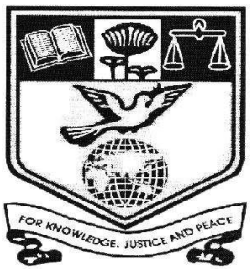
Curriculum Framework and Syllabi for

Master of Computer Applications (MCA)

(To be implemented from the academic year 2019-2020)

(UNDER CHOICE BASED CREDIT SYSTEM-CBCS)



POST GRADUATE AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

NEHRU MEMORIAL COLLEGE (AUTONOMOUS)

[Nationally Accredited with 'A' Grade by NAAC]

Affiliated to Bharathidasan University

Puthanampatti—621 007

(Approved by Board of Studies in Computer Applications(PG) in its meeting dated 25.09.2018)

PRELUDE

The Department of Computer Science was elevated as a Post Graduate Department in the year 1993 by introducing Master of Computer Applications. The Department is one of the pioneer institutions inculcating knowledge in the domain of computer applications and sculpting software professionals to suite the global needs in the IT industry. True to this fact our Alumni are working in various parts of the globe and also in all Top IT sectors. Another unique feature of the department is that lot of students hailing from poor and downtrodden society have got elevated to very good position in the industry after completing MCA degree programme in our college.

VISION

Sculpting highly competent software professionals, researchers, innovators and entrepreneurs to cater the global needs of the society.

MISSION

- To offer high quality, value based higher education in Computer Applications
- To inculcate creative and innovative ideas among the mindset of the students
- To facilitate better communication skills and enhancing the personality of the students to meet the ever changing needs of the society
- To bridge the gap between the industry and institution by introducing latest technology in the field of computer science

PROGRAMME EDUCATIONAL OBJECTIVES(PEO)

The Post Graduates of MCA Programme will be able to

PEO1: Design, model and develop smart applications by utilizing strong technical and domain knowledge acquired from the programme for the improvement of society.

PEO2: Apply current tools, technologies and critical thinking to develop applications for solving industry oriented problems

PEO3: Function as amember of a team and develop projects in a multi-disciplinary environment by emulating leadership skills

PEO4: Work productively as computer professionals by adopting to environment with lifelong learning and adhering to ethical standards

PROGRAMME OUTCOMES (PO)

At the end of the MCA programme, the students will be able to

PO1: Scientific Knowledge
Apply the knowledge in mathematics, statistics and computer science to solve the real life problems.

PO2: Problem Analysis
Ability to analyze and design applications by solving problems in the field of computer science.

PO3: Design and Development of Solution
Design applications for any specific needs from societal and environmental aspects.

PO4: Conduct investigations of complex problems
Investigate and apply technical skills to solve complex problems

PO5: Modern tool usage
Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to obtain solutions

PO6: Communication

Communicate effectively and present technical information both in oral and written form.

PO7: Individual and team work

Function competently as an individual and as a leader in a team project

PO8: Link with society&Ethics

Work in professional environment by adhering professional ethics and involved in perennial learning in the context of social, economic and cultural aspects

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO 1: Apply the scientific Knowledge acquired to develop smart Applications.

PSO 2: Ability to design and develop software with appropriate documentation.

PSO 3: Apply Current tools and techniques to design and develop innovative Applications

PSO 4: Understand the concepts in the specified domain and ability to apply it in real life problems

NEHRU MEMORIAL COLLEGE [AUTONOMOUS[							
MASTER OF COMPUTER APPLICATIONS							
STRUCTURE 2019 -2020							
SEM	**COU**	**TITLE**	**HRS**	**CRE**	**INT**	**EXT**	**TOT**
I	FC1	Problem Solving using C & C++	4	4	25	75	100
	FC2	Principles of Operating System	4	4	25	75	100
	FC3	Digital Design and Architecture	4	4	25	75	100
	FC4	C & C++ Lab	4	2	40	60	100
	FC5	Shell Programming Lab	4	2	40	60	100
	SC1	Mathematical Foundations in Computer Science	4	4	25	75	100
	SC2	Human Resource Management	4	4	25	75	100
	CB	Competency Building Programme	2	-			
	TOTAL		**30**	**24**			**700**
II	CC1	Programming in JAVA	4	4	25	75	100
	CC2	Database Systems	4	4	25	75	100
	CC3	Data Structures and Algorithm	4	4	25	75	100
	CC4	Computer Networks	4	4	25	75	100
	CC5	Java Lab	4	2	40	60	100
	CC6	Database Lab	4	2	40	60	100
	SC3	Statistics and Linear Programming	4	4	25	75	100
	CB	Competency Building Programme	2	-	-	-	-
	TOTAL		**30**	**24**			**700**
III	CC7	Scripting Languages (JavaScript, JQuery, Angular JS, Node JS)	4	4	25	75	100
	CC8	Web Design and Development [PHP, MYSQL, AJAX and JOOMLA)	4	4	25	75	100
	CC9	Data Mining and Warehousing	4	4	25	75	100
	CC10	Scripting Lab	4	2	40	60	100
	CC11	Web Design Lab	4	2	40	60	100
	SC4	Accounting and Financial Management	4	4	25	75	100
	EC1	Service Oriented Architecture	4	4	25	75	100
		Computer Graphics					
		Mobile Computing					
	CB	Competency Building Programme	2	2	100	-	100
	TOTAL		**30**	**26**			**800**

NEHRU MEMORIAL COLLEGE [AUTONOMOUS[							
MASTER OF COMPUTER APPLICATIONS							
STRUCTURE 2019 -2020							
SEM	**COU**	**TITLE**	**HRS**	**CRE**	**INT**	**EXT**	**TOT**
IV	CC12	Game Design and Development using Python	4	4	25	75	100
	CC13	Distributed Programming using J2EE	4	4	25	75	100
	CC14	Software Engineering	4	4	25	75	100
	CC15	Game Development Lab	4	2	40	60	100
	CC16	J2EE Lab	4	2	40	60	100
	OEC	Internet of Things	4	4	25	75	100
		Embedded Systems					
	EC2	Machine Learning	4	4	25	75	100
		Cyber Security					
		Functional Programming					
	CS	Coding Skill	2	1	100	-	100
	TOTAL		**30**	**25**			**800**
V	CC17	Mobile Application Development	4	4	25	75	100
	CC18	.NET Programming	4	4	25	75	100
	CC19	Compiler Design	4	4	25	75	100
	CC20	Mobile Application Development Lab	4	2	40	60	100
	CC21	.NET lab	4	2	40	60	100
	EC3	Cloud Computing	4	4	25	75	100
		Digital Image Processing					
		Software Testing					
	EC4	Big Data Analytics	4	4	25	75	100
		Computer Forensics					
		Software Project Management					
	OC	Online Course (MOOCS)	2	1	100	-	100
	TOTAL		**30**	**25**		**33**	**800**
VI	PW	Project Work	30	16	100	100	**200**
IV	IS	Internship*	-	2	100	-	**100**
V	MP	Mini Project*	-	2	100	-	**100**
			180	**144**			**4200**

***: Additional Credits**

CREDIT DISRIBUTION

S .NO	COURSES CATEGORY		CREDITS	PERCENTAGE OF CREDITS TO TOTAL CREDITS
1	Core Theory	Foundation Courses(3*4=12)	64	44.44
		Core Courses(13*4=52)		
2	Core Practical	Foundation Courses(2*2=4)	20	13.89
		Core Courses(8*2=16)		
3	Open Elective		04	2.78
4	Major based Electives		16	11.11
5	Supportive Courses-Maths		08	5.56
6	Supportive Courses-Commerce		08	5.56
7	Project		16	11.11
8	Employability Training		08	5.56
	TOTAL		**144**	**100%**

AVERAGE PERCENTAGE OF THE COURSES HAVING FOCUS ON SKILLS

Courses	Employability	Skill	Ent*	Knowledge
FC1- Problem solving using C and C++	Y			
FC2-Principles of Operating System				Y
FC3-Digital Design and Architecture				Y
FC4-C & C++ Lab	Y			
FC5-Shell Programming Lab	Y			
CC1-Programming in JAVA		Y		
CC2-Data Base System				Y
CC3-Data Structures and algorithms		Y		
CC4-Computer Networks				Y
CC5- JAVA Lab	Y			
CC6-Data Base Lab	Y			
CC7-Scripting Languages(JavaScript , JQuery, Angular JS, Node JS)		Y		
CC8-Web Design and Development[PHP,MySql,AJAX and JOOMLA]		Y		
CC9- Data Mining and Warehousing				Y
CC10-Scripting Lab	Y			
CC11-Web Design Lab			Y	
CC12- Game Design and Development using Python		Y		
CC13- Distributed Programming using J2EE		Y		
CC14-Software Engineering				Y
CC15--Game Development Lab			Y	
CC16-J2EE Lab	Y			
CC17- Mobile Application Development		Y		
CC18- NET Programming		Y		
CC19-Compiler Design				Y
CC20- Mobile Apps Development Lab			Y	
CC21-.NET Lab	Y			
Core Courses –Total	8	8	3	7

Courses	Employability	Skill	Ent*	Knowledge
EC1 Service Oriented Architecture		Y		
EC2Machine Learning				Y
EC3 Cloud Computing		Y		
EC4-Big Data Analytics	Y			
OEC-Internet of Things (or) Embedded Systems		Y		
Elective Courses Total	**1**	**3**		**1**

Courses	E*	Skill	Ent*	Knowledge
Competency Building Programme	Y			
Coding Skill	Y			
Internship	Y			
Online Course(MOOC)	Y			
Mini Project	Y			
Project	Y			
Others-Total	6			

Core Courses –Total	8	8	3	7	
Elective Courses Total	1	3		1	
Others-Total	6				
PERCENTAGE	15	11	3	8	
	41	**30**	**8**	**24**	
(For Core Elective Courses Ib,IIb,IIIb,IVb) **PERCENTAGE**	14	10	3	10	
	38	**27**	**8**	**27**	
(Core Elective Courses(CEC) Ic, IIc, IIIc, IVc) **PERCENTAGE**	14	12	3	8	
	38	**32**	**8**	**22**	**100**

***Ent: Entrepreneur Skill**

Assessment Pattern of Internal and External

Internal Theory:

CIA Test – I	**10 Marks**
CIA Test-II	**10 Marks**
Assignments (2)CUM Seminars	**05Marks**
Total	**25 Marks**

External Theory: 75 marks

Question Paper Pattern for Internal and External Assessment:

Section A: 10 Questions x 2 Marks = 20 Marks

(Two Questions from each unit)

Section B: 5 Questions x 5 Marks = 25 Marks

(Internal Choice and one question from each unit. For Programming Language Courses, 1 question must be a program)

Section C: 3 Questions x 10 Marks = 30 Marks

(Answer any three out of 5 questions and one question from each unit)

Maximum marks: 100

Internal Practical

CIA Test-I	**15 Marks**
CIA Test-II	**15 Marks**
Observation/ Lab Exercises/Problem Solving Assignments	**10 Marks**
Total	**40**

External Practical:

Record	**10 Marks**
Practical Examination	**50 Marks**
Total	**60 Marks**

Course Code & Title	PROBLEM SOLVING USING C AND C++		
FC1	Semester I	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ providethe essential concepts of computer programming, and presents the syntax and semantics of the various control structures of C language. ➢ demonstrate the fundamentals of functions, storage classes and arrays. ➢ learn the importance of pointers, structures and union and Data Files and apply them to develop applications using them. ➢ learn the basic concepts of OOP paradigm. ➢ learn the friend functions, inheritance and polymorphism		

PREREQUISITE:

None

UNIT -- I:

Introduction to C Programming: Operators and Expressions – Data Input and Output – Preparing and Running a Complete C program - Control Statements: The IF-ELSE statement – Looping : The While Statement, The Do-While Statement, The For Statement – Nested Control Structures - The Switch Statement – The Break and Continue Statement – The Comma Operator – The goto Statement.**[12Hrs]**

Self-study: the break and Continue Statement – the Comma Operator – the goto Statement

UNIT -- II:

Functions: Defining a function – Accessing a Function – Function Prototypes – Passing Arguments to a Function – Recursion. **Storage Classes:** Automatic Variables – Global Variables – Static Variables. **Arrays:**Defining an Array – Processing an Array – Passing Arrays to Functions – Multidimensional Arrays – Arrays and Strings.**[12 Hrs]**

UNIT -- III:

Pointers: Fundamentals – Pointer Declarations – Passing Pointer to a Function – Pointers and One-dimensional Arrays – Operation on Pointers – Pointers and Multidimensional Arrays – Arrays of Pointers – Passing Functions to other Functions. **Structures and Unions:** Defining Structure – Processing a Structure - Unions. **Data Files:** Opening and Closing a Data File – Reading and Writing a Data File – Processing a Data File – Unformatted Data Files – Concept of Binary Files.**[15Hrs]**

UNIT --IV:

Principles of Object Oriented Programming: Software Evolution – Procedure Oriented Programming – OOP Paradigm – Concepts, Benefits, Object Oriented Languages and Applications - Classes and Objects - Constructors and Destructors. **[10Hrs]**

UNIT -- V:

Friend Functions – Overloading Unary and Binary Operators - **Inheritance:** Single Inheritance – Multiple Inheritances – Hierarchical, Hybrid Inheritance – Polymorphism – Constructors in Derived Classes – Virtual Base Class – Virtual Functions. **[11Hrs]**

Books for Study:

1. Byron.S. Gottfried, "***Programming with C***", Schaum's Outlines", Second Edition, Tata McGraw-Hill, 1998. ISBN-13: 978-0070240353 ISBN-10: 0070240353.
2. E. Balagurusamy, "***Object Oriented Programming with C++***" , Sixth Edition, Tata McGraw Hill Publishing Ltd., New Delhi,2013, ISBN-10: 125902993X

Books for Reference:

1. YashawantKanetkar, "***Let Us C***", Seventh Edition, BPB Publications, 2007.
2. Herbert Schilt, "***The Complete Reference***", Ninth Edition (March 11, 2014),McGraw-Hill Osborne Media, ISBN-13: 978-0071808552

Web References:

1. https://fresh2refresh.com/c-programming/c-basic-program/
2. https://www.programiz.com/c-programming/examples
3. https://c-language.com/c-tutorial/c-basic-program/
4. https://www.studytonight.com/cpp/basics-of-cpp.php
5. https://www.youtube.com/watch?v=Rub-JsjMhWY
6. https://www.youtube.com/watch?v=ki3B8a

Course Outcomes

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

CO1:	interpret the syntax and semantics of C language for solving problems	**K2**
CO2:	apply the concepts of functions, storage classes and array in real world problems	**K4**
CO3:	develop programs using pointers and files	**K3**
CO4:	describe the basic concepts of OOP paradigm	**K2**
CO5:	develop C++ programs for friend functions, inheritance and polymorphism	**K3**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	M	M	M	M	S	S	M	S
CO2	S	S	S	S	M	M	S	M	S	S	S	M
CO3	S	S	S	S	S	M	M	S	S	S	M	S
CO4	S	M	S	S	M	S	S	M	S	S	M	M
CO5	S	S	S	S	S	S	S	M	S	S	M	S

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared By	Ms.P.Kalpana
Verified By	Dr.M.Muralidharan

Course Code & Title	PRINCIPLES OF OPERATING SYSTEM		
FC2	Semester I	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learn about the objective and functions of operating system,systemstructure and system calls. ➢ gain the knowledge on process states, principles of concurrency and deadlock. ➢ inculcate the policies of memory management, virtual memory andscheduling. ➢ studyabout I/O and file organization ➢ understand the concepts of network operating system.		

