of the Android platform. 2. To acquire knowledge on user interface design to develop frameworks. 3. To develop skills in creating drawables and animation. 4. To implement the Android platform with a database. 	
Prerequisites	Programming skills in JAVA.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introducing Android: The Android platform, Understanding Java and DVM (Dalvik Virtual Machine), The layers of android, The Intent of Android development, Four kinds of Android components, Understanding Android Manifest.xml file, Creating an Android application. Android's development Environment: Introducing SDK, Using the Android emulator, Debugging your application. 1. To make use of form widgets. 2. To make use of Text fields. 3. Design your UI with view.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	User interfaces: Creating the activity, Working with views, Using Resources. Android Framework Overview: XML, APK file, Screen Layout Design: Views and Layouts: Android view hierarchies, Defining screen layouts using XML. 4. Apply all the layouts to your design. 5. Create images in your application. 6. Make use of intents.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	UI Design: Buttons, Menus and Dialogs: Using Android UI elements, using menus in Android, Adding Dialogs. An introduction to Graphics Resources in Android: Introducing the Drawables, Using bit map images and creating Animation. 7.Create Date and Time widgets in your application. 8. Create database in your application. 9.To create an application with graphical images.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
IV	Understanding Content Providers: Defining content provider, Working with a Database. Understanding Intents and Intent Filters: Using Intents with activities, Using Intents with broadcast receivers. 10.Create a Web View. 11.Create an application by sending SMS from your device. 12.Create a simple app for Registration form.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
V	Telephony: Exploring telephony background ,Accessing telephony information, working with messaging, Notifications and Alarms, Drawing Graphics in Android, Capturing media. 13.Create a Blood bank app. 14. Create an Android application to navigate to web page, send sms, and email using filters. 15. To make use of Image switcher and Progress bar.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6

Text Books

1. W.Frank Ableson , Robi Sen Chris King,2013. Android in action, DreamTech.
2. Wallace Jackson, 2013. Android apps for absolute beginners,Apress.

Suggested Readings

1. Lauren Darcey and Shane Conder, 2011. Android Wireless Application Development, Pearson Education.
2. Erik Hellman, 2014. Android programming-Pushing the limits, Wiley India Pvt Ltd.
3. Mark L. Murphy, 2015. Beginning Android, Wiley India Pvt Ltd.

Web Resources

1. <https://www.cin.ufpe.br/~tfl2/artificial-intelligence-modern->
2. <https://mitpress.mit.edu/books/introduction-ai-robotics-second-edition>
3. http://www.mech.sharif.ir/c/document_library/get_file?uuid=5a4bb247-1430-4e46-942c-

Course Outcomes (COs) and Cognitive Level Mapping

UCS 6502 MOBILE APP DEVELOPMENT LAB (MC)		COGNITIVE LEVEL
CO 1	To enumerate and understand the concepts of JAVA and DVM platform	K1, K2
CO 2	To apply the activities in the android framework to develop mobile applications.	K3
CO 3	To analyze the working of UI elements and resources	K4
CO 4	To recommend the role of the database for the android platform	K5
CO 5	To devise and plan the role of communication among wireless gadgets	K6

Course Code	UCS 6503
Course Title	PROJECT
Credits	06
Hours/Week	06
Category	Major core (MC)
Semester	VI
Regulation	2019
Course Overview	
<ol style="list-style-type: none"> 1. This course implements major software engineering techniques and position them to lead and develop applications. 2. It also aims to implement programming skills for solving real-time problems. 3. It enables resource utilization, scheduling, and evaluation. 4. It focuses on documentation and presentation of the project progress on par with Industry standards. 	
Course Objectives	
<ol style="list-style-type: none"> 1. To build a new software system based on theory and practical skills. 2. To gain knowledge about various domains, platforms, and software developing environments. 3. To gain confidence in conceptualization, design, and implementation of a working software project. 4. To be accustomed to the various methods and techniques used for effective project management. 	
Prerequisites	Good programming skills.

Course Outcomes (COs) and Cognitive Level Mapping

UCS 6503 PROJECT (MC)		Cognitive Level
CO 1	To identify and understand the real-world problem for application development.	K1, K2
CO 2	To apply a standard model in a necessary environment.	K3
CO 3	To classify the relationships among scheduling and planning process.	K4
CO 4	To appraise and measure the development and implementation process.	K5
CO 5	To validate and manage the developed software.	K6