PREREQUISITE:

None

UNIT -- I:

INTRODUCTION TO OS AND ITS SERVICES:

Objectives and functions of Operating System: Batch Processing System – Time Sharing System – Multiprogramming – Distributed Operating System and Parallel System - Operating System Interface – System calls- System Structure**.[5Hrs]**

UNIT -- II:

PROCESS DESCRIPTION AND CONTROL:

Process States – Process Description – Process Control – Processes & threads. Principles of Concurrency: Mutual Exclusion – Semaphores. Principles of Deadlock: Prevention – Avoidance – Detection & Recovery. **[20Hrs]**

UNIT -- III:

MEMORY MANAGEMENT:

Partitioning –Paging – Segmentation – Virtual Memory - Demand Paging – Page Replacements.Scheduling: Uniprocessor scheduling – types of scheduling – Scheduling Algorithms- Multiprocessor scheduling. **[15Hrs]**

UNIT -- IV:

I/O Organization: Evolution of I/O function- DMA – Design objectives – I/O Buffering – Disk Scheduling – Disk Cache. **File Organization**: File Directories-File sharing – Record Blocking – Secondary Storage Management. **[10 Hrs]**

UNIT --V:

Introduction to Networking Operating System: Distributed Operating System- Protection – Goals of protection – Domain of protection – Access Matrix – Security – Authentication. **[10Hrs]**

Books for study:

1. William Stallings,"***Operating Systems, Internals & Design Principles***",8th Edition, Prentice Hall, 2014.
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "***Operating System Concepts***", 9th Edition, John Wiley & Sons, 2012.

Book for Reference:

1. M.Milancovic, "***Operating System Concepts and Design***", Second Edition, McGraw-Hill International Edition.

Web References:

1. www.geeksforgeeks.org
2. www.tutorialspoint.com
3. www.studytonight.com

Course Outcomes:

On the successful completion of the course, students should be able to

CO1:	describethe services provided by operating systems, system calls and the structure system.	**K2**
CO2:	illustrate process description, mutual exclusion, deadlock detection and starvation.	**K3**
CO3:	categorize the management of main, virtual memory and scheduling algorithms.	**K4**
CO4:	describe I/O and file organization.	**K2**
CO5:	recognize the concepts of Network operating system	**K2**

Mapping of Cos with PSOs &Pos:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	M	M	M	S	S	M	S	S
CO2	S	S	S	M	M	M	S	S	S	M	M	S
CO3	S	S	S	S	S	M	M	S	S	M	S	S
CO4	S	M	M	S	M	M	M	S	M	M	M	S
CO5	S	S	S	S	S	M	M	S	S	M	S	S

Prepared By	Mrs.K.Saraswathi
Verified By	Dr.M.Muralidharan

Course Code & Title	DIGITAL DESIGN AND ARCHITECTURE		
FC3	Semester I	Credits: 4	Hours: 4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢study various data types and its representation. ➢impart knowledge in various digital components. ➢inculcateinstruction formats, computer registers and CPU Organization. ➢understand various peripheral devices, I/O interface, asynchronous and serial communication interface. ➢learn various memory organizations.		

PREREQUISITE:

None

UNIT -- I:

Data Representation - Data Types - Complements - Fixed-Point representation- Floating Point representation- Other Binary Codes- Error Detection codes.**[12Hrs]**

UNIT --II:

Logic Gates -Boolean Algebra - Map Simplification - Combinational Circuits: Half-Adder, Full Adder- Flip Flops - Sequential Circuits. ICs - Decoders - Multiplexers - Registers - Shift Registers - Binary Counters - Memory Unit. **[12Hrs]**

UNIT --III:

Instruction Codes - Computer Registers - Computer Instructions - Timing and Control – Instruction Cycle - Memory Reference Instructions –Input-Output and Interrupt. CPU: General Register Organization –Stack Organization - Instruction Format - Addressing Modes - Data Transfer And Manipulation- Program Control. **[14Hrs]**

UNIT -- IV:

Peripheral Devices - Input-Output Interface - Asynchronous Data Transfer - Modes of Transfer -Priority Interrupt - DMA - IOP - Serial Communication. **[12Hrs]**

UNIT --V:

Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory -Virtual Memory - Memory Management Hardware. **[10Hrs]**

Book for Study:

1. M.Morris Mano, "***Computer System Architecture***", Third Edition, Prentice Hall of India,2005.

Books for Reference:

1. William Stallings, "***Computer Organization and Architecture***", Fifth Edition, Pearson Education,2001.
2. Malvino A. P. and Donald P. Leach, "***Digital Principles and Applications***", Seventh Edition, McGraw Hill Publications, 2002
3. John P.Hayes, "***Computer Architecture and Organization***", Third Edition, Tata McGraw Hill,1998.

Web References:

1. http://expandknowledge.net/csc106/
2. https://nptel.ac.in/courses/106103068/
3. https://www.electronics-tutorials.ws/combination/comb_1.html
4. https://youtu.be/ksAok2NhzBs
5. https://study.com/academy/lesson/associative-memory-in-computer-architecture.html

Course Outcomes

On the successful completion of the course, students should be able to

CO1: Classify different types of data and representation of data	**K2**
CO2: Design Combinational and Sequential digital functions	**K3**
CO3: Explain an instruction set capable of performing a specified set of operations	**K2**
CO4: Categorize modes of data transfer and Compare different ways of communication with I/O Devices	**K4**
CO5: Distinguish Different types of memory	**K1**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	M	S	S	M	M	S	M	S	S	W	M	S
CO2	S	S	S	S	S	S	S	S	S	M	M	S
CO3	S	M	W	M	M	M	S	S	M	M	M	M
CO4	S	S	S	S	M	M	S	S	S	M	M	S
CO5	M	M	M	M	S	S	M	S	S	S	M	M

Prepared By	Mrs.K.PonvelAzhagulakshmi& Mrs. D.Nandhini
Verified By	Dr.M.Muralidharan

Course Code & Title	C & C++ LAB		
FC4	**Semester I**	**Credits: 2**	**Hours: 4**
Cognitive Level	**K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ give exposure to basics of C & C++ from operators to control structures ➢ develop programs using functions, arrays, structures and unions in C ➢ generate programs using OOP concepts ➢ design and develop C and C++ programs for the given real world problem.		

PREREQUISITE:

Programming in C

Solve the problems using

- Operators in C & C++
- Control structures in C & C++
- Functions
- Storage Classes
- Arrays
- Structure&Union
- Pointers
- File Management in C++
- Classes and Objects
- Inheritance
- Overloading

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes:
On the successful completion of the course, students should be able to

CO1: design algorithms for the given problem and Write programs in C and C++ **K3**
CO2:write C programs using pointers, Structures and unions **K3**
CO3: implement C++ programs using OOPs concepts **K4**
CO4: Build C and C++ applications to solve any kind of real world problem **K6**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	S	S	S	S	S	S	M	S
CO2	S	S	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	M	M	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Ms.P.Kalpana
Verified By	Dr.M.Muralidharan

Course Code & Title	SHELL PROGRAMMING LAB		
FC5	Semester I	Credits: 2	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:**Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ learnto install the OS and familiar with basic commands. ➢ writesimple scripts using operators and control structures. ➢ develop scripts using filters and advanced commands. ➢ write scripts for the given real life problems		

PREREQUISITE:

None

Solve problems using

1. Basic commands
2. Control Structures
3. Functions
4. Files
5. Directory related commands
6. Pattern Matching & Regular Expressions
7. Process related commands
8. String manipulation
9. Command Line Arguments
10. Filters
11. Login creation
12. Disk files related scripts
13. Date & time manipulation
14. Cron, at and wall commands
15. Batch file processing
16. Standalone simple scripts
17. System based simple scripts

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes:

On the successful completion of the course, students should be able to

CO1:demonstrate the installation of OS and work with basic commands	**K2**
CO2:apply the basic commands to create scripts	**K3**
CO3: develop scripts for the given problem specification	**K4**
CO4: write a shell scripts to solve the real world problems	**K6**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	W	W	M	S	S	M	S	M	M	M	M
CO2	S	S	S	M	S	S	M	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S	M	S
CO4	S	S	S	S	S	S	M	S	S	S	M	S

Prepared By	Ms.K.Saraswathi
Verified By	Dr.M.Muralidharan

Course Code & Title	MATHEMATICAL FOUNDATION IN COMPUTER SCIENCE		
SC1	Semester I	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learn about the matrix algebra ➢ know the concepts of Mathematical logic ➢ familiar with Set theory ➢ give exposure to lattices and its types ➢ study the concepts of Boolean Algebra		

PREREQUISITE:

None

UNIT -- I:

Definition of Matrix – Rank of a Matrix – Consistency Equations – Eigen values and Eigen vectors – Cayley Hamilton theorem (Statement only) Problems.**[12Hrs]**

UNIT -- II:

Mathematical Logic: Statements and Notations – Connectivity's – Statement Formula and Truth tables – Tautologies – Equivalence of Formulas – Duality law. Disjunctive Normal Form – Conjunctive Normal form. The theory of inference – validity using truth tables – Rules of inferences.**[12Hrs]**

UNIT -- III:

Basic concepts of set theory: Inclusion and Equality of sets – Power set – Operations on Sets – Venn diagrams – Cartesian Products. Relations and ordering – Binary & Equivalence relations – Partial ordering. Functions – Composition of functions, inverse functions, Binary &n-ary operations.**[12Hrs]**

UNIT -- IV:

Lattices as partially ordered sets – Hash Diagrams – properties of lattices – Distributive & Modular inequalities – Special lattices – Complete, Bounded, Complemented and Distributive lattices. Properties of Boolean algebra.**[12Hrs]**

UNIT -- V:

Boolean Algebra – Boolean functions – Representation and Minimization of Boolean functions. **[12Hrs]**

Books for Study:

1. A.AbdulRasheed, "***Allied Mathematics***", Vijay Nicole Imprints private Limited 2006. ISBN: 81-8209-144-6. (UNIT I: Chapter 3: 3.1-3.4)
2. J.P.Tremblay&R.Manohar, ***"Discrete Mathematical Structures with Applications to Computer Science"***, McGraw Hill International Edition, 1987. ISBN: 0-07-463113-6. (UNIT II: Chapter 1:1.1-1.3,1.4.1,1.4.2 .UNIT III: Chapter 2: 2.1.1-2.1.5,2.19, 2.3.1,2.3.8, 2.4.1-2.4.4 . UNIT IV: Chapter 4: 4.1. UNIT V : Chapter 4: 4.2-4.4)

Books for Reference:

1. T.K.ManicavasagamPillay& Co, ***"Algebra Volume-II"***, S.Viswanathan(Printers & Publishers)Pvt Ltd, 1999
2. M.K.Venkataraman, N.Sridharan and N.Chandrasekar,***"Discrete Mathematics"***, The National Publishing Company, 2000.

Course Outcomes:

On successful completion of the course the student will be able to

CO1: Apply consistency equations to solve matrix problems **K3**
CO2: Utilize mathematical logic to analyze theory of inference **K2**
CO3: Apply set theory concepts to work with relations **K3**
CO4: Represent lattices and its properties **K4**
CO5: Design map to get simplified form of Boolean function **K4**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	S	S	M	S	M	S	S	S	M	S
CO2	S	M	S	S	M	S	M	S	S	M	M	S
CO3	S	M	S	S	M	S	M	S	S	M	M	S
CO4	S	M	S	S	M	S	M	S	S	M	M	S
CO5	S	M	S	S	M	S	M	S	S	S	S	S

Prepared By	Dr.Saavithiri
Verified By	Dr.M.Muralidharan

Course Code & Title	HUMAN RESOURE MANAGEMENT		
SC2	Semester I	Credits: 4	Hours: 4
Cognitive Level	**K1:**Recall **K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand the concepts of Human Resource Management ➢ know about the process of Human Resource planning ➢ acquire the skills of employees training and development ➢ know the concepts of job evaluation and wage salary administration and compensation ➢ understand the techniques of performance appraisal.		

PREREQUISITE:

None

UNIT -- I:

HRM: Nature and Scope-HRM as a Profession- objectives – Importance— Functions of HRM – Role of HR Manager – Recent Trends. **[12Hrs]**

UNIT -- II:

HR Planning: Concept and Objectives – Need – Importance – Process – Problems and Guidelines for HR Planning – Recruitment – Selection – Placement – Induction.**[12Hrs]**

UNIT -- III:

Training and Development – Concept – Importance – Objectives – Methods of Training – Executive Development – Career Planning and Development.**[12Hrs]**

UNIT -- IV:

Compensation – Concept, process and Objectives of Job Evaluation – Advantages and Limitations – Methods – Wages and Salary Administration. **[12Hrs]**

UNIT -- V:

Performance Appraisal – Concept and Objectives – Methods and techniques of Performance Appraisal. **[12Hrs]**

Book for Study:

1. C.B.Gupta, ***"Human Resource Management"***, Sultan Chand & Sons, New Delhi, 2012.

Books for Reference:

1. S.S.Khanka, ***"Human Resource Management"***, Sultan Chand & Sons, New Delhi.
2. BiswajeetPattanayak, ***"Human Resource management"***, Prentice Hall of India, New Delhi.
3. L.M.Prasad, "***Human Resource Management",*** Sultan Chand & Sons, New Delhi-2013.

Course Outcomes:

On successful completion of the course the student will be able to

CO1: identify the concepts, functions and trends in HRM **K2**

CO2: acquire the skills and knowledge of planning, recruitment, selection, placement and induction **K1**

CO3: demonstrate the techniques for training and development **K3**

CO4: understand the concept compensation, job evaluation and wage salary administration **K2**

CO5: analyze the strategies to evaluate the performance of employees **K4**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	M	M	S	S	S	S	S	M	S	S
CO2	M	S	M	M	S	S	S	S	S	M	M	S
CO3	S	S	M	M	S	S	S	S	S	M	M	S
CO4	S	S	M	M	S	S	S	S	S	M	S	S
CO5	S	S	M	M	S	S	S	S	S	M	S	S

Prepared By	Ms.LakshmiPriya
Verified By	Ms.Jannathul Firthoes & Dr.M.Muralidharan

Course Code & Title	PROGRAMING IN JAVA		
CC1	**Semester II**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ familiar with the distinct properties and features of Object Orientations. ➢ understand the name space,Exceptions and standard library functions of JAVA ➢ inculcate utility and concurrency conditions in JAVA. ➢ give an exposure toInput/Output functions and java based applications. ➢ impart knowledge in GUI and Network programming applications.		

PREREQUISITES:

Problem Solving using C & C++
Data Structures and Algorithms

UNIT -- I:

An overview of Java - Java language fundamentals - Class and objects - Constructors - Garbage collection - The finalize method - method overloading – Recursion - this, static and final usage - Nested and Inner classes – Arrays – Inheritance – Method overriding – abstract methods and abstract classes – final methods and final classes. [**12 Hrs]**

UNIT –II

Packages-Interfaces-Exception Handling-String Handling-Object class – ExploringJava.lang package: Wrapper classes-String –StringBuffer. **[12 Hrs]**

UNIT -- III:

Util packages– ArrayList-Calender-Date-HashTable-LinkedList-Vector-Enumset-Stack-Multithreading - Thread priorities - Inter Thread communications – Synchronization - Dead locks. [**12 Hrs]**

UNIT -- IV:

I/O Streams: Byte Stream class-Character stream class-Serialization – JDBC-Data Manipulation-data navigation. [**12 Hrs]**

UNIT -- V:

Java Swing and Networking**:** JLabel – Jlist – JcomboBox – Jslider – Jmenu – Jbutton-Socket Programming- Proxy server - TCP/IP Sockets - Net address- datagrams. **[12 Hrs]**

Books for Study:

1. Herbert Schildt, "***Java 2 complete Reference***", Ninth Edition, Tata McGraw Hill, 2014.
2. Ivan Bayross, "***Java 2.0 (Web Enabled Commercial Application Development***" – BPB Publications India, Edition 2000, ISBN: 81-7656-356-0.

Books for Reference:

1. Peter Norton & William stanck, "***Guide to Java programming***", First Edition,1997, Techmedia Publications, New Delhi.
2. Laura Lemay, Charles l, Perkins, "***Teach Yourself Java 1.1"***, First Edition, 1998, Techmedia Publications, New Delhi.
3. Lay S. Horstmann, Gray Cornell. "***Core Java 2 – Fundamentals"*** 2nd Edition, 2000.
4. Scott daks& Henry "***Java threads"***, 2nd Edition,Shroff Publishers & Distributors Pvt Ltd.
5. Elliotte Rusty Harold, "***Java Network Programming***", First Edition, 2000, Shroff Publications &Pvt Ltd.

Web References:

1. URL:http://Docs.oracle.com/javase/tutorials/java/index.html
2. URL:http://javabeginnerstutorial.com/core-java
3. URL:http://www.w3schools.in/java-tutorial/

Course Outcomes:

At the end of the course the student will be able to:

CO1: identify the properties and features of Object Orientations using JAVA **K2**

CO2: analyze the name space, Exception conditions standard library functions in JAVAusing package and Exception handling. **K4**

CO3: employ Utility and concurrency conditions in JAVA for complex and container types of problems **K3**

CO4: apply Input / Output functions and java based applications with file manipulations, user interface and database connectivity. **K3**

CO5: develop GUI and Network programming applications using swing and networkingpackages. **K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	S	S	M	S	S	S	S	M
CO2	S	S	M	S	S	M	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Ms.V.Priya
Verified By	Dr.M.Muralidharan

Course Code & Title	DATA BASE SYSTEM		
CC2	**Semester II**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand the conceptual data models, entities, attributes ➢ impart knowledge in design and create tables in database ➢ introduce the concepts of transactions ➢ familiar with normalization techniques. ➢ know the concept of database system architecture, distributed database		

PREREQUISITE:

Principles of Operating System

UNIT -- I:

Introduction: Data base system verses file system – View of data – Data Models – Database Languages – Database users and Administrators – Database system structure. **Entity:** Basic concepts – Constraints – Keys – Design Issues – ER Diagram – Weak entity Relationship Model: Sets – Design of an ER Database schema – Reduction of an ER schema to tables. Relational Model**:** Structure – Relational Algebra – Extended Relational Algebra – Algebraic operations – Modification. **[15 Hrs]**

UNIT -- II:

SQL: Structure of SQL -Set operations – Aggregate functions – Null values – Nested sub queries – Views – Complex queries – Joined Relations – Embedded SQL - Dynamic SQL – QBE – Domain Constraints – Referential Integrity – Assertions – Triggers. **[10 Hrs]**

UNIT -- III:

Database Design: Relational – First normal form – Functional dependencies – Decomposition – Boyce-Codd normal form – Third Normal Form – Fourth normal form - More normal form. **[10Hrs]**

UNIT -- IV:

Transactions Concepts: Transaction state – concurrent execution – serializability – recoverability – testing for serializability. **Concurrent control:** Lock based protocols – timestamp based protocols – validation based protocols – Deadlock Handling. [**15 Hrs]**

UNIT -- V:

Data base system architecture: Centralized and client server architecture – server system architecture – parallel systems – Distributed systems - Network types. **Distributed database**: Distributed data storage - distributed transactions – commit protocols – distributedquery processing. **[10 Hrs]**

Books for study:

1. Henry F.Korth and Abraham Silberschatz, *"**Database System concepts",*** 5th Edition, McGraw Hill publication, 2002,(unit I,II,IV,V) ISBN: 0-07-120413-X.
2. C.J.Date, ***" An Introduction to Database system",*** 7th edition, Addison Wesley publication,year2000,(Chapter10.2,10.3,11.3,11.3,11.5,12.2,12.3,12.4,12.7)ISBN:81-7808-231-4

Books for Reference:

1. BepinC.Desai, *"**An Introduction to Data base system",*** Galogotia publications Private limited.
2. Ivan Bayross, *"**SQL and PL/SQL",*** BPB Publications, New Delhi.

Web References:

1. https://en.wikibooks.org/wiki/Introduction_to_Computer...Systems/Database
2. https://www.c-sharpcorner.com/UploadFile/.../types-of-database-management-systems/

Course Outcomes:

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

CO1:	understand the fundamentals of database system	**K2**
CO2:	design and create tables in database and execute queries.	**K4**
CO3:	design database based on a data models using normalization.	**K4**
CO4:	apply transaction concept	**K3**
CO5:	illustrate database system architecture and distributed database	**K2**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	M	S	S	S	M	M	S
CO5	S	M	M	S	S	M	S	S	S	S	S	S

Prepared By	Dr.D.Jayachitra
Verified By	Dr.M.Muralidharan

Course Code & Title	DATA STRUCTURES AND ALGORITHMS		
CC3	**Semester II**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand basic data structures such as arrays, linked lists, stacks and queues ➢ learn about trees, operations and its implementation. ➢ solve problem involving graphs, trees and heaps ➢ learn various sorting and searching techniques. ➢ enhance the problem solving skill using Recursive algorithms		

PREREQUISITE:

Problem Solving Using C & C++

UNIT -- I:

Design and analysis of algorithms: From problems to programs – Abstract data types – Data types, data structures and abstract data types- Basic data types**:** The data type 'list' – Implementations of lists – Stacks – Queues. **[10 Hrs]**

UNIT -- II:

Trees: Basic terminology – The ADT tree- Implementation of trees- Binary trees- Basic operations on sets - Introduction to sets – Bit-vector implementation of sets- Linked-list implementation of sets- Hash table data structures- Priority queues – implementation of priority queues. **[15Hrs]**

UNIT -- III:

Directed Graph: Basic definitions- Representation of directed graph - The Single Source shortest path problem – The All-pairs shortest path problem- Traversals of directed graphs – Directed acyclic graphs – Strong components. Undirected Graph: Definitions – Minimum cost spanning trees- Traversals- Articulation and bi-connected components. **[15 Hrs]**

UNIT -- IV:

Sorting: Sorting arrays-Sorting by straight insertion, selection & exchange- Insertion sort by

diminishing increment - Tree sort - Partition sort - Sorting sequential files - Straight merging-Natural merging. [**10 Hrs]**

UNIT -- V:

Recursive Algorithms - Introduction – two examples of recursive programs – Backtracking Algorithms – The knight's tour problem - The eight queen's problem - The optimal selection problem -Searching Techniques. [**10 Hrs]**

Books for Study:

1. Alfred V.Aho, John E.HopCroft and Jeffrey D.Ullman, ***"Data structures and Algorithms",*** Addison Wesley Longman private limited, New Delhi, Fourth Indian Reprint 2001, (Chapters: 1.1 – 1.3, 2.1 – 2.4, 3.1 – 3.4, 4.1 – 4.11 except 4.2, 4.8 & 4.9, 6.1 – 6.7, 7.1 – 7.4. **Unit I, II, and III).**ISBN: 81-7808-102-4.
2. Niklaus Wirth, "***Algorithms + Data structures = Programs***", Prentice Hall of India Limited, New Delhi, 1999, (Chapters: 2.1,2.2.1-2.2.6,3.1,3.3,3.4,3.5,3.7. **Unit IV, V).** ISBN: 81-203-0569-8.

Books for Reference:

1. Ellis Horowitz and SartajSahni, ***"Fundamentals of Computer Algorithms"***, Galgotia Publications, New Delhi, 1985.
2. Trembley and Soreson, "***An Introduction to data structures with Applications***", Second Edition, McGraw Hill, New Delhi, 1985.

Web References:

1. https://nptel.ac.in
2. https://geeksforkeeks.org/knights-tour-problem
3. https://www.geeksforgeeks.org/backtracking
4. https://youtu.be/0DeznFqrgAl

Course Outcomes:

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

CO1: describe stack, queue and linked list operation. **K2**

CO2:choose appropriate data structure as applied to specified problem definition. **K4**

CO3: manipulate the operations on various data structures. **K3**

CO4: apply the concepts learned in algorithms to various domains **K3**

CO5: use linear and non-linear data structures **K3**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	S	S	M	S	S	S	M	S
CO2	S	S	S	M	M	S	M	S	S	S	M	S
CO3	S	S	S	S	M	S	M	S	S	S	M	S
CO4	S	S	S	M	S	S	S	S	S	S	M	S
CO5	S	S	S	M	S	S	S	S	S	S	M	S

Prepared By	Mr.P.Velmurugan
Verified By	Dr.M.Muralidharan

Course Code & Title	COMPUTER NETWORKS		
CC4	**Semester II**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K1:** Recall **K2:**Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ comprehend the basic types of networks, its classifications and properties ➢ acquire the design of the Data Link Layer ➢ conversant with Network Layer functionalities. ➢ recognize the services and protocols of Transport Layer. ➢ catalogue security algorithms and the protocols of Application Layer.		

PREREQUISITE:

Digital Design and Architecture

UNIT -- I:

Introduction: Uses of Computer Networks – Network Hardware – Network Software – The Reference Model. **The Physical Layer:** Concepts of Guided Transmission Media – Wireless Transmission – The Telephone System. [**12Hrs]**

UNIT -- II:

Data Link Layer: Data Link Layer Design Issues – Error Detection and Correction – Elementary Data Link Protocols –Elementary Data Link Protocol. **The Medium Access Control Sub layer:** The Channel Allocation Problem – Wireless LANs – Bridges. **[12Hrs]**

UNIT -- III:

Network Layer : Network Layer Design issues – Routing Algorithms – The Optimality Principle – Shortest Path Routing – Flooding – Distance Vector Routing – Link State Routing – Hierarchical Routing – Broadcast Routing – Multicast Routing – Congestion Control Algorithms. [**12 Hrs]**

UNIT-IV:

Transport Layer: The Transport Service – Elements of Transport protocols – A simple Transport protocol – The TCP Protocol – The TCP Segment Header – UDP.**[12 Hrs]**

UNIT -- V:

Application Layer: Network Security – Cryptography – Symmetric Key algorithm: DES - IDEA – Public Key algorithm: RSA - DNS – Concepts of Email, SNMP,WWW,FTP,MIME **[12 Hrs]**

Book for Study:

1. Andrews S. Tannenbaum, "***Computer Networks***", Prentice Hall of India, New Delhi, Fifth Edition, ISBN-13: 978-0132126953.

Book for Reference:

1. Behrouz A. Forouzan, "***Data Communication and Networking***", Tata McGraw Hill, New Delhi 2013, Fifth Edition,ISBN: 0073376221.

Web References:

1. http://iips.icci.edu.iq/images/exam/Computer-Networks---A-Tanenbaum---5th-edition.pdf
2. my.fit.edu/~vkepuska/ece4561/0132127067_ppt-125189/Chapter1-
   https://www.ce.yildiz.edu.tr/personal/gokhan/file/763/Chapter5-NetworkLayer.ppt
3. ant.comm.ccu.edu.tw/course/103_Computer_Networking/1_Lecture/ch2.ppt

Course Outcomes:

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

CO1: comprehend the basic types of networks, its classifications and properties of OSI and TCP/IP reference models	**K2**
CO2:acquire the design of the Data Link Layer with Data Link layer Protocols.	**K1**
CO3:apply various routing algorithms to find the shortest paths between two nodes.	**K3**
CO4:recognize the Transport Layer with TCP/IP and UDP protocols.	**K1**
CO5:investigate the Application Layer functionalities using Protocols like SNMP, WWW, FTP, MIME and security	**K4**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	M	S	S	S	S	S	S	S
CO2	S	M	M	M	M	M	M	S	S	W	W	S
CO3	S	S	S	S	S	M	M	S	S	S	M	S
CO4	S	M	M	M	M	M	M	S	S	M	M	S
CO5	S	M	M	W	S	M	M	S	S	M	M	S

Prepared By	Mrs.V.Priya
Verified By	Dr.M.Muralidharan

Course Code & Title	JAVA LAB		
CC5	**Semester II**	**Credits: 2**	**Hours: 4**
Cognitive Level	**K2:**Understand **K3:**Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ apply Object oriented Programming Concepts to develop simple applications ➢ Give practical exposure to Networking programs. ➢ Design and Develop multi-tier applications ➢ write JAVA code for the given problems		

PREREQUISITES:

Problem Solving using C & C++
Programming in JAVA

Solve the problems using

- Operators
- Control structures
- Arrays&String Manipulation
- Classes and objects
- Constructors
- Method Overloading
- Abstract class, Inheritance
- Method overriding&'static', 'This', 'Final' and 'super' keyword
- Packages, Interfaces
- Exception handling
- Thread&Streams
- Swing control based applications
- Database connectivity (queries)

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes

At the end of the course the student will be able to:

CO1: apply the concepts of Java to solve simple problems.	**K3**
CO2: develop, execute and troubleshoot programs using networking concepts.	**K4**
CO3: design and developmulti-tier applications using JDBC	**K6**
CO4: build simple applications using JAVA	**K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	S	S	S	S	S	S	S
CO2	M	S	S	S	S	S	S	S	S	S	S	S
CO3	M	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.V.Priya
Verified By	Dr.M.Muralidharan

Course Code & Title	DATA BASE LAB		
CC6	**Semester II**	**Credits: 2**	**Hours: 5**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ Educate developing query using DDL,DML,DCL,TCL ➢ Understand and create tables in database using logical operator, set operator, sequence ➢ prepare SQL reports ➢ learn the implementation of cursors, procedure and function		

PREREQUISITE:

Data base System

Solve theproblems using

- DDL, DML, DCL & TCL Commands
- Queries with key constraints
- Queries with operators: Logical Operators and Set Operators
- Nested Sub Queries: Sub query and Join
- Built in functions of SQL
- Views and Sequence
- SQL Reports
- Cursors: Implicit and Explicit
- Triggers
- Procedures and Functions
- Package

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes

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

CO1: design and implement database schema for the given problem **K2**
CO2: populate and query using DDL,DML,DCL,TCL **K3**
CO3: prepare SQL reports, create implicit and explicit cursor and implement triggers, procedures and function **K4**
CO4: generate a normalized database for the given real life application **K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	M	S	M	M	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Dr.D.Jayachitra
Verified By	Dr.M.Muralidharan

Course Code & Title	STATISTICS AND LINEAR PROGRAMMING		
SC3	**Semester II**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ give awareness to random variables and its dependency functions. ➢ learn discrete and continuous probability distribution functions ➢ give exposure to various types of hypothesis testing and errors. ➢ know about the functionalities of regression and time series analysis ➢ acquire the knowledge about various LPP problems		

PREREQUISITE: None

UNIT – I

RANDOM VARIABLES: Distribution function – discrete, continuous random variables – equivalent events – functions of discrete and continuous random variables – expectation – moment generating functions

JOINT PROBABILITY DISTRIBUTIONS: Joint distribution for two dimensional random variables - marginal distributions – conditional distributions – conditional expectation – regression of the mean – Independence of random variables - covariance and correlation - distribution function for two dimensional random variables. **[12Hrs]**

UNIT – II

DISCRETE AND CONTINUOUS DISTRIBUTIONS: Bernoulli trials and Bernoulli distribution – Binomial distribution – Poisson distribution – Applications Normal distribution – central limit theorem - Normal approximation to the Binomial distribution – Applications.
[12Hrs]

UNIT – III

TESTS OF HYPOTHESES: Statistical hypotheses – Type I and Type II errors – one sided and two sided hypotheses- Tests of hypotheses on a single sample – Tests of hypotheses on two samples – Testing for goodness of fit.**[12Hrs]**

UNIT –IV

LINEAR REGRESSION AND CORRELATION: Simple linear regression – prediction of new observations – Correlation.