Course Code	UCS 6701
Course Title	ADVANCED JAVA PROGRAMMING
Credits	5
Hours/Week	6
Category	Major Core (MC)
Semester	VI
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course helps to understand the basic and advanced concepts in Java. 2. It elucidates the network programming, remote and distributed environment. 3. It explicates different technologies like Servlet, JDBC, JSP. 4. It provides in-depth knowledge to develop Enterprise Level Applications. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the components of user interface design using swings. 2. To familiarize network programming and RMI in java. 3. To explore the concepts of JDBC for database connectivity. 4. To develop enterprise level applications. 	
Prerequisites	Basic knowledge in programming.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	JAVA FUNDAMENTALS Java Input output streaming–filter and pipe streams–Byte Code interpretation – Multithreading–Thread methods-thread priority- Synchronization- thread using runnable interface – Java Swing -Swing components.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
II	NETWORK PROGRAMMING IN JAVA Sockets–secure sockets - custom sockets-UDP datagrams – multicast sockets –URL classes– Reading Data from the server –writing data – configuring the connection –Reading the header – telnet application - Java Messaging services.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
III	APPLICATION IN DISTRIBUTED ENVIRONMENT Remote Method Invocation – Setting up Remote Method Invocation – RMI with Applets - Networking Basics – The Networking Classes and Interfaces – Inet Address – Inet4 Address and Inet6Address -TCP/IP Client sockets – URL – URL Connection – Http URL Connection.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
IV	MULTI TIER APPLICATION DEVELOPMENT JDBC settings – JDBC Driver Types – JDBC Packages – Overview of JDBC Process – Database Connection – Servlet: Life Cycle of a Servlet – Java Applet-Simple Servlet – The Servlet API -Servlet Concept –Servlet Package – Reading Servlet Parameters- Handling HTTP Request and Responses.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6
V	JSP & JAVA BEANS Java Server Pages: Introduction -simple java server page-scripting-Directives–introduction to J2EE- Java Bean – Advantages of Java Beans – Enterprise java beans -session beans-Entity beans-Persistent entity beans-Transactions.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,K6

Text Books

1. Herbert Schildt,” Complete Reference: Java2”, McGraw-Hill Education, 2017, 5thedition.
2. Cay S. Horstmann, “Core Java, Volume II--Advanced Features” ,Pearson, 2019 11th edition..
3. Ed Roman,Rima Patel Sriganesh,Gerald Brose,” Mastering Enterprise java Beans”, John Willey & Sons Inc, 2004,3rd Edition.

Suggested Readings

1. S.Padmapriya.” Advanced Java Programming”, Sree Magnus Publications ,2010, 1st edition.
2. Elliotte Rusty Harold,” Java Network Programming”, O’Reilly Publishers, 2002.

Web Resources

1. <https://javarevisited.blogspot.com/>
2. <https://www.tutorialspoint.com/java/>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 6701 ADVANCED JAVA PROGRAMMING (MC)		COGNITIVE LEVEL
CO 1	To acquire knowledge in java fundamentals such as I/O, multithreading, swing components.	K1, K2
CO 2	To analyze network programming requirements specifications for different making communication among different computers.	K3
CO 3	To develop skills in basic design in distributed environment and RMI	K4
CO 4	To apply different techniques to establish connectivity between frontend and backend using JDBC	K5
CO 5	To ability to define and develop Enterprise Applications using servlets, JSP& Java Beans.	K6

Course Code	UCS 6706
Course Title	ADVANCED JAVA PROGRAMMING - LAB
Credits	5
Hours/Week	6
Category	Major Core (MC)
Semester	VI
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course helps to understand the basic and advanced concepts in Java. 2. It elucidates the network programming, remote and distributed environment. 3. It explicates different technologies like Servlet, JDBC, JSP. 4. It provides in-depth knowledge to develop Enterprise Level Applications. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the components of user interface design using swings. 2. To familiarize network programming and RMI in java. 3. To explore the concepts of JDBC for database connectivity. 4. To develop enterprise level applications. 	
Prerequisites	Basic knowledge in programming.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	1. Create threads using Thread class and Runnable interface. 2. Set the priority for the threads. 3. Design a Graphical User Interface using SWING.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
II	4. Reading and writing data in the server. 5. Implement telnet concept. 6. Implement Java Messaging Service.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
III	7. Implement Remote Method Invocation. Implement internet Programming using Java	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
IV	8. Implement Database connectivity for data manipulation. 9. Create a simple web application using Servlet.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
V	10. Create a simple application using Java Server Page. 11. Creat a Web application using Session, Entity and Message Druven Bean.	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
Text Books				
1. Herbert Schildt,” Complete Reference: Java2”, McGraw-Hill Education, 2017, 5 th edition. 2. Cay S. Horstmann, “Core Java, Volume II--Advanced Features” ,Pearson, 2019 11 th edition.. 3. Ed Roman,Rima Patel Sriganesh,Gerald Brose,” Mastering Enterprise java Beans”, John Willey & Sons Inc, 2004,3 rd Edition				
Suggested Readings				
1. S.Padmapriya.” Advanced Java Programming”, Sree Magnus Publications ,2010, 1 st edition. 2. Elliotte Rusty Harold,” Java Network Programming”, O’Reilly Publishers, 2002.				
Web Resources				
1. https://javarevisited.blogspot.com/ 2. https://www.tutorialspoint.com/java/				