TIME SERIES ANALYSIS: Examples of time series – time series plots – nature and uses of forecasts – measuring forecast errors – measurement of trends – moving average method – method of least squares.**[12Hrs]**

UNIT – V

LINEAR PROGRAMMING: Mathematical formulation of LPP – Graphical method for two dimensional problems – central problems of Linear Programming – Definitions – Simplex – Algorithm – Phase I and Phase II of Simplex Method – Big M Method – Transportation problem and its solution – Assignment problem and its solution by Hungarian method. [**12Hrs]**

Books for Study:

1. William W Hines, Douglas C Montgomery, David M Goldsman and Connie MBorror, ***"Probability and Statistics in Engineering"***, John Wiley, 2003.
2. Hillier and Lieberman, ***"Introduction to Operations Research",*** Tata McGraw-Hill, 2011.
3. Hamdy A Taha , "***Operations Research – An introduction"***, PearsonEducation, 2012.

Book for Reference:

1. Douglas C Montgomery and George C Runger, "***Applied Statistics and Probability for Engineers***", John Wiley, 2010.

Course Outcomes:

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

CO1: illustrate different types and functions of random variables and probability distributions	**K2**
CO2: apply discrete and continuous distributions to solve the given applications	**K3**
CO3: categorize and apply various types of hypothesis and errors	**K4**
CO4: employ regression and correlation to find the relation between variables and solve problems using time series analysis	**K3**
CO5: solve problems using linear programing techniques	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	M	M	M	M	M	S	S	S	M	S
CO2	S	S	S	S	M	M	M	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	M
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	M	M	M	S	S	S	M	S

Prepared By	Dr.Saavithiri
Verified By	Dr.M.Muralidharan

Course Code & Title	SCRIPTING LANGUAGES(Java Script, JQuery, Angular JS, Node JS)		
CC7	Semester III	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learn the client side scripting functionalities ➢ give exposure to Java Script library ➢ know the functionalities ofopen source web based framework ➢ imbibe knowledge in cross platform run time environment ➢ familiar with front end framework bootstrap		

PREREQUISITES:

HTML, CSS
Programming in JAVA

UNIT --I:

JavaScript: Introduction to JavaScript - JavaScript in the Browser – JavaScript Basics - Expressions, Operators, and Statements – Declaring Functions- Passing Arguments by Value versus Reference-Return Values- Variable Scope -Events - The Form Object- Form Elements- Basic Form Manipulation- Working with Inputs.**[12 Hrs]**

UNIT --II:

JQuery: Introduction to JQuery - Element Getters and Setters: HTML Attributes - CSS Attributes - CSS Classes - HTML Form Values - Altering Document Structure - Events - Animated Effects. **[10 Hrs]**

UNIT -- III:

Angular JS: Basics of AngularJS- Data Binding and Your First AngularJS Web Application- Modules- Scopes- Controllers- Expressions- Filters- Introduction to Directives- Built-In Directives- Directives Explained- Angular Module Loading- Multiple Views and Routing - Dependency Injection- Services. **[12 Hrs]**

UNIT --IV:

Node JS: Introduction – environment set up – First Application – REPL terminal – Package Manager – Call back concepts – Event Loop – Event Emitter – Buffers- Streams – File System – Utility modules – web module – RESTful API [**14 Hrs]**

UNIT -- V:

Bootstrap: Introduction – Bootstrap with CSS: Grid System – CSS overview – Typography – code – tables- forms- buttons- images – Bootstrap Layout Components: Drop downs- button groups- button drop downs- input groups – navigation elements- pagination- alerts – progress bar – media objects.**[12 Hrs]**

Books for Study

1. Alexei White, "***JavaScript Programmer's Reference***", Wiley Publishing, Inc, ISBN: 978-0-470-34472-9.

2. David Flanagan, "***jQuery Pocket Reference***", O'Reilly Media, Inc., ISBN: 978-1-449-39722-7

3. Material will be provided by the Department for UNITS III, IV & V

Web references:

1. www.tutorialspoint.com/nodejs
2. www.w3schools.com

Course Outcomes:

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

CO1: describe Java Script functionalities in creating web page	**K2**
CO2: Develop pages using JQuery	**K3**
CO3: illustrate UI design and maintains it in database	**K2**
CO4: employ Nodjs to create server side application	**K4**
CO5: Design effective UIs	**K4**

Mapping of COs with POs&PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	M	S	S
CO4	S	M	S	M	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	M	S	S	S	S	S	S

Prepared By	Mrs K PonevelAzhagu Lakshmi &Mr.P.Velmurugan
Verified By	Dr.M.Muralidharan

Course Code & Title	WEB DESIGN AND DEVELOPMENT [PHP, MySQL, AJAX, JOOMLA]		
CC8	Semester III	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ study the components for web technology ➢ give exposure to server side script –PHP ➢ conversant in MySQL database and its connectivity with PHP ➢ imbibe knowledge in Web applications with Ajax ➢ familiar with content management system		

PREREQUISITES:

Data Base System
Computer Networks

UNIT I:

Web Medium: Core web technologies – web browsers – Markup Languages – Style sheet technologies – programming technologies – client side, server side – network and related protocols – Introduction to static, dynamic and active web pages. [**12 Hrs]**

Self -Study: HTML elements and attribute. CSS: Properties and values.

UNIT II:

Programming in PHP – Structure and syntax of PHP and integrating the same with HTML – Comments – Variables – data types – operators – Control structures - Arrays and functions- Passing information between pages – Strings. **[12 Hrs]**

UNIT III:

PHP / MySQL Functions: Mysql_connect, mysql_pconnect, mysql_query, mysql_fetch_array, mysql_select_db, mysql_fetch_assoc, mysql_fetch_row, mysql_fetch_field, mysql_num_rows, mysql_error, mysql_errno and mysql_close. **Apache& MySQL:** Using PHP with MySQL – using tables – form design – editing the data base – validation – using Apache Web Server – handling and avoiding errors – creating an interactive web page using AMP technology.**[12 Hrs]**

UNIT IV:

Ajax and Future Web Applications: Functionality - Advantages of Web Applications - HTTP and HTML - PHP and server side Technologies - JavaScript and Client side technologies-

Understanding Ajax - Building Simple Application with Ajax and PHP. **[10 Hrs]**

UNIT V:

Joomla Basics: CMS-Features-Advantages and Disadvantages – Architecture – Control Panel – Menus: create, add, modify and submenus – content menu- components menu – Article Management: Adding and formatting contents. **[14 Hrs]**

Books for Study:

1. Thomas A Powell, "***Web Design – The complete Reference***", Tata McGraw-Hill, Second Edition, 2003. UNIT I
2. TiothyBoronczyk, Elizabeth Naramore, Jason Gerner,Yann Le Scouarnec,JeremyStolz,Michael K Glass, " ***Beginning PHP6, Apache, MySQL Web Development***", Wiley Publishing,Inc, 2009ISBN: 978-0-470-39114-3.
3. CristianDarie, BogdanBrinzarea, FilipCherecheş-Toşa, MihaiBucica, "***Building Responsive Web Applications with Ajax and PHP***", Packet Publishing(UNITIV)
4. Material will be provided by the department for UNIT V.

Books for Reference:

1. AndiGutmans, StigSætherBakken and DerickRethans, "***PHP5 Power Programming***", Prentice Hall.
2. Hagen Graf, "***Building websites with Joomla***", Packet Publishing House, January 2005.

Web References:

1. www,w3schools.com
2. www.phptpoint.com/php-tutorial

Course Outcomes

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

CO1: Summarize the technologies required for the web development **K2**
CO2: Develop simple programs using php **K3**
CO3: interpret MySQL functions with php to maintain the database **K4**
CO4: Relate Ajax with WAMP **K3**
CO5: Organize web site and publish through CMS **K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	M	M	S	M	M	S	S	M	S	S
CO2	S	S	S	M	S	M	M	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	M	S	M	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	**DATA MINING AND WAREHOUSING**		
CC9	**Semester III**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K 6:** Create		
Learning Objectives	**The course aims to** ➢ introduce the basic concepts of data mining and preprocessing techniques ➢ imbibe the knowledge on Association Rule Mining ➢ elaborate the importance of classification and prediction techniques through various methods ➢ introduce the concepts and importance of basic clustering techniques ➢ introduce the concepts of warehousing, architecture and multidimensional data model		

PREREQUISITES:

Data Structures and Algorithms
Data Base System

UNIT -- I:

DATA MINING & DATA PREPROCESSING: Introduction to KDD process – Knowledge Discovery from Databases - Data Preprocessing: An Overview – Data Cleaning – Data Integration – Data Reduction –Data Transformation and Data Discretization. **[10 Hrs]**

Self- Study Portion: Data Discretization.

UNIT – II:

ASSOCIATION RULE MINING: Mining Frequent Patterns: Basic concepts - Frequent Itemset Mining Methods: Apriori Algorithm: Finding Frequent Itemsets using Candidate Generation- Generating Association Rules from Frequent Itemsets- A Pattern-Growth Approach for Mining Frequent Itemset. **[10Hrs]**

UNIT – III:

CLASSIFICATION: Basic Concepts - Decision Tree Induction -Bayes Classification Methods- Rule-based Classification - Model Evaluation and Selection- Techniques to Improve Classification Accuracy. **[13 Hrs] Self- Study Portion:**

Techniques to Improve Classification Accuracy.

UNIT – IV:

CLUSTERING: Cluster Analysis - Partitioning Methods: k-means and k-medoids- Hierarchical methods: Agglomerative and Divisive Hierarchical Clustering - BIRCH – Density-Based Methods: DBSCAN – Grid-Based Methods: STING - Evaluation of Clustering. **Self -Study Portion: Evaluation of Clustering.** **[15 Hrs]**

UNIT – V:

DATA WAREHOUSE: Data Warehousing - Operational Database Systems vs. Data Warehouses - Data Warehouse Multitier Architecture - Data Warehouse Models: Enterprise Warehouse, Data Mart and Virtual Warehouse - Multidimensional Data Model: Data Cube, Stars, Snowflakes, and Fact Constellations – Online Analytical Processing: Introduction - OLAP Operations. **[12 Hrs]**

Book for Study:

1. Jiawei Han and MichelineKamber, *"**Data Mining Concepts and Techniques"***, Third Edition, Elsevier, Reprinted 2008.

Books for Reference:

1. K.P. Soman, ShyamDiwakar and V. Ajay, ***"Insight into Data mining Theory and Practice"***, Easter Economy Edition, Prentice Hall of India, 2006.
2. G. K. Gupta, ***"Introduction to Data Mining with Case Studies"***, Easter Economy edition, Prentice Hall of In***d***ia, 2006.
3. A Pang-Ning Tan, Michael Steinbach and Vipin Kumar, ***"Introduction to Data Mining",*** Pearson Education, 2007

Web References:

1. https://www.tutorialspoint.com/data_mining/
2. https://www.hackerearth.com/blog/machine-learning/beginners-tutorial-apriori-algorithm-data-mining-r-implementation/
3. https://t4tutorials.com/apriori-algorithm-in-data-mining-with-examples/
4. https://data-flair.training/blogs/classification-algorithms/
5. https://www.youtube.com/watch?v=9v4Wnz27c20
6. https://www.youtube.com/watch?v=E24Wxj7UmaA
7. https://www.slideshare.net/2cdude/data-warehousing-3292359

Course Outcome:

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

CO1: preprocess the data using various preprocessing techniques **K3**
CO2: generate association rules using Apriori and FP-growth algorithms **K6**
CO3: predict the class label of a given tuple using the classification techniques **K2**
CO4: group the data using the basic clustering techniques **K3**
CO5: summarize the concepts of warehouse, its architecture and multidimensional data models. **K2**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	S	M	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	M	M	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	M	M	M	M	M	S	S	M	M	S

Prepared By	Ms.P. Kalpana
Verified By	Dr.M.Muralidharan

Course Code & Title	SCRIPTING LAB		
CC10	Semester III	Credits: 2	Hours:4
Cognitive Level	**K3: Apply** **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ study the designing of attractive home page using Bootstrap, JavaScript and JQuery ➢ learn to develop single page applications using angularJS ➢ know the creation of I/O intensive web applications ➢ develop a front end design for the given problem		

PREREQUISITES:

HTML, CSS

Programming in JAVA

Develop scripts using JavaScript

Operators, Control Structures and loops

Functions, Form validations& implementation of CSS

Develop scripts using JQuery

Working with HTML elements

Working with CSS

Effects& Animations

Develop scripts using Node JS

HTTP module

NPM package

Uploading

Develop scripts using Angular JS

Modules

Events

Filters

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes:

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

CO1: Create UI designs with validations using JavaScript **K6**
CO2: design and develop attractive web pages **K3**
CO3: analyze and apply events and execute scripts with server **K4**
CO4: build dynamic website using different scripting concepts **K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	M	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	M	M	S	S	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi & .P.Velmurugan
Verified By	Dr.M.Muralidharan

Course Code & Title	WEB DESIGN LAB		
CC11	Semester III	Credits: 2	Hours: 4
Cognitive Level	**K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ develop script using PHP ➢ apply knowledge PHP and MySql to develop interactive webpage ➢ design and develop Interactive web page using Ajax and JQuery. ➢ classify the given problem and design the web page		

PREREQUISITES:
Data Base Lab

Develop PHP Programs

Operators, control structures

Arrays and loops

Functions, passing information between pages

Simple utilities with HTML&PHP: BMI calculator, Currency Converter etc

Develop programs using PHP & MySQL

MySQL Commands & constraints

PHP-MYSQL(connection establishment, table creation, insertion, updation& selection queries)

Develop web sites using AMP

Simple Dynamic Pages

Interactive Web Pages: Ecommerce, Entertainment, Simple academic site

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes:

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

CO1: develop simple PHP scripts	**K3**
CO2: create simple web pages using HTML and PHP.	**K6**
CO3: design and develop interactive pages using HTML, PHP and MySQL	**K4**
CO4: build interactive web pages using PHP, MySQL, Ajax and JQuery.	**K6**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	ACCOUNTING AND FINANCIAL MANAGEMENT		
SC4	**Semester III**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learn the concepts and conventions of accounting. ➢ acquire the skills to prepare Journal, Ledger andTrial Balance learn about various types of accounts ➢ know the preparation of final accounts with adjustments ➢ give exposure to the preparation of budgetary control. ➢ understand the concepts of Capital budgeting.		

PREREQUISITE: None

UNIT - I:

Introduction to Accounting – Book Keeping – Definition – Advantages – Accounting concepts and conventions – Double Entry Book – Differences between double entry system and single entry system – Classification of Accounts. **[12 Hrs]**

UNIT - II:

Journal – Accounting Cycle – Practical approach to journal – Ledger – Format of Journal to Ledger – Trial Balance.**[12 Hrs]**

UNIT - III:

Trading Account – Profit and Loss Account – Balance Sheet – Definition – Objectives – Difference between Trial balance and Balance sheet – adjustment entry (Closing Stock, Outstanding, Prepaid, Depreciation). **[12 Hrs]**

UNIT - IV:

Budgeting and Budgetary control – Definition – Advantages – Limitation – main steps - objective- functions of budget controller – type of budgets – preparation of various functional budgets – preparation of production budget – cash budget – flexible budget only**.** **[12 Hrs]**

UNIT– V

Capital Budgeting – meaning, need and importance – methods – payback period method – Accounting Rate of Return (ARR) – Discounted Cash Flow method, NPV – IRR – Merits and Demerits. [**12 Hrs]**

(75% Theory, 25% Problem)

Books for Study:

1. T.S.Ready and A.Murthy, "***Financial Accounting***", Margham Publication-2011
2. Dr.S.N.Maheswari, "***Principles of Management Accounting***", Sultan Chand & Sons, 5th Edition, 2010

Books for Reference:

1. M.C.Shukla, T.S.Grewal-S.C.Gupta, "***Advanced Accounts***", (Volume-I) Sultan Chand & Sons, New Delhi-2002
2. R.L.Gupta, M.Radhasamy, "***Advanced Accountancy***", Sultan Chand & Sons, New Delhi, 2011
3. R.S.N.Pillai&Bagavathi, "***Fundamentals of Advanced Accounting***", Sultan Chand & Sons, New Delhi, 2007
4. M.Y.Khan&P.K.Jain, "***Management Accounting***", Tata McGraw Hill Education Private Ltd, 5th Edition
5. Prof.Jawaharlal, "***Advanced management Accounting***", Sultan Chand & Sons, New Delhi, Third Edition-2013

Course Outcomes:

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

CO1: recognize the basics of concepts and conventions of accounting **K1**
CO2: apply accounting principles to practice the preparation of journal, ledger and Trail balance preparation **K3**
CO3: identify the financial position of the business concern **K2**
CO4: analyze budgeting and its control **K4**
CO5: understand the concepts of capital budgeting **K2**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	W	W	M	M	M	S	S	M	W	S
CO2	S	S	S	S	S	M	M	S	S	M	S	S
CO3	M	M	M	M	S	M	M	S	M	M	S	S
CO4	S	M	M	M	S	M	M	S	S	M	S	S
CO5	S	S	S	M	S	S	M	S	S	S	M	S

Prepared By	Mrs.H Lakshmi Priya
Verified By	Ms.Jannathul Firthoes & Dr.M.Muralidharan

Course Code & Title	SERVICE ORIENTED ARCHITECTURE		
EC1a	**Semester III**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢study the concepts of software architecture, Service Oriented Architecture evolution, patterns and programming models. ➢learn about the design, technologies and benefits of SOA. ➢know related technologies, implementation basics of SOA and Amazon Web Services. ➢imbibe the knowledge of web services security and its related technologies. ➢inculcate the policies for transactions processing and the usage of SOA in mobiles.		

PREREQUISITES:

Web Design and Development
Programming in JAVA

UNIT - I:

Software Architecture – Types of IT Architecture – SOA – Evolution – Key components – perspective of SOA – Enterprise-wide SOA – Architecture – Enterprise Applications – Solution Architecture for enterprise application – Software platforms for enterprise Applications – Patterns for SOA – SOA programming models. **[14 Hrs]**

UNIT- II:

Service-oriented Analysis and Design – Design of Activity, Data, Client and business process services – Technologies of SOA – SOAP – WSDL – JAX – WS – XML WS for.NET – Service integration with ESB – Scenario – Business case for SOA –stakeholder objectives – benefits of SPA – Cost Savings. **[16 Hrs]**

UNIT- III:

SOA implementation and Governance – strategy – SOA development – SOA governance – trends in SOA – event-driven architecture – software s a service – SOA technologies– SOA best practices-Introduction to Amazon Web Services-AWS Components.**[15 Hrs]**

UNIT - IV:

Meta data management – XML security – XML signature – XML Encryption – SAML – XACML – XKMS – WS-Security – Security in web service framework – advanced messaging. **[15Hrs]**

UNIT- V

Transaction processing – paradigm – protocols and coordination – transaction specifications – SOA in mobile – research issues. [**15 Hrs]**

Books for Study:

1. Shankar Kambhampaly, "***Service –Oriented Architecture for EnterpriseApplications***",First Edition, Wiley India Pvt Ltd, 2008.
2. Eric Newcomer, Greg Lomow, "***Understanding SOA with Web Services***", Pearson Education. Third Impression 2009, ISBN 978-81-317-1113-2
3. Mark O' Neill, et al., "***Web Services Security***", Tata McGraw-Hill Edition, 2003. ISBN 978-0-07-181197-2
4. AurobindoSarkar, AmitShah,"***Amazon Web Services***", Second Edition, Packt Publishing, 2015.

Web References:

1. http://snsce.snscourseware.org/notes.php?cw=CW_5869ea2881d33
2. http://studentsfocus.com/it6801-soa-notes-service-oriented-architecture-lecture-handwritten-notes-cse-7th-sem-anna-university/
3. http://www.professionalcipher.com/2017/07/service-oriented-architecture-soa-notes.html
4. https://www.tutorialspoint.com/amazon_web_services/

Course Outcomes:

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

CO1:	illustratethe software architecture, enterprise wide SOA, SOApatterns and SOAprogramming models.	**K2**
CO2:	analyze the design, technologies and benefits of SOA	**K4**
CO3:	relatethe technologies and describe the implementation of SOA andAmazonWebServices Components.	**K3**
CO4:	explain the meta data management and web services security.	**K2**
CO5:	Analyze the transaction processing and web services security.	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	S	M	M	S	S	M	S	S
CO2	S	S	S	M	M	M	M	S	S	M	M	S
CO3	S	S	S	S	S	S	M	S	S	M	S	S
CO4	S	M	M	M	M	M	M	S	M	M	M	S
CO5	S	M	S	S	S	W	M	S	S	M	M	S

Prepared By	Mrs.K.Saraswathi
Verified By	Dr.M.Muralidharan

Course Code & Title	COMPUTER GRAPHICS		
EC1b	**Semester III**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ introduce the concepts of computer graphics. ➢ gain knowledge about graphics hardware devices and software used. ➢ understand the two dimensional graphics and their transformations. ➢ understand the three dimensional graphics and their transformations ➢ familiar with understand clipping techniques.		

PREREQUISITES:

Mathematical Foundations in Computer Science
Data Structures and Algorithms

UNIT–I: Introduction: Applications of Computer Graphics, Raster Scan System, Random Scan System, Raster Scan Display Processors. **Output Primitives**: Points and Lines – Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms. Attributes of Output Primitives.**[12 Hrs]**

UNIT–II: Two Dimensional Geometric Transformations- Matrix Representations and Homogeneous Coordinates, Composite Transformations, Transformations between Coordinate Systems – Two Dimensional Clipping and Viewing: The viewing pipeline, Viewing coordinate reference Frame, Window to View-port Coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line Clipping algorithms, Sutherland Hodgeman Polygon clipping algorithm.**[18 Hrs]**

UNIT–III: Graphics Structures – Hierarchical modeling – Graphical User Interfaces and Interactive Input Methods.**[10 Hrs]**

UNIT–IV: 3-D Object Representation: Polygon surfaces, Quadric surfaces,Spline representation, Hermite Curve, Bezier Curve and B-Spline Curve, Bezier and B-Spline surfaces - Three Dimensional Geometric Transformations: Three Dimensional Viewing pipeline, Clipping, Projections(Parallel and Perspective).**[17 Hrs]**

UNIT –V: Visible Surface Detection Methods: Classification, back-face Detection, Depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods –

Computer animation.**[18 Hrs]**

Books for Study:

1. Donald Hearn and M.Pauline Baker, "***Computer Graphics C Version***", Pearson Education 2003, Second Edition,ISBN *0-13-530924-7*.

2. John F. Hughes, Andries Van Dam, Morgan McGuire,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley ,***"Computer Graphics: Principles and Practice"***, 3rd Edition, AddisonWesley Professional,2013.

Books for Reference:

1. Foley, Vandam, Feiner, Huges, "***Computer Graphics: Principles & Practice***", Pearson Education, Second Edition 2003, *ISBN*: 0201121107,9780201121100.

2. Donald Hearn and M. Pauline Baker, Warren Carithers,***"Computer Graphics With Open GL"***, 4th Edition, Pearson Education, 2010.

Course Outcomes:

At the end of the course, the student should be able to:

C01: interpret two dimensional graphics.	**K2**
C02: apply two dimensional transformations.	**K3**
CO3: analyze three dimensional graphics and	**K4**
CO4: apply three dimensional transformations.	**K3**
CO5: describe clipping techniques to graphics.	**K2**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	M	M	M	S	M	S	S	S	M	S
CO2	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	S	M	M	S	M	M	S	S	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	M	M	M	S	M	M	S	S	M	S	S

Prepared By	Mrs.K.Deepa
Verified By	Dr.M.Muralidharan

Course Code & Title	MOBILE COMPUTING		
EC1c	Semester III	Credits: 4	Hours:4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand the basics of mobile computing and its architecture ➢ know wireless LAN architecture and its standards ➢ give exposure to mobile IP and packet delivery mechanisms. ➢ learn different protocols of mobile transport layer ➢ familiar with various mobile OS and mobile language		

PREREQUISITIES

Computer Networks
Operating System
Programming in JAVA

UNIT–I:

Introduction to Mobile computing: Mobile communication – Mobile computing –Mobile computing architecture – Mobile devices **Mobile computing technology:**GSM, SMS, GPRS CDMA and 3G. [**14 Hrs**]

UNIT-II:

Wireless LAN: Introduction – Wireless LAN advantages – IEEE 802.11 standards –Wireless LAN architecture – Mobility in wireless LAN – Deploying wireless LAN –Mobile Ad Hoc networks and sensor networks – Wireless LAN security – WIFIversus 3G.**[12 Hrs]**

UNIT–III:

Mobile IP Network Layer: IP and Mobile IP network layers – Packet delivery andHandover management – Location management – Registration – Tunneling andEncapsulation – Route optimization – Dynamic Host Configuration Protocol. **[12 Hrs]**

UNIT–IV:

Mobile Transport Layer: Conventional TCP/IP Transport layer protocols – IndirectTCP – Snooping TCP Mobile TCP – Other methods of TCP – Layer transmission formobile networks – TCP over 2.5G/3G Mobile networks **[10 Hrs]**

UNIT–V:

Mobile application languages and Operating Systems: J2ME – Palm OS –Windows CE – Symbian OS – Linux for Mobile devices. **[12 Hrs]**

Books for Study:

1. Raj Kamal, "***Mobile Computing***", 2nd Edition, Oxford University Press, 2012 Chapters: 1,5,6,14
2. Asoke K Talukder, Roopa R Yuvagal, "***Mobile Computing***",Tata McGraw Hill, New Delhi, 2005. Chapters: 5, 6, 7, 9, 10, 15

Book for Reference:

1. JochenH.Schiller, "***Mobile Communications***", 2nd Edition, Pearson Education Private Limited, New Delhi,2003

Web References:

1. https://www.youtube.com/watch?v=WuuxZNjodFY
2. https://www.tutorialspoint.com/

Course Outcomes:

On completion of course the students will be able to

CO1: explain mobile computing basics and technologies **K2**
CO2: categorize WIFI standards and deployment of WIFI **K4**
CO3: illustrate mobile network packet delivery and management **K2**
CO4: summarize the protocols of transport layer over conventional transport layer **K2**
CO5: justify different types of mobile OS. **K3**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	W	M	M	M	M	S	S	W	M	S
CO2	S	S	S	S	S	M	M	S	S	M	M	S
CO3	S	M	M	M	S	M	W	S	S	M	M	S
CO4	S	M	W	W	S	M	M	S	S	M	M	S
CO5	S	S	M	M	S	M	M	S	S	M	S	S

Prepared By	Mrs.VPriya
Verified By	Dr.M.Muralidharan

Course Code & Title	COMPETENCY BUILDING		
CB	Semester III	Credits: 2	Hours:2

Objectives:

The course aims to

- train the students in soft skill
- prepare the students in aptitude
- practice the students to debug the code

Course Code & Title	GAME DESIGN AND DEVELOPMENT USING PYTHON		
CC12	**Semester IV**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learn the basic concepts of Python ➢ understand sequencing structures ➢ conversant with files and exceptions ➢ give an exposure to OOPs concepts ➢ inculcate pygame module and its functionalities		

PREREQUISITIES

Programming in JAVA

Problem solving using C & C++

Data Structures and Algorithms

UNIT -- I:

Core python: python introduction – Origin – Features – Downloading and Installing python- Running python – Program output statement – Program input statement. **Python Basics:** Statements and Syntax – variable assignment – Identifiers – Memory Management – data types – conditional and loops -Guess the number game. [**12 Hrs]**

UNIT -- II:

Sequences: Strings, Lists and Tuples: Sequences- strings – Strings and Operators – String-Only Operators – Built-in Functions – String Built-in Methods – Lists –Operators – Built-in Functions – List Type Built-in Methods- Special features of List – Tuples- Tuple Operators and Built-in Functions - Special features. **Mapping and Set Types**.**Functions:** calling functions – Creating Functions – Passing Functions – Types of arguments - – Variable Scope – Recursion - **Modules:** Modules and Files – Namespaces – Importing Modules – Features of Module Import- Module Built-in Functions – Packages- Other features of modules - The hang man game. **[12 Hrs]**

UNIT -- III:

Files and Input/Output: File Objects – File Built-in Functions – File Built-in Methods – File Built-in Attributes – Standard Files – Command-Line Arguments - **Errors and Exceptions**: Exceptions- Exceptions in Python – Detecting and Handling Exceptions – Raising Exceptions – Assertions – Standard Exceptions – Creating Exceptions. **Python Standard Library**: os,sys,random,math. **[12 Hrs]**

UNIT -- IV:

Regular Expression: Introduction – Special Symbols and Characters – Res and Python. Object Oriented Programming: Classes – Class Attributes – Instances – Instance Attributes – Binding and Method Invocation – Static Methods and Class Methods – Inheritance – Built-in Functions - Objects and Classes – Inheritance –Customizing classes with Special methods - The Blackjack game. **[12 Hrs]**

UNIT -- V

Game development using Pygame: Installing pygame – importing the pygame module-pygame.init()-pygame.display.set_mode() and pygame.display.set_caption() – colors in pygame – fonts – drawing functions- fill and blit method – pygame.display.update() – events and game loop – pygame.event.get()- pygame.quit(), pygame.time.Clock and tick() Method.Casestudies: pong game and tic-tac-toe. **[12 Hrs]**

Books for Study:

1. Wesley J.Chun,"***Core Python Programming***", Second Edition, Pearson Education,Inc., 2007. ISBN 978-81-317-1188-0. **UNIT-I** Chapter 1,2.1,2.2,2.6-2.9,3,8 **Unit-II:** Chapters 6,7,11.1-11.6,11.8,11.9,12 **Unit –III:** Chapters: 9 & 10 **Unit –IV**: Chapter 13.1-13.8,13.11-13.13,15 **Unit-V:** Material will be provided by the department

Books for Reference:

1. Tony Gaddis, "***Starting out with python***", 2nd edition, 2012, Addison Wesley, Pearson
2. Michael Dawson, "***Python programming for the absolute beginner***", Premier press, 2003
3. Jennifer Campbill, Paul Gries, Jason Montojo and Greg Wilson, "***Practical programing, An Introduction to computer science using Python***",2009
4. Al Sweigart, "***Invent your own computer games with python***", 2nd edition, 2008

Web Reference

1. https://www.tutorialspoint.com/python/
2. https://docs.python.org/3/
3. https://www.guru99.com/python-tutorials.html
4. https://www.pygame.org/wiki/

Course Outcomes:

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

CO1: develop simple console based games	**K2**
CO2: design and develop games using sequences	**K3**
CO3: demonstrate the usage of files and pattern matching	**K4**
CO4: apply OOP concepts in creating attractive games	**K3**
CO5: build interactive games using pygame	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	S	M	M	S	S	M	M	S
CO2	S	S	S	S	S	M	M	S	S	M	S	S
CO3	S	M	M	M	M	M	M	S	S	M	M	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	DISTRIBUTED PROGRMMING USING J2EE		
CC13	Semester IV	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand distributed environment, its architecture ➢ learn the concepts of RMI to develop distributed applications ➢ impart knowledge in web based distributed applications using Java Servlets ➢ give exposure to Java Server Pages ➢ inculcate enterprise applications using Enterprise Java Beans(EJB)		

PREREQUISITIES

Programming in JAVA

UNIT -I

Distributed Hardware Architecture: Evolution of Personal Computer – PC to PC Communication – Local Area Network – File Server Architecture – Client-Server Architecture – Database Server Architecture – Corporate Network – Intranet – Wide Area Network – Internet.**Distributed Software Architecture**: Mainframe – File Server - **Client-Server Architecture**:Single – two tier–three tier–N-tier Architecture–DistributedApplication.[**10 Hrs]**

UNIT - II:

Distributed Computing using RMI: Introduction - RMI Architecture – RMI Exceptions – Developing Applications with RMI –RMI with Database Connectivity.**Java Servlets:** Servlet Life Cycle – Generic and HTTP Servlet – Servlet with Database Connectivity- Session Tracking: Hidden Form Fields – URL Rewriting – The Cookie Class – TheSession Tracking class.

[**14 Hrs]**

UNIT - III:

Java Server Pages: JSP Basic Concepts – JSP Elements – Expressions – Scriplets – Request and Response Objects – Redirection and Forwarding –JSP with Database Connectivity - **Session Tracking:** Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking class. **[14 Hrs]**

UNIT - IV:

The Struts Framework: Introduction - J2EE Platform: J2EE Architecture – Containers – **J2EE Technologies**: Component – Service – Communication Technologies – Developing J2EE Application. [**12 Hrs]**

UNIT - V:

EJB Architecture and Design: Introduction to EJB – The EJB Container and its Services – Working with EJB – Session Bean and Business Logic – Entity Bean and Persistence. **[10 Hrs]**

Books for Study:

1. Ivan Bayross, "***Web Enabled Commercial Applications Development using Java 2***", Edition 2000, BPB Publications. ISBN 10: 8176563560 ISBN 13: 9788176563567
2. Jason Hunter with William Crawford, "***Java Servlet Programming***", Shroff Publishers & Distributors Pvt. Ltd, ISBN 1-56592-391-XE
3. Phil Hanna, "***JSP 2.0 The Complete Reference***", Tata McGraw Hill Publishing Company Limited, ISBN-10: 0072224371; ISBN-13: 978-0072224375.
4. James Holmes,"***Struts :The Complete Reference",*** Second Edition, Tata McGraw Hill Publishing Company Limited., *ISBN*: 9780070658455 .
5. SubrahmanyamAllamaraju, "***Professional Java Server Programming – J2EE Edition Volume 1",*** Shroff Publishers & Distributors Pvt. Ltd, *ISBN* 0-13-015592-6.

Web References:

1. www.j2eebrain.com
2. www.tutorialspoint.com

Course Outcomes:

Upon completion of the course the student will be able to

CO1: identify distributed hardware and software architecture and distributedenvironment	**K2**
CO2: identify RMI architecture and Java Servlets, apply the same to develop variousapplications using RMI and Servlets	**K3**
CO3: apply the concepts of Java Server Pages to write various real time web based distributed applications	**K3**
CO4: build applications in J2EE server using Java Servletsand Java Server Pages using J2EE architecture	**K6**
CO5: design distributed applications that run on EJB server using Session and Entity bean with Enterprise Java Beans (EJB), its architecture	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Dr. K.Sridevi
Verified By	Dr.M.Muralidharan

Course Code & Title	SOFTWARE ENGINEERING		
CC14	Semester IV	Credits: 4	Hours: 4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ understand the basic concepts of software engineering ➢ know various phases of software development life cycle ➢ give exposure to the preparation of SRS. ➢ learn different design process and test strategies ➢ familiarize with the importance of Quality to design and develop correct and robust software products		

PREREQUISITIES

Data Structures and Algorithms
Data Base System

UNIT - I:

Introduction to Software Engineering: Software – The changing nature of software – A generic view of Process: Software Engineering : A Layered Technology – A process framework - Process Models: Perspective Models – The Waterfall Model – Incremental Process Models – Evolutionary Process Models - Specialized Process Models. **[12 Hrs]**

UNIT - II:

Requirements Engineering: Requirements Engineering Tasks – Initiating the Requirements Engineering Process – Eliciting Requirements – Developing use – cases. **Building the Analysis Model:** Requirement Analysis – Analysis Modeling approaches – Data Modeling concepts – Object Oriented Analysis – Scenario Based Modeling – Flow Oriented Modeling – Class based Modeling – Creating a behavioral modeling. **[12 Hrs]**

UNIT- III

Design Engineering: Design within the context of Software Engineering – Design Process and Design Quality – Design Concepts –The Design Model – Pattern Based Software Design. Creating an Architectural Design – Software Architecture – Data Design– Mapping Data flow into software Architecture. [**12 Hrs]**

UNIT– IV

Estimation: The project planning process – software scope and feasibility – Resources – Software Project Estimation – Decomposition Techniques – Empirical Estimation Models – Estimation for object – oriented projects – The Make/Buy Decision. Testing Strategies: Unit testing – Integration testing-Validation testing – System testing -White Box Testing-Basic Path Testing-Control Structure Testing-Black Box Testing. **[12 Hrs]**

UNIT– V

Reengineering: Business Process Reengineering – Software Reengineering – Reverse Engineering – Restructuring – Forward Engineering. Quality Management: Quality concepts – Software Quality Assurance – Formal Approaches to SQA. **[12 Hrs]**

Case Study: Software Requirement Specification, Data base Design, UI Design, Data Flow Diagrams and Test cases preparation

Book for Study:

1. Roger S. Pressman, "***Software Engineering – A Practitioner's Approach***", 7th Edition, McGraw – Hill International Edition, ISBN: 007-124083.

Book for Reference:

1. Richard Fairley**,** "***Software Engineering concepts***" McGraw Hill Publication

Web reference:

1. htttp://www.tutorialspoint.com/software_engineering.

Course Outcomes:

On completion of the course the students will be able to

CO1: Explain various process models for a software project development **K1**
CO2: Classify the requirements and prepare SRS **K4**
CO3: Create architectural design, Data flow Design and procedural design **K6**
CO4: Estimate time, cost and effort for the specific software to be developed **K2**
CO5: Apply different testing techniques to test the software and Create test plans and strategies **K3**
CO6: Summarize various reengineering process and Quality concepts for quality assurance **K2**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	M	S	S	S	S	S	S	S	S
CO4	S	S	M	M	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	M	M	M	M	S	S	S	S	S	S

Prepared By	Dr.J.Saigeetha& Mrs. K. PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	GAME DEVELOPMENT LAB		
CC15	Semester IV	Credits: 2	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ develop simple programs using python ➢ create programs using sequences ➢ design applications using functions and modules ➢ create oops based applications		

PREREQUISITIES

Programming in JAVA

Solve problems using

- Operators
- Control structures
- Console based simple game:
- Data structures: String, List, Tuple, Dictionary and Set
- Game using data structure
- Files and exceptions
- OOPs related games
- 2D games using pygame methods:
    1. Design and develop racing games
    2. Design and develop asteroid game
- Create a game with your own ideas

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes:

On completion of the course the student will be able to

CO1: design console based simple games	K2
CO2:analyze and develop game applications using sequences	K4
CO3: applyOOP concepts to develop game applications	K3
CO4:design and develop real world game applications using pygame	K6

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	M	M	S	S	S	M	M	S
CO2	S	S	S	S	M	M	S	S	S	M	M	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	J2EE LAB		
CC16	Semester IV	Credits: 2	Hours: 4
Cognitive Level	**K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢give practical exposure to develop distributed applications using RMI ➢create web based distributed applications using Java Servlets and Java Server Pages ➢generate enterprise applications using Enterprise Java Beans(EJB) ➢classify the given problems and develop the cod using J2EE		

PREREQUISITIES

Programming in JAVA

Distributed applications using RMI

a. Simple RMI application
b. RMI application with a server and more than one client
c. RMI application with Database Connectivity

Implementing Servlet

i. Simple Servlet
ii. Servlet with JDBC
iii. Servlet Session Tracking

Implementing Java Server Pages(JSP)

i. Simple JSP
ii. JSP with JDBC
iii. JSP with Session Tracking

Enterprise Java Beans

a. Session Bean
b. Entity Bean

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes:

On completion of the course the student will be able to

CO1: Design various real time applications using RMI **K3**

CO2: employ Java Servlets to develop various real time web based distributed applications. **K4**

CO3: Build applications in J2EE server using Java Server Pages **K6**

CO4: Design and develop distributed applications that run on EJB server using Session and Entity bean **K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	M	S	S	S	M	S	S

Prepared By	Dr.K.Sridevi
Verified By	Dr.M.Muralidharan

Course Code & Title	INTERNET Of THINGS		
OECa	Semester IV	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand the fundamentals of Internet of Things ➢ provide IOT and related Internet technologies ➢ know about heterogeneous objects, applications and services ➢ give up-to-date knowledge about cloud services with IoT ➢ introduce and apply the concept of Internet of Things in the real world scenario		

PREREQUISITIES:

Digital Design and Architecture

Computer Networks

UNIT – I:

Introduction - Putting the Internet of Things forward to the Next Level - Internet of Things Strategic Research and Innovation Agenda : Internet of Things Vision - Internet of Things Strategic Research and Innovation Directions - IoT Smart X Applications. [**12 Hrs]**

UNIT–II:

Internet of Things and Related Future Internet Technologies - Network and Communications - Processes - Data Management - Security, Privacy and Trust - Device Level Energy Issues - IoT Related Standardization - IoT Protocols Convergence.[**12 Hrs]**

UNIT–III:

Scalable Integration Framework for Heterogeneous Smart Objects, Applications and Services : IPV6 Potential - IoT6 - IPV6 vsIoT - Adapting IPV6 to IoT Requirements - IoT6 Architecture - DigCovery - IoT6 Integration with the Cloud and EPICS – Enabling Heterogeneous Integration - IoT6 Smart Office Use Case - Scalability Perceptive.**[12 Hrs]**

UNIT– IV:

Insights on Federated Cloud Service Management and the IoT : Federated Cloud Service Management - Federated Management Service Life Cycle - Self Management Life Cycle - Self Organizing Cloud Architecture - Horizontal Platform. [**12 Hrs]**

UNIT – V:

Internet of Things Applications: OpenIoT - iCORE - Compose. **[12 Hrs]**

Book for Study:

1. VidiuVermesan and Peter Friess,***"Internet of Things - From Research Innovation to Market Deployment"***, River Publishers, 2014.

Book for Reference:

1. Adrian McEwen and Hakim Cassimally, ***"Designing the Internet of Things"***, John Wiley and Sons, Ltd, 2014.

Course Outcomes:

On completion of the course the student will be able to

CO1: analyze the basics of IoT	**K4**
CO2: interpret web services to access/control IoT devices	**K2**
CO3: apply an IoTin heterogeneous environment	**K3**
CO4: relate cloud services and IoT	**K2**
CO5: Analyze applications of IoT in real time scenario	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	M	W	M	S	S	M	M	S
CO2	S	S	M	M	S	M	S	S	S	M	S	S
CO3	S	S	S	S	S	M	S	S	S	M	S	S
CO4	S	S	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	S	S	M	M	S	S	M	S	S

Verified By	Dr.M.Muralidharan

Course Code & Title	EMBEDDED SYSTEMS		
OECb	**Semester IV**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand embedded system and its components ➢ impart knowledge in interfacing ➢ explain communication among process and functions of different units ➢ illustrate RTOS programming ➢ give exposure to software development and tools		

PREREQUISITIES

Digital Design and Architecture

Problem solving using C & C++

UNIT -- I:

Introduction to Embedded Systems: Embedded Systems- Processor Embedded Into A System-Embedded Hardware And Software Units- Applications-Design Process – Intel 8051 Architecture- Processor And Memory Organization-Interrupts Of 8051 - Assembly Language Programming Using 8051. **[12 Hrs]**

UNIT -- II:

Input-Output Interfacing – Bus Standards – PCI – ISA – Timing And Control – Input Output Devices – Serial And Parallel Communication – Motor Control-Programming Display Devices – ARM Architecture. **[12 Hrs]**

UNIT -- III:

Inter Process Communication – Signal Functions – Socket Programming – Mailbox - Pipes – RTOS –OS Services – Process Management - Timer Function –Event Function – Memory Management –Device, Files And I/O Subsystem – Basic Design of RTOS. [**12 Hrs]**

UNIT -- IV:

RTOS Programming: Basic Functions – Types Of RTOS – RTOS mCOS – RTLinux – Real Time Linux Functions-Programming With RTLinux. **[15Hrs]**

UNIT -- V:

Embedded Software Development Process and Tools: Introduction – Host and Target Machines – Linking and Locating Software – Getting Embedded system into target System – Issues in design. [**15Hrs]**

Book for Study:

1. Rajkamal, ***"Embedded System: Architecture, Programming and Design",***SecondEdition,TataMcgraw-Hill Education Private Limited, New Delhi 2008.