UCS 6706 ADVANCED JAVA PROGRAMMING – LAB (MC)		COGNITIVE LEVEL
CO 1	To acquire knowledge in java fundamentals such as I/O, multithreading, swing components.	K1, K2
CO 2	To analyze network programming requirements specifications for different making communication among different computers.	K3
CO 3	To develop skills in basic design in distributed environment and RMI.	K4
CO 4	To apply different techniques to establish connectivity between frontend and backend using JDBC.	K5
CO 5	To ability to define and develop Enterprise Applications using servlets, JSP& Java Beans.	K6

Course Code	UCS 6702
Course Title	DATA SCIENCE USING PYTHON
Credits	5
Hours/Week	6
Category	Major Skill (MS) – Theory
Semester	VI
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. Data science deals with huge volume of data, discover unseen patterns, derive meaningful information, and make business decisions. 2. This course covers complex machine learning algorithms to build predictive models using python. 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	
<ol style="list-style-type: none"> 1. To understand the various techniques and concepts of Data Science. 2. To employ the Python libraries for Data manipulation. 3. To apply principles of Data Science to analyze business problems. 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	IPython: Beyond Normal Python – Help and Documentation in Ipython – Input and Output History. Introduction to NumPy: Understanding Data Types in Python - The Basics of NumPy Arrays - Aggregations: Min, Max, and Everything in Between- Computation on Arrays: Broadcasting - Comparison , Masks and Boolean Logic – Fancy Indexing - Sorting Array – Structured Data: NumPy’s Structured Arrays.	18	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: Concat and Append - Merge and Join – Aggregation and Grouping - Pivot Table – Working with Time series – High performance Pandas.	18	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 Colorbars- Multiple Subplots - Text and Annotation - Customizing Ticks – Customizing Matplotlib: Configuration and style sheets – Three Dimensional plotting in Matplotlib - Visualization with Scaborn.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
IV	Machine Learning: Introduction to Machine Learning – Introducing Scikit – Learn. Supervised Learning: Classification and Regression – Generalization, Overfitting and Underfitting. Supervised Machine Learning Algorithms: Some simple Datasets –k – Nearest Neighbors – Linear models –Naïve Bayes Classification –Decision Trees – Ensembles of Decision Trees. Model Evaluation and Improvement : Cross Validation –Evaluation Metrics and Scoring.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
V	Unsupervised Learning: Types of Unsupervised Learning – Challenges in Unsupervised Learning – preprocessing and scaling. Clustering:K- Means Clustering – Agglomerative Clustering – DBSCAN – Comparing and Evaluating Clustering Algorithms.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6

Text Books

1. Jake VanderPlas, Python Data Science Handbook - Essential Tools for Working with Data, O'reilly, First edition, 2016
2. Jiawei Han, Micheline Kamber, Jian Pei. Data Mining Concepts and Techniques, Morgan Kaufmann Publishers, Third edition, 2012.

Suggested Readings

1. Samir Madhavan, Mastering Python for Data Science, PACKT Publishing, First edition, 2015
2. Joel Gurus, Data science from Scratch, O'reilly, First edition, 2015

Web Resources

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

Course Outcomes (COs) and Cognitive Level Mapping

UCS 6702 DATA SCIENCE USING PYTHON (MS)		COGNITIVE LEVEL
CO 1	To describe and understand the concepts of Data Science.	K1, K2
CO 2	To implement Data Visualization and Machine Learning Techniques.	K3
CO 3	To analyze the various Data Science techniques, supervised and unsupervised learning algorithms.	K4
CO 4	To compare the performance of various data mining algorithms.	K5
CO 5	To propose solutions for real world problems using huge volume of data.	K6

Course Code	UCS 6707
Course Title	DATA SCIENCE USING PYTHON - LAB
Credits	5
Hours/Week	6
Category	Major Skill (MS) – Lab
Semester	VI
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. Data science is used to extract knowledge and derive meaningful information to take business decisions. 2. This course implements machine learning algorithms to build predictive models using the Python Programming language. 3. It enables better decision making, predictive analysis, visualization and pattern discovery. 4. It also explains the basics of Python and the fundamental libraries like Numpy, Pandas, Matplotlib and SciKit-learn. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the various techniques and concepts of Data Science. 2. To employ the Python libraries for Data manipulation. 3. To apply principles of Data Science to analyze decision making problems. 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	1. Exercise to implement Arrays. 2. Exercise to manipulate data. 3. Exercise to visualize the data.	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
II	4. Exercises to load dataset into sci-kit learn 5. Exercise to extract features from datasets 6. Exercise to implement Regression	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
III	7. Exercise to implement k – Nearest Neighbors Classification 8. Exercise to implement Naïve Bayes Classification 9. Exercise to implement Decision Trees Classification	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
IV	10. Exercise to implement Ensembles of Decision Trees 11. Exercise to implement K- Means Clustering 12. Exercise to implement Agglomerative Clustering	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
V	13. Exercise to implement DBSCAN Clustering 14. Exercises for Model selection and evaluation	18	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
Text Books				
1. Jake VanderPlas , Python Data Science Handbook - Essential Tools for Working with Data, O’relly, First edition, 2016 2. Jiawei Han, Micheline Kamber, Jian Pei. Data Mining Concepts and Techniques, Morgan Kaufmann Publishers, Third edition, 2012.				
Suggested Readings				
1. Samir Madhavan, Mastering Python for Data Science, PACKT Publishing, First edition, 2015. 2. Joel Gurus , Data science from Scratch, O’relly, First edition, 2015.				
Web Resources				
1. https://www.tutorialspoint.com/python_data_science/index.htm 2. https://realpython.com/tutorials/data-science/ 3. https://cognitiveclass.ai/learn/data-science-with-python				