Books for reference:

1. B.KanthRao, "***Embedded Systems***", PHI Learning Private Limited, 2011.
2. Marilyn Wolf, "***Computers and Components***", Third Edition, Morgan Kaufmann Series 2012.
3. A.P.Godse&A.O.Mulani,"***Embedded Systems***" Third Edition, Technical publications 2009.

Course Outcomes:

On completion of the course the student will be able to

CO1:interpretthe components of embedded system **K2**

CO2: classify various devices **K3**

CO3: analyze functions of various units **K4**

CO4: acquire the knowledge of real time operating system and implement real time functions **K1**

CO5:understand embedded system development and tools **K2**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	W	W	S	M	M	S	S	M	S	S
CO2	S	M	W	W	S	M	M	S	S	M	M	S
CO3	S	S	M	M	S	M	M	S	S	M	S	S
CO4	S	S	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	S	S	M	M	S	S	M	S	S

Verified By	Dr.A.Rajendiran &Dr.M.Muralidharan

Course Code & Title	MACHINE LEARNING		
EC2a	Semester IV	Credits: 4	Hours:4
Cognitive Level	**K1: Recall** **K2:** Understand **K3:**Apply		
Learning Objectives	**The course aims to** ➢ learn the basics of machine learning ➢ understand Neural Networks and Genetic Algorithms ➢ Know Bayseian and Computational learning methods ➢ Give exposure to Instant learning ➢ Recognize Advanced learning algorithms		

PREREQUISITIES

Data Mining and Warehousing

UNIT – I:

Introduction : Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search. **[15 Hrs]**

UNIT – II:

Neural Networks And Genetic Algorithms: Neural Network Representation – Problems – Perceptron – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning. **[15 Hrs]**

UNIT – III:

Bayesian And Computational Learning : Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network –EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model. **[15 Hrs]**

UNIT – IV:

Instant Based Learning: K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning **[15 Hrs]**

UNIT – V:

Advanced Learning : Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules– Sets of First Order Rule–Induction on Inverted Deduction–Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning –Task–Q-Learning – Temporal]Difference Learning. **[15 Hrs]**

Book for Study:

1. Tom M. Mitchell, ***"Machine Learning"***, First Edition, McGraw Hill Education (India) Private Limited, (1 May 2013) ISBN-10: 1259096955 , ISBN-13: 978-1259096952

Books for References:

1. EthemAlpaydin, ***"Introduction to Machine Learning (Adaptive Computation and Machine Learning)",*** The MIT Press 2004
2. T. Hastie, R. Tibshirani, J. H. Friedman, "***The Elements of Statistical Learning",*** Springer; 1 edition, 2001

Web Reference:

https://www.cs.ubbcluj.ro/~gabis/ml/ml-books/McGrawHill%20-20Machine%20Learning%20-Tom%20Mitchell.pdf

Course Outcomes

On completion of the course the student will be able to

CO1: Identify learning problems, various concept learning methods	**K1**
CO2:outline the representation of neural networks and various algorithms	**K2**
CO3: Describe bayes theorem, bayes optimal and naïve bayes classifier and Bayesian belief network	**K2**
CO4: Interpret case based learning	**K3**
CO5: Identify various advanced learning methods	**K1**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	S	S	S	S	M	S	S
CO2	S	M	S	S	S	M	S	S	S	S	S	S
CO3	S	M	M	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Dr.K.Sridevi
Verified By	Dr.M.Muralidharan

Course Code &Title	CYBER SECURITY		
EC2b	Semester IV	Credits: 4	Hours: 4
Cognitive Level	**K1:** Recall **K2:** Understand **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ know about Vulnerabilities in information Systems and threats ➢ know various risks and securing systems ➢ familiar with nature and responsibilities of CIO ➢ imbibe knowledge in Intrusion Detection and Prevention System ➢ impart understanding of Cyber law, warfare and security		

PREREQUISITIES

Computer Networks

UNIT –I:

Vulnerabilities in Information Systems: Introduction – Measuring vulnerability – Avoiding Vulnerabilities – Mistakes – Threats Classification – Threat Modeling Process – Security in home and Applications- Vulnerabilities in Organization. **[15 Hrs]**

UNIT – II:

Risks in Information System Infrastructure: Risks in Hardware – Software – People – Laptops – Cyberspace. **Secure Information System**: Assets identification, communication, storage – Resource access control - securing email communication – Information Security Management. **[15 Hrs]**

UNIT–III:

Cyber Security and the CIO: CIO Personality – CIO Responsibilities – CIO Information Security. **Building a Secure Organization**: Business Continuity Planning – System Access Control – Development and Maintenance – Physical and Environment Security – Compliance – Personnel Security – Security Organization – Computer and Network management- Asset Classification and Control – Security Policy. **[15 Hrs]**

UNIT – IV:

Cyberspace Intrusions: Introduction – IDPS Configuration – IDPS Capabilities – IDPS Classification – IDPS Comparison. **Cyberspace Defense**: Introduction - File Protection Applications – PC Performance Applications – Protection Tools. **[15 Hrs]**

UNIT – V:

Cyberspace and the LAW: Introduction – International Laws – Cybercrime. **Cyber Warfare and Homeland Security**: Cyber Warfare – Homeland Security – Challenges – Cyber Defense Eco System. **[15 Hrs]**

Book for Study:

1. George K Kostopoulos, *"**Cyber Space and Cyber Security**"*, CRC Press, ISBN-13: 978-1-4665-0134-8

Book for Reference:

1. James Graham, Richard Howard, Ryan Oison,*"**Cyber Security Essentials**"*, CRC Press

Web References:

1. https://www.scribd.cpm/doc/../08-cyber-crime-cyber-laws-final-ppt
2. https://study.com/academy//
3. https://www.coursera.org/lecture/cyber-security-manufacturing/

Course Outcomes:

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

CO1 infer Vulnerabilities in information systems and organization	**K2**
CO2:analyzing Risks and Securing them	**K4**
CO3: summarize the role and responsibilities of CIO	**K2**
CO4:describe IDPS and cyberspace defense	**K1**
CO5:distinguish cyber law and security	**K2**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	W	W	M	M	M	S	S	M	M	S
CO2	S	S	S	M	M	M	M	S	S	M	M	S
CO3	S	W	W	W	M	M	M	S	S	S	M	S
CO4	S	W	W	W	M	M	M	S	S	S	M	S
CO5	S	S	M	M	M	M	S	S	S	S	M	S

Prepared By	Dr.K.Mani
Verified By	Dr.M.Muralidharan

Course Code & Title	FUNCTIONAL PROGRAMMING		
EC2c	**Semester IV**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K1:** Recall **K2:** Understand **K3:**Apply		
Learning Objectives	**The course aims to** ➢ study evaluation and applications of Haskell ➢ know about functional programming ➢ understand Type classes and file processing ➢ gain knowledge about data structures in Haskell ➢ conversant with interoperability and REPL		

PREREQUISITIES

Problem solving using C & C++

UNIT – I:

Getting Started – Lists – Strings and Characters –Type System – Function Application – Writing Simple functions – Understanding evaluations – Defining new Data types – Algebraic data types – Pattern matching. **[15 Hrs]**

UNIT – II:

Functional Programming – Infix functions – Working with Lists – Think about loops – Lamda functions – Writing a Library – Working with JSON data- Anatomy of Haskell module – Pointing JSON Data - Using Type Classes – Built in Type Class – Type Classes at work – I/O – Classic I/O –Working with files – Lazy I/O – I/O Monad – Buffering. **[15 Hrs]**

UNIT –III:

File processing – Regular Expressions – Pattern matching – Writing Lazy Function – I/O case study – Find – Naïve finding system – Predicates - Data Structures – Association Lists – maps – Monads – Monad type class using new monad – State Monad.**[15 Hrs]**

UNIT – IV:

Clojure: introduction – features – functional programming – collections and data structures – concurrency and parallelism. **[15 Hrs]**

UNIT – V:

Macros - data types and protocols – multimethods – java and JVM interoperability – REPL-oriented programming. **[15 Hrs]**

Book for Study:

1. O'Sullivan, "***Real World Haskell***",OReallIy , ISBN-10: 8184046480

   ISBN-13: 978-8184046489

2. Chas Emerick, Brain Carper and Christophe Grand, "***ClojureProgramming***",O'reilly, April 2012

Course Outcomes:

On completion of the course the student will be able to

CO1: define algebraic data types and pattern matching	**K1**
CO2: describe functional programming	**K1**
CO3: illustrate file processing	**K2**
CO4: describe the functions of clojure	**K1**
CO5: predict macros and utilize Java and JVM	**K3**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	W	W	W	M	M	M	S	S	M	M	S
CO2	S	S	S	S	M	M	M	S	S	M	M	S
CO3	S	S	S	S	M	M	M	S	S	M	S	S
CO4	S	M	M	M	M	M	M	S	S	M	M	S
CO5	S	S	S	S	S	M	M	S	S	S	S	S

Prepared & Verified By	Dr.M.Muralidharan

Course	Code	CODING SKILL	Sem	Hrs	Cre
CS			IV	2	1

Objectives:

The course aims to

- train the students to create the logics and write the programs by their own
- prepare students to attend interview for jobs in IT industry. Students will learn key problem solving strategies specific to technical/coding interview

Course Code & Title	MOBILE APPLICATION DEVELOPMENT		
CC17	Semester V	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K 4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand the Android OS and application architecture and its installation. ➢ build user interfaces with Layout, Form widgets and enhance the application with fragments. ➢ present menus via the Android action bar and handle menu selections. ➢ store application data on the mobile device, in internal or external storage locations with an exposure about databases and content providers. ➢ understand the principles of graphics, messaging, sound and video and give an exposure to generating signed APK and Publishing it.		

PREREQUISITIES

Scripting Languages
Programming in JAVA
Data base System

UNIT – I:

Android Introduction: An Open Platform for Mobile Development – Native Android applications – Android SDK features – Evolution- development of android for mobile – Development framework. **[12 Hrs]**

UNIT – II:

Android application development: installation – Creating application – Types of Applications – Android development tools. Creating Applications and activities: Application Manifest file – Manifest editor – Externalizing the resources – Android application life cycle – Android application class- android activities. **[12 Hrs]**

UNIT – III:

Building user interfaces: Fundamental UI Design – Layouts – Fragments – Widget Tool box – Creating new views – introducing adapters. **[12 Hrs]**

UNIT – IV

Databases and content providers: Android databases – working with SQLite databases – Creating content providers – Native android content providers - Introducing the Action Bar – Creating and Using Menus and Action bar action items – Introducing Dialogs – Introducing notifications. **[12 Hrs]**

UNIT – V

Supporting and optimizing for different screen sizes- creating scalable graphic assets - Working with animations-Audio, Video and using the Camera - introducing SMS and MMS – signing and publishing application. **[12 Hrs]**

Books for Study

1. Reto Meier, ***"Professional Android 4 Application Development"***, WROX Publication – Wiley – India, 2012

Books for Reference:

1. Pradeep Kothari &Kogent Learning Solutions Inc, ***"Android Application Development Black Book"***, Dreamtech Press, Edition 2014, ISBN: 978 – 93 – 5119 – 409 –5.
2. W.FrankAbleson, RobiSen, Chris King, C.Enrique Ortiz, ***"Android in Action"***, Manning Publications Co,Third Edition, ISBN 9781617290508
3. Lauren Darcey, Shane Conder, ***"SAMS Teach Yourself Android Application Development in 24 Hours"***, Second edition.

Web References:

1. https://developer.android.com/guide/
2. https://studytonight.com/android
3. Toy tube Play list: android tutorial for beginner's slidenered.

Course Outcomes:
On Completion of the course the student will be able to

CO1: understand the Application Architecture, lifecycle, configuration files, etc.	**K2**
CO2:illustrate various application components like Activities, Fragments, and Content Provider etc.	**K3**
CO3: design the User Interface.	**K3**
CO4:write simple mobile applications.	**K4**
CO5: generate the APK and Publishing it on Android Market.	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	M	M	M	S	S	S	M	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	M	M	M	S	S	M	S	S	M	S	S
CO4	S	S	M	M	S	M	M	S	S	S	S	S
CO5	S	S	S	S	S	M	S	S	S	S	S	S

Prepared By	Mr P. Velmurugan
Verified By	Dr.M.Muralidharan

Course Code & Title	.NET PROGRAMMING		
CC18	Semester V	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ understand the architecture and frame work of .NET ➢ familiar with the concepts of C# ➢ impart knowledge in ASP .NET and Ado .NET ➢ give up-to-date knowledge in different controls and tools ➢ give exposure to database connectivity		

PREREQUISITIES

Programming in JAVA

Data Base System

UNIT – I:

The NET Architecture: The vision and goals of . NET – The building blocks of NET – An Overview of. NET framework: The NET Evolution – Design goals of the NET frame work – The NET framework Architecture – An Overview of .NET application. **[12 Hrs]**

UNIT – II:

The creation of C# - An overview of C# - Data types, Literals, and Variables – Operators – Control Statements – Introducing Classes and Objects – Arrays and Strings – Methods - Operator Overloading. **[12 Hrs]**

UNIT – III:

Indexes and Properties – Inheritance – Interfaces , Structures, Enumerations – Exception Handling – Delegates, Events, Lambda Expressions – Namespaces, Preprocessor, and Assemblies. **[12 Hrs]**

UNIT – IV:

ASP .NET Overview of ASP .Net Frame work – Overview of CLR – Class Library –Overview of ASP .Net Control – Understanding of HTML Controls – Study of Standard Controls – Validation Controls – Rich Controls – Adding controls to forms –Handling events and using various Tools. **[12 Hrs]**

UNIT – V:

ADO .NET Fundamentals – Component Object Model – ODBC – OLEDB and SQL Connected mode – Disconnected Mode – Data Set – Data Reader – Data Access Control – Grid View Control – Other controls. **[12 Hrs]**

Books for Study:

1. Stephen C. Perry, AtulKahate, Stephen Walther, Joseph Mayo," ***Essentials of .Net and Related Technologies: With a focus on C# , XML, ASP .NET and ADO .NET***", First Edition, Pearson Education., 2009.
2. Herbert Schildt, "**The Complete Reference C# 4.0",** 1st edition (1 July 2017), McGraw Hill Education.
3. Kevin Hoffman & Jeff Gabriel, "***Professional .NET Framework***", Shroff Publishers and Distributors Pvt. Ltd.