Course Outcomes (COs) and Cognitive Level Mapping

UCS 6707 DATA SCIENCE USING PYTHON LAB (MS)		COGNITIVE LEVEL
CO1	To describe and understand the basic concepts of Python	K1, K2
CO2	To implement the Data Science techniques in python	K3
CO3	To apply the various Data Science techniques, supervised and unsupervised learning algorithms in Python.	K4
CO4	To compare the various machine learning algorithms in Python	K5
CO5	To create and evaluate machine learning models to solve real world problems using Python.	K6

Course Descriptors (Offered to other Departments)

Course Code	UCS 3401
Course Title	DATA ANALYSIS USING MS-EXCEL
Credits	03
Hours/Week	5
Category	Allied Optional (AO)
Semester	III
Regulation	2019
COURSE OVERVIEW <ol style="list-style-type: none">1. Data analysis deals with the process of inspecting, cleansing, transforming, modelling data to discover useful information, suggesting conclusions and supporting decision making.2. The course aims to give basic knowledge of MS Excel with statistical applications.3. It helps to understand the operations, functions in MS Excel and statistical measures.4. It elucidates the different charts, usage of tables and mathematical problems.	
COURSE OBJECTIVES <ol style="list-style-type: none">1. To understand the significance of MS Excel.2. To know the various operations and functions in MS Excel.3. To explore the functionalities of charts, tables and statistical measures.4. To understand the basics in visualization and interpretation of charts and Tables.	
Prerequisites	Basic knowledge in computers.

SYLLABUS

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p>Introduction to MS Excel: MS Excel Options – Ribbon - Sheets - Saving Excel File as PDF, CSV and Older versions - Using Excel Shortcuts - Copy, Cut, Paste, Hide, Unhide, and Link the Data in Rows, Columns and Sheet - Using Paste Special Options - Formatting Cells, Rows, Columns and Sheets - Protecting & Unprotecting Cells, Rows, Columns and Sheets with or without Password - Page Layout and Printer Properties – Equations.</p> <p>1. Implement the basic operation of MS Excel.</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
II	<p>Functions: Logical Functions - Date and Time Functions - Information Functions -Math and Trigonometry Functions - Statistical Functions - Text Functions.</p> <p>2. Manipulate data with logical Functions. 3. Manipulate data with Date and Time Functions. 4. Manipulate data with Math and Trigonometry Functions. 5. Manipulate data with Information and Text Functions. 6. Implement the Equation editor.</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
III	<p>Charts: Simple Bar Chart – Multiple Bar Chart – Subdivided Bar Chart – Pie Chart – Donut Chart - Line Chart – Histogram – Scatter Plot - Radar Chart – Bubble Chart – BiAxis chart.</p> <p>7. Visualize the data with various types of charts. 8. Apply Conditional formatting</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
IV	<p>Lookup functions, Index, Address, Match, Offset, Transpose - Conditional Formatting - Data Sorting and Filtering. Pivot Tables – Chart Templates.</p> <p>9. Implement Vlookup. 10. Implement Hlookup. 11. Implement match and Offset. 12. Implement sorting concepts. 13. Execute filtering concepts. 14. Create pivot tables.</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6
V	<p>Statistical measures – Mean, Median, Mode, Variance, Percentiles, Quartiles - Pearson correlation – Spearman’s Rank correlation - Recording Macro.</p> <p>15. Calculate mean, median, mode and percentile. 16. Measure correlation and rank correlation. 17. Create macros.</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4, K5,k6

Text Books

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

Suggested Readings

1. Wayne L Winston, “Microsoft Excel 2010 Data Analysis and Business Modeling Paperback”, Prentice-Hall of India Pvt. Ltd, Third Edition, 2011.
2. Bernd Held.” Excel Functions and Formulas Paperback”, Word ware Publishing, Second Edition, 2015.

Web Resources

1. <https://www.educba.com/data-analysis-tool-in-excel/>
2. <https://www.contextures.com/PowerPivot-for-Excel-2010-Lab.html>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 3401 DATA ANALYSIS USING MS-EXCEL (AO)		COGNITIVE LEVEL
CO 1	To identify and understand basic operations and functions of MS-Excel.	K1, K2
CO 2	To apply and examine different formatting features and mathematical operations.	K3
CO 3	To explore the possibilities of data representation and visualization.	K4
CO 4	To explain and evaluate statistical measures and its applications.	K5
CO 5	To create solutions to solve business problems.	K6

Course Code	UCS 3402
Course Title	DIGITAL MARKETING LAB
Credits	03
Hours/Week	05
Category	Allied Optional (AO)
Semester	III
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. Digital Marketing is the promotion of brands to connect with potential customers using Internet and other forms of communication. 2. This course gives in-depth knowledge of digital marketing strategies. 3. It also explores various tools to implement different types of digital marketing techniques. 4. It explains the Search engine optimization, email campaign etc., 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the fundamentals of digital marketing strategies. 2. To focus on the creation of websites using Word Press. 3. To explore the various tools and features in content creation. 4. To familiarize with creating and customizing YouTube channels. 	
Prerequisites	Basic knowledge in Internet.

SYLLABUS				
UNIT	CONTENT	HOURS	Cos	COGNITIVE LEVEL
I	Introduction of the digital marketing - Digital vs. traditional Marketing - Digital Marketing Channels – Digital Marketing Budgeting- resource planning- cost estimating- cost budgeting- cost control. 1. Installation of word press and usage of themes 2. Creation of a website using word press.	13	CO1 CO2 CO3 CO4 CO5	K1, K2,K3, K4,K5, K6
II	Internet Marketing and Digital Marketing Mix – Internet Marketing, opportunities and challenges; Web design - Optimization of Web sites - Content Marketing; Tools to create and manage content and blog. 3. Usage of Google Analytics and creation of an account. 4.Content creation (Presentation / Videos/ Poster)	13	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
III	Introduction of Social Media Marketing- Facebook Marketing: Business through Facebook Marketing, Creating Advertising Campaigns, Facebook Marketing Tools. Linkedin Marketing: Framing Linkedin Strategy- Twitter Marketing: Twitter Advertising Campaigns - Instagram and Snapchat: - Digital Marketing Strategies through Instagram and Snapchat. 5.Social Media Account 6.Email marketing – Developing email campaign	13	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
IV	Mobile Marketing: Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics- E-mail marketing- E-mail marketing plan- E-mail marketing campaign analysis - Keeping up with conversions. 7. Search engine optimization 8. Google Adwords 9.Youtube channel creation	13	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
V	YouTube content Marketing :Creating business accounts on YouTube • YouTube Advertising - YouTube Analytics - Introduction to SEO, SEM, Web Analytics - SEO Optimization - Writing the SEO content-Web Analytics: Google Analytics and Google Ad Words. 10. Customizing YouTube channel. 11. Uploading videos.	13	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
Text Books				
1. Puneet Singh Bhatia, 2017. Fundamentals of Digital Marketing, 1 st Edition, Pearson Publication.				
2. Shiwani Karwal, 2015. 2. Digital Marketing Handbook: A Guide to search engine optimization, Pay per click marketing, Email Marketing and Content Marketing, 1 st Edition, Create Space Independent Publishing platform.				

Suggested readings

1. Damian Ryan, Understanding Digital Marketing: Marketing Strategies for engaging the Digital Generation, 4th Edition, Kogan page publication, 2017.
2. Puneet Singh Bhatia, Fundamentals of Digital Marketing, 2nd Edition, Pearson Education, 2019.

Web Resources

1. <https://www.digitalmarketer.com/digital-marketing/assets/pdf/ultimate-guide-to-digital-marketing.pdf>
2. <https://www.webmarketingacademy.in/beginners-guide-to-digital-marketing-with-resources/>
3. https://www.mediakings.com.au/wp-content/uploads/2014/05/Ian_Dodson_-
4. <https://neilpatel.com/what-is-digital-marketing/>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 3402 DIGITAL MARKETING LAB (AO)		COGNITIVE LEVEL
CO 1	To describe and understand the key elements of a digital marketing strategy.	K1, K2
CO 2	To implement Search Engine Optimization tools and digital marketing concepts.	K3
CO 3	To analyze and interpret content creation, email marketing and advertising.	K4
CO 4	To explain the design of social media account using digital marketing tools.	K5
CO 5	To create online campaigns and YouTube channels using digital marketing strategies.	K6

Course Code	UCS 3801
Course Title	INTRODUCTION TO DATA ANALYTICS
Credits	02
Hours/Week	3
Category	Non Major Elective (NME)
Semester	III
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. Data analysis deals with the process of inspecting, cleansing, transforming, modelling data to discover useful information, suggesting conclusions and supporting decision making. 2. The course aims to give basic knowledge of MS Excel with statistical applications. 3. It helps to understand the operations, functions in MS Excel and statistical measures. 4. It elucidates the different charts, usage of tables and mathematical problems. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the significance of MS Excel. 2. To know the various operations and functions in MS Excel. 3. To explore the functionalities of charts, tables and statistical measures. 4. To understand the basics in visualization and interpretation of charts and Tables. 	
Prerequisites	Basic knowledge in computers.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to MS Excel: MS Excel Options – Ribbon - Sheets - Saving Excel File as PDF, CSV and Older versions - Using Excel Shortcuts - Copy, Cut, Paste, Hide, Unhide, and Link the Data in Rows, Columns and Sheet - Using Paste Special Options- Formatting Cells, Rows, Columns and Sheets, Protecting & Unprotecting Cells, Rows, Columns and Sheets with or without Password. 1. Implement the basic operations of MS Excel.	09	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
II	Functions: Logical Functions - Date and Time Functions - Information Functions -Math and Trigonometry Functions - Statistical Functions - Text Functions. 2. Manipulate data with Date and Time Functions. 3. Manipulate data with Logical and Math Functions. 4. Implement match and Offset	09	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
III	Charts: Simple Bar Chart – Multiple Bar Chart – Subdivided Bar Chart – Pie Chart – Donut Chart - Line Chart – Histogram – Scatter Plot - Radar Chart – Bubble Chart – BiAxis chart. 5. Visualize the data with various types of charts. 6. Apply Conditional formatting on data.	09	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
IV	Create and format tables, Sort data in a table, Filter data in a table. Lookup function, Index, Address, Match, Offset, Transpose - conditional Formatting - Data Sorting and Filtering 7. Implement Vlookup and Hlookup. 8. Implement sorting and filtering concepts.	09	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
V	Pivot Tables - Chart Template, Statistical measures – Mean, Median, Mode, Variance, Percentiles. 9. Create pivot tables. 10. Calculate mean, median, mode and percentile.	09	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6

Text Books

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

Suggested Readings

1. Wayne L Winston, Microsoft Excel 2010 Data Analysis and Business Modeling Paperback, Prentice-Hall of India Pvt. Ltd, Third Edition, 2011.
2. Bernd Held." Excel Functions and Formulas Paperback", Word ware Publishing, Second Edition, 2015.

Web Resources

1. <https://www.educba.com/data-analysis-tool-in-excel/>
2. <https://www.contextures.com/PowerPivot-for-Excel-2010-Lab.html>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 3801 DATA ANALYSIS USING MS-EXCEL(AO)		COGNITIVE LEVEL
CO 1	To identify and understand basic operations and functions of MS-Excel.	K1, K2
CO 2	To apply and examine different formatting features and mathematical operations.	K3
CO 3	To explore the possibilities of data representation and visualization.	K4
CO 4	To explain and evaluate statistical measures and its applications.	K5
CO 5	To create solutions to solve business problems.	K6

Course Code	UCS 4402
Course Title	SOFTWARE TESTING LAB
Credits	03
Hours/Week	05
Category	AO- Lab
Semester	IV
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course provides the knowledge on the fundamentals of software testing. 2. It aims to introduce analysis techniques for testing. 3. It also reviews on important phases of testing. 4. It emphasizes the significance of each phase of testing. 5. It explains implementation techniques to locate software defects. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To introduce the construction of test cases. 2. To explore and implement the boundary value analysis. 3. To focus on the features of testing tools. 4. To test a given application using HP-UFT, IBM Rational Functional tester, Selenium QTP and HP tools. 	
Prerequisites	Basic knowledge on software engineering.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p>Fundamentals of Testing - Objectives of Testing - Fundamental Test Process - Test planning- Structured approach to testing Test Factors and Eleven Steps for software tests processes - Defect Analysis and Prevention Strategies.</p> <p>1. For the given application design adhoc test cases to test the system. Design the test cases to test the given system using following Black Box testing</p> <p>2. technique:</p> <p>a. Boundary Value Analysis, Worst Boundary Value Analysis, Robust Boundary Value Analysis, Robust Worst Boundary Value Analysis</p> <p>b. Equivalence class testing (Input/Output domain)</p> <p>c. Decision table and cause-effect graph</p>	10	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
II	<p>Test Case Design Strategies - White Box Strategies - Black Box Testing Strategies - Evaluating test adequacy criteria - Case Studies-“Applying the suitable White Box Strategy and the suitable Block Box Strategy.</p> <p>3. Design the test cases to test the given system using following Black Box testing technique:</p> <p>a. Equivalence class testing (Input/Output domain)</p> <p>b. Decision table and cause-effect graph</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
III	<p>Levels of Testing - Unit Testing - Integration Testing - Role of use cases in testing - Internationalization testing - Testing Documentation plan - Recording test cases - Reporting and Measurement of Success.</p> <p>4. For a given program segment using tool</p> <p>a. Draw the control flow graph</p> <p>b. Determine the cyclomatic complexity</p> <p>c. Determine the independent paths</p> <p>d. Generate the test cases for each independent path How many tests are required for 100% decision coverage? Give the test cases.</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6

IV	<p>Test Automation - Software Test Automation - Skills and Scope Design and Architecture for Automation - Requirements for a test tool. Perform functional testing for the given application/project using the testing tool</p> <p>5. Perform functional testing for the given application/project using the testing tool</p> <p>6. Perform web testing for the given application/project using the testing tool</p> <p>7. Perform load testing for the given application/project using the testing tool</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
V	<p>Test Management and Defect Analysis - Infrastructure Management, Test People -Test Plan Components, Test Plan Attachments - Test Analysis report Documentation - Analyze reports - Problem tracking - Controlling and Monitoring Test Progress.</p> <p>8. Perform bug tracking for the given application/project using tool</p> <p>9. Perform test management for the given application/project using testing tool</p>	20	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6

Text Books

1. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing – Principles and Practices, Pearson Education, 1st Edition 2006.

Suggested Readings

1. Ron Patton, Software Testing, Sams Publishing, 5nd Edition 2007.
2. Yogesh singh, Software Testing, Cambridge University Press, 1st Edition 2012.

Web Resources

1. <https://www.qasymphony.com/blog/100-plus-best-software-testing-tools/>
2. <https://netbeans.org/kb/docs/java/junit-intro.html>
3. <https://www.edureka.co/blog/what-is-selenium/>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 4402 SOFTWARE TESTING LAB (AO)		COGNITIVE LEVEL
CO 1	To define and understand the basic process of testing a software.	K1, K2
CO 2	To explain the concepts of software testing, its types and test cases.	K3
CO 3	To apply more testing features and testing tools.	K4
CO 4	To evaluate various testing strategies.	K5
CO 5	To create solutions with international Quality standards.	K6

Course Code	UCS 4401
Course Title	JAVA PROGRAMMING
Credits	03
Hours/Week	05
Category	AO – Lab
Semester	IV
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course deals with the fundamentals of object oriented concepts in Java Programming. 2. It facilitates to develop simple Java applications. 3. It focuses on the effective usage of reusability. 4. It explores and implements Exception handling. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the principles of object-oriented programming. 2. To acquire knowledge on optimal usage of interfaces and packages. 3. To utilize the error handling features in Java. 4. To apply the programming techniques in solving real world problems. 	
Prerequisites	Basic knowledge in programming.

SYLLABUS

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p>Fundamentals of Object Oriented Programming - Simple java program-More of java-An application with two classes-java program structure-java tokens-java statements- Implementing a java program-java virtual machine- Command line argument. Constants- Variables-Data Types -type casting.</p> <p>Exercises:</p> <p>1. Write Java Programs using data types and operators.</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
II	<p>Operators and Expressions - Decision Making and Branching - Decision Making and Looping statements.</p> <p>Exercises:</p> <p>2. Write a Java Program using Control Structures.</p> <p>3. Write a Java Program to demonstrate looping statements</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
III	<p>Classes, Objects and Methods - Constructors- Methods overloading- Static Members – Inheritance - Overriding methods-Final variable and methods-Final Class-Finalizer methods.</p> <p>Exercises:</p> <p>4. Write a Java Program using classes and objects.</p> <p>5. Write a Java Program using method over loading.</p> <p>6. Write a Java Program using method overriding.</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
IV	<p>Arrays - Strings - Abstract methods and classes – Interfaces: Multiple Inheritance - Defining Interface- Extending Interface- Implementing Interface- Accessing Interface Variable Exercises:</p> <p>7. Write a java program to handle strings.</p> <p>8. Write a Java Program using Abstract classes.</p> <p>9. Write a Java Program using Interfaces to implement multiple inheritance.</p>	15	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6

V	Packages: Putting Classes Together. Exception Handling: Exceptions - Exception Handling Code- Multiple Catch Statements- Using Finally-Throwing our own Exceptions. Exercises: 10. Create and import a package in Java. 11. Write a Java Program to handle Built- in Exceptions. 12. Write a Java Program to handle user defined Exceptions	15	CO1 CO2 CO3 CO4 CO5	K1, K2, K3, K4, K5, K6
---	--	----	---------------------------------	---------------------------

Text Books

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

Suggested Readings

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

Web Resources

1. <https://beginnersbook.com/java-tutorial-for-beginners-with-examples/>
2. <https://www.w3schools.com/java/>

Course Outcomes (COs) and Cognitive Level Mapping

UCS 4401 JAVA PROGRAMMING (AO)		COGNITIVE LEVEL
CO 1	To describe and understand the fundamentals of object-oriented programming concepts in Java.	K1, K2
CO 2	To implement the programming concepts in Java.	K3
CO 3	To explore programming constructs with objects, classes and inheritance.	K4
CO 4	To evaluate the application of packages and interfaces.	K5
CO 5	To create solutions for the real world problems.	K6

Course Code	UCS 4801
Course Title	PC TROUBLE SHOOTING
Credits	02
Hours/Week	03
Category	NON MAJOR ELECTIVE
Semester	IV
Regulation	2019
COURSE OVERVIEW	
<ol style="list-style-type: none"> 1. This course deals with the fundamentals of troubleshooting techniques. 2. It focuses on installation of system software, identification and resolving hardware problems. 3. It aims to assess the existing configuration of the computers and peripherals. 4. It familiarizes on PC assembling and maintenance. 	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. To understand the components of PC. 2. To acquire knowledge on the functionalities of motherboard, CPU and RAM. 3. To explore the various issues and perform troubleshooting. 4. To gain competence to solve common PC problems and configure necessary softwares. 	
Prerequisites	Basic knowledge on Computer system and its peripherals.

SYLLABUS				
UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p>Motherboard: Motherboard Controllers and System Resources, I/O System Bus: ISA, MCA, ELSA, VESA local bus, PCI, AGP, PCIX, Onboard I/O devices, Chipsets, ROM BIOS, ROM POST, CMOS settings, Motherboard Form factor: AT and ATX Motherboard, LPX and NLX form factor.</p> <p>1. Identify Major Components of Motherboard 2. Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards. 3. Configure BIOS setup program and troubleshoot the typical problems using BIOS utility.</p>	5	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
II	<p>Device Drives and Peripherals: Magnetic Storage: Reading/Writing, hard disk drives, Floppy disk drives, Optical Storage devices: CD-ROM drive, DVD-ROM drive, Keyboard: layouts, interfaces, Pointing devices, Mouse, Monitors, Printers, Troubleshooting of device drivers and peripherals.</p> <p>4. Front panel indicators & switches and Front side & rear side connectors. 5. Install Hard Disk and configure to the Pc's 6. Identify Common Peripheral ports, associated Ncables and their connectors.</p>	6	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
III	<p>OPERATING COMPUTER USING GUI BASED OPERATING SYSTEM: Introduction, Objectives, Basics of Operating System: Operating system, Basics of popular operating system (LINUX, WINDOWS).</p> <p>7. Assemble a system with add on cards, check the working condition of the system, and install OS, Hard Disk Formatting. 8. Operating System Setup and Installations. 9. Operating System Setup and Installations.</p>	6	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
IV	<p>The User Interface: Task Bar, Icons, Menu, Running an Application. Installation of Dual Operating System, Changing System Date And Time, Changing Display Properties, To Add Or Remove A Windows Component, Changing Mouse Properties, Adding and removing Printers. File and Directory Management: Creating and renaming of files and directories, Common utilities.</p> <p>10. Install and Configure Dual OS Installation. 11. Printer Installation and Servicing and troubleshoot 12. Download and install software from internet.</p>	6	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6

V	Interfaces and I/O Ports: Floppy Disk interface: Controller, Power cable, Control/Data cable, IDE interfaces: ATA standards, Master/Slave Configuration, Data transfer modes, SCSI interface: Bus, Standards, Hardware's, which is better SCSI or IDE, Serial ports, Parallel ports, USB, Troubleshooting. 13. Troubleshooting motherboard. 14. Troubleshooting the serial port. 15. Troubleshooting printer problem.	7	CO1 CO2 CO3 CO4 CO5	K1,K2,K3, K4,K5,K6
Text Books 1. PC Maintenance, Troubleshooting and Tools , Anonymous, John Wiley & Sons, Firstedition, 2018. 2. Troubleshooting & Maintaining Your PC All-in-One for Dummies, Dan Gookin, Wiley,Third Edition, 2017.				
Suggested Readings 1. PC Troubleshooting Pocket Book, Howard Anderson and Mike Tooley, Newnes, Third edition, 2003. 2. How computers work and what to do when they don't, G. Mathew R Barker, 2019.				
Web Resources 1. https://swayam.gov.in/nd2_cec20_cs11/ 2. https://www.udemy.com/ 3. https://alison.com/course/comptia-a-1000-part-1				

Course Outcomes (COs) and Cognitive Level Mapping

UCS 4801 PC TROUBLE SHOOTING (NME)		COGNITIVE LEVEL
CO 1	To understand and recognize the computer components.	K1,K2
CO 2	To apply the acquired skills to configure system softwares.	K3
CO 3	To analyze the troubleshooting techniques of computer system.	K4
CO 4	To support installation and maintenance of computer system.	K5
CO 5	To report various types of errors and find the strategies to fix them.	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
UCA 5503 Visual Programming (MC)

III BSC

Time: 3.00 pm to 4.30 pm

23.08.2021

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.	Summarise the .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-General Languages.

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.

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI 60034
Department of Computer Science
END SEMESTER EXAMINATION, NOVEMBER 2021
UCA5503 Visual Programming (MC)

III BSC
Duration: 3 hrs

15.11.2021
Max. Marks: 100

SECTION A			
Answer ALL			
1.	Multiple Choice Questions	(5 x 1 = 5 Marks)	
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) Data Adapter iv) Data Query	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 = 5 Marks)	
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)	_____ SqlCommand 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 = 10 Marks)	
a)	List out the different types of applications that can be created on .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 in 150 words		(2 x 10 = 20 Marks)	
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 in ASP.NET. b) Explain the compilation procedure of ASP.NET.	K3	CO2
SECTION C			
Answer any TWO of the following in 150 words		(2 x 10 = 20 Marks)	
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 = 40 Marks)	
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 END 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
UCA5504 Visual Programming Lab (MC)

III BSC
 Time: 1.30 pm to 3.00 pm

29.09.2021
 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.	Analyzing 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
UCA5504 Visual Programming Lab (MC)

III BSC

Time: 1.30 pm to 4.30 pm

29.10.2021

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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • 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. They 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, or 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