Web References:

1. https://memberfiles.freewebs.com/02/83/78118302/documents/McGraw.Hill.CSharp.4.0.The.Complete.Reference.Apr.2010.pdf
2. https://jignesh272.files.wordpress.com/2011/09/object-oriented-programming-using-c-sharp.pdf

Course Outcomes:

On completion of the course the student will be able to

CO1: utilize the features of Dot Net Framework along with the features of C#	**K2**
CO2: apply ASP.NET todesign web applications	**K3**
CO3: use ASP.NET controls in web applications.	**K2**
CO4: debug and deploy ASP.NET web applications	**K4**
CO5: create database driven ASP.NET web applications and web services	**K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	S	S
CO2	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S	S	S
CO4	S	M	M	S	S	M	M	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mr C. Yogaraj
Verified By	Dr.M.Muralidharan

Course Code & Title	COMPILER DESIGN		
CC19	Semester V	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand translators and its functions with phases of a compiler ➢ inculcate thorough knowledge in Parsers ➢ categorize intermediate code generation techniques ➢ give exposure in data structures for symbol table and error handler ➢ describe different methods to generate object code.		

PREREQUISITES

Operating System
Problem solving using C& C++
Data Structures and Algorithms
Programming in JAVA

UNIT – I:

Introduction to Compilers –Compilers and translators – assembly language – macros – structure of compiler – Compiler writing tools – bootstrapping. Lexical analysis – role of lexical analyzer – regular expression – finite automata – implementation of lexical analyzer – context free grammars – derivation and parse trees. **[12 Hrs]**

Self- Study: Compiler writing tools, implementation of simple lexical analyzer in C

UNIT – II:

Parsers – shift reduce parsing – operator precedence parsing – top down parsing –predictive parsers – simple precedence parser – LR parsers – constructing SLR parsing tables – constructing canonical LR parsing table – constructing LALR parsing tables –using ambiguous grammars. **[14 Hrs]**

UNIT – III:

Syntax directed translation schemes – implementation of syntax directed translationschemes – intermediate code– postfix notation – parse trees and syntax trees – threeaddress code, quadruples and tuples – translation of assignment statements – Booleanexpression – postfix translation. **[12 Hrs]**

UNIT – IV:

Symbol table – the contents of a symbol table – data structures for symbol tables – representing scope information – Errors – lexical phase errors – syntactic phase errors– Semantic errors. **[10 Hrs]**

UNIT –V:

Code optimization – principle sources of optimization – loop optimization – machinedependent optimization – DAG representation in basic blocks. Code generation –problems in code generation – a simple code generator – register allocations andassignment – Code generation from DAG's – Peep hole optimization. [**12 Hrs]**

Self- study: assembly language instructions.

Book for Study:

1. A.V.Aho and J D Ullman, "***The Principles of Compiler Design***" ,Narosa Publishing House, 1987, ISBN: 81-85015-61-9.(Chapters: 1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 15)

Books for Reference:

1. Alfred Aho, Ravi Sethi, Jeffy D. Ullman, "***Compilers – Principles, Techniques and Tools***", Pearson Education Asia, 2003
2. Dick Grune, Kes van Reeuwijk, Henri E.bal, Ceriel J H Jacobs, KoenLangendoen, ***"Modern Compiler Design"***, Second edition.

Web references

1. www.nptel.ac.in/courses/106108052/
2. www.nptel.ac.in/downloads
3. www.tutorialspoint.com/compiler_design/
4. www.geeksforgeeks.org/compiler-design-tutorials/

Course Outcomes:

On completion of the Course, the student should be able to

CO1: classify various types of translators and its functions and identify phases of compiler	**K2**
CO2: design lexical analyzer and identify the similarities and differences among different parsing techniques	**K3**
CO3: formulate the different representation of intermediate code	**K3**
CO4: utilize parsers and symbol tables to identify errors from different phases	**K4**
CO5: explain the conversion of optimized code to object code.	**K2**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	M	M	M	S	S	M	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	M	M	M	M	S	S	M	M	S
CO4	S	M	W	W	M	M	M	S	S	M	S	S
CO5	S	S	M	M	M	S	M	S	S	M	M	S

Prepared By	Dr.J.Saigeetha
Verified By	Dr.M.Muralidharan

Course Code & Title	MOBILE APPLICATION DEVELOPMENT LAB		
CC20	**Semester V**	**Credits: 2**	**Hours: 4**
Cognitive Level	**K3: Apply** **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ apply layouts, views and events to solve simple problems ➢ design and develop applications using SQlite ➢ develop applications using multimedia objects		

PREREQUISITIES

Scripting Languages
Programming in JAVA
Data base System
Web Design and Development

Solve Problems using

- Layouts
- Views
- Events
- Preferences
- Notification
- Programs using SQlite
- Audio and Video Applications
- Messaging Applications
- Camera
- Action Bar
- Alert Dialogs
- Signed APK generation

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes:
On Completion of the course the student will be able to

CO1: design User Interface using various components	**K4**
CO2: implement applications with database	**K3**
CO3: write applications with multimedia objects	**K3**
CO4:build the given simple applications with action and alert dialogs	**K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	M	S	M	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mr P. Velmurugan
Verified By	Dr.M.Muralidharan

Course Code &Title	.NET LAB		
CC21	Semester V	Credits: 2	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ apply standard controls to design windows based applications ➢ develop programs using Asp.net and rich controls ➢ Create web pages with ADO.NET ➢ design the web page for the given problem		

PREREQUISITIES

Programming in JAVA

Data Base System

Building Windows Based Applications

Standard Controls

Components

Forms

Menus and Dialogues

Validating user input

Working with

Asp.net controls

Rich controls

Validation Controls

Web Applications development

Accessing Data with ADO.NET

Session Tracking

Problem solving Assignments

The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes:
On Completion of the course the student will be able to

CO1: design and develop user interfaces	**K3**
CO2:implement different controls	**K4**
CO3: create a database and access it using ADO.NET	**K6**
CO4: build simple web applications	**K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	S	S
CO2	S	S	S	S	S	M	M	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	MrC.Yogaraj
Verified By	Dr.M.Muralidharan

Course Code & Title	CLOUD COMPUTING		
EC3a	Semester V	Credits: 4	Hours: 4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:**Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand various types of clouds ➢ learn cloud computing architecture ➢ familiar with cloud computing applications ➢ learn Cloud based online tools and real time applications. ➢ recognize cloud security and its issues		

PREREQUISITIES

Service oriented Architecture

UNIT –I:

Introduction to Cloud Computing: Roots of Cloud Computing - Layers and Types of Cloud – Features of a cloud-Infrastructure Management-Cloud Services-Challenges and Risks. Migrating into a Cloud: Approaches –Seven Step Model.Introduction- Broad Integration as a Service-Integration Methodologies- SaaS. **[18 Hrs]**

UNIT –II:

The Anatomy of Cloud Infrastructure- Distributed Management of Virtual Infrastructures- Scheduling Techniques for Advance Reservation of Capacity- RVWS Design – Cluster as a Service: The Logical Design – Cloud Storage : from LANs TO WANs- Technologies for Data Security in Cloud Computing . **[15 Hrs]**

UNIT –III:

Collaborating on Project Management: Understanding Project Management - Exploring Project Management Applications - Collaborating on Word Processing: How Web-Based Word Processing Works - Exploring Web-Based Word Processors - Collaborating on Spreadsheets: How Web-Based Spreadsheets Work - Exploring Web-Based Spreadsheets - Collaborating on Databases: Understanding Database Management - Exploring Web-Based Databases - Collaborating on Presentations: Preparing Presentations Online - Evaluating Web-Based Presentation Applications. **[15 Hrs]**

UNIT –IV:

Storing and Sharing Files and other online contents: Understanding Cloud Storage - Evaluating Online File-Storage and Sharing Services - Exploring Online Bookmarking Services— Sharing Digital Photographs: Exploring Online Photo- Editing Applications - Exploring Photo-Sharing Communities - Controlling it all with web based Desktops: Understanding Web-Based Desktops - Evaluating Web Based Desktops - Collaborating via web based Communication Tools: Evaluating Web Mail Services - Evaluating Instant Messaging Services - Evaluating Web Conferencing Tools. **[15 Hrs]**

UNIT –V:

Grid and Cloud- HPC in the Cloud: Performance related Issues –Data Security in the Cloud- The Current State of Data Security in the Cloud- Homo Sapiens and Digital Information- Risk-Identity- The Cloud, Digital Identity and Data Security – Content Level Security: Pros and Cons-Legal Issues in Cloud Computing–Data Privacy and Security Issues-Cloud Contracting models.
[12 Hrs]

Books for Study:

1. RajkumarBuyya, James Broberg, and AndrzejGoscinski. ***"Cloud Computing Principles and Paradigms"*** 2011 .(UNIT I, II, V), ISBN: 978-0-470-88799-8
2. Michael Miller***" Cloud Computing: Web Based Applications that change the way You work and collaborate online***, Pearson Education, 2009 edition.(UNIT III,IV) ISBN: 9788131725337

Book for Reference:

1. George Reese" ***Cloud Application Architectures",*** Shroff/O' Reilly,2009,ISBN: 8184047142

Web References:

1. http://calvary.cponus.com/cp/wp-content/uploads/2013/05/CloudComputingPrinciplesandParadigmsChapter3ENRICHINGTHEINTE.pdf
2. http://chettinadtech.ac.in/storage/13-01-21/13-01-21-08-33-12-1373-mahendra.pdf

Course Outcomes:

At the end of the course the student will be able to:

CO1:recognise various types of clouds service and deployment models	**K1**
CO2: acquire cloud computing architecture	**K2**
CO3: identify and analyzebasic cloud collaborating applications	**K2**
CO4: identify and Analyzeadvanced cloud collaborating applications	**K4**
CO5: summarize Cloud security and its importance to real time applications	**K3**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	S	S	S	M	S	S	M	S	S
CO2	S	S	S	M	S	S	M	S	S	M	S	S
CO3	S	S	S	S	S	M	M	S	S	M	S	S
CO4	S	S	S	S	S	M	M	S	S	M	S	S
CO5	S	M	S	S	S	M	M	S	S	M	S	S

Prepared By	DrD.Jayachitra
Verified By	Dr.M.Muralidharan

Course Code & Title	DIGITAL IMAGE PROCESSING		
EC3b	**Semester V**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ study the components and elements of digital image ➢ impart knowledge in various domain for image enhancement ➢ introduce the concepts filtering images ➢ familiar with different compression techniques. ➢ identify the methods of representing images and recognize them.		

PREREQUISITIES

Computer Graphics

UNIT – I

DIGITAL IMAGE FUNDAMENTALS: Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels color models. **[15 Hrs]**

UNIT – II

IMAGE ENHANCEMENT: Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening; Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters. **[15 Hrs]**

UNIT – III

IMAGE RESTORATION AND SEGMENTATION : Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation Morphological processing erosion and dilation.**[15 Hrs]**

UNIT – IV

WAVELETS AND IMAGE COMPRESSION: Wavelets – Sub band coding Multire solution expansions Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.**[15 Hrs]**

UNIT – V

IMAGE REPRESENTATION AND RECOGNITION : Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, momentsRegional Descriptors – Topological feature, Texture Patterns and Pattern classes Recognition based on matching. **[15 Hrs]**

Books for Study

1. Rafael C. Gonzales, Richard E. Woods, "***Digital Image Processing***", Third Edition, Pearson Education, 2010.

Books for Reference

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "***Digital Image Processing Using MATLAB***", Third Edition Tata McGraw Hill Pvt. Ltd., 2011.
2. Anil Jain K. "***Fundamentals of Digital Image Processing***", PHI Learning Pvt. Ltd., 2011.
3. William K Pratt, "***Digital Image Processing***", John Willey, 2002

Course Outcomes:

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

CO1: explain the fundamentals of digital image **K2**

CO2: apply various methods and techniques to enhance the image **K3**

CO3: classify the techniques for filtering and segmentation **K4**

CO4: classify compression, decompression techniques and standards. **K4**

CO5: illustrate image representation and pattern matching **K2**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	M	S
CO2	S	S	S	S	S	M	M	S	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	M	S	S
CO4	S	S	M	M	S	M	S	S	S	M	S	S
CO5	S	M	M	M	S	M	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	SOFTWARE TESTING		
EC3c	**Semester V**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learn the principles of testing and Life cycle models ➢ understand various testing techniques ➢ familiar with the preparation of test plans and test cases ➢ know the tools for Test automation		

PREREQUISITIES

Software Engineering

UNIT -- I:

PRINCIPLES OF TESTING: Context of Testing in Producing Software – Principles of Testing –Dijkstra's Doctrine – A Test in Time –Test the Tests First- The Pesticide Paradox –The Ends of Pendulum – Men in Black – Automation Syndrome. **SOFTWARE DEVELOPMENT LIFE CYCLE MODELS:** Phases of Software Project – Quality, Quality Assurance and Quality Control – Testing, Verification and Validation – Process model to Represent Different Phases – Life cycle models –Comparison of Various Life Cycle Models.

[15 Hrs]

UNIT -- II:

WHITE BOX TESTING: Classification of White Box Testing – Static testing – Static Testing by Humans– Methods of Static Testing - Static Analysis Tools – Code Review Checklist - Structural Testing –Unit/Code testing – Code Coverage Testing – Code Complexity Testing – Challenges in White Box Testing. **BLACK BOX TESTING:** Need for Black Box Testing – Techniques for Effective Black box testing - Requirements Based Testing – Positive and Negative Testing – Boundary Value Analysis –Decision Tables – Equivalence Partitioning – State Based or Graph Based Testing – Compatibility Testing – User Documentation Testing – Domain Testing. **[15 Hrs]**

UNIT -- III:

INTEGRATION TESTING: Integration Testing - Integration Testing as a Type of Testing – Top- Down Integration – Bottom-Up Integration – Bi-directional Integration – System Integration – Choosing Integration Method – Integration Testing as a Phase of Testing – Scenario Testing – Defect Bash . **SYSTEM AND ACCEPTANCE TESTING :** System Testing

Overview – Need for System Testing -Functional Versus Non-functional System Testing - Design/ Architecture Verification – Business Vertical Testing- Deployment Testing – Beta Testing – Certification, Standards and Testing for Compliance – Non Functional Testing – Setting up the Configuration – Scalability Testing – Reliability testing – Stress Testing – Interoperability Testing – Acceptance Testing – Acceptance Criteria –Selecting Test Cases for Acceptance Testing – Executing Acceptance Tests. **[15 Hrs]**

UNIT -- IV:

PERFORMANCE TESTING: Introduction – Factors governing Performance Testing – Methodology for Performance Testing – Collecting Requirements – Writing Test Cases – Automating Performance Test Cases – Executing Performance Test Cases – Analyzing the Performance Test Results – Performance Tuning – Performance Benchmarking – Capacity Planning – Tools for Performance Testing. **REGRESSION TESTING**: Need for Regression Testing - Types of Regression Testing – Regression Testing Phase- Method for Conducting Regression Testing- Performing an Initial Smoke or Sanity Test – Understanding the criteria for selecting the test cases – Classifying Test Cases – Methodology for Selecting the Test Cases – Resetting the Test Cases for Regression Testing – Results of Regression Testing – Best practices in Regression Testing. **[15 Hrs]**

UNIT -- V:

S/W TEST AUTOMATION: Introduction – Terms Used in Automation -Skills Needed for Automation-Scope of Automation- Design and Architecture for Automation-Generic Requirements for Test Tool/Framework-Process Model for Automation –Selecting a Test Tool-Criteria for Selecting a Test Tool –Steps for Tool Selection and Deployment-Automation for Extreme Programming Model-Challenges in Automation. **[15 Hrs]**

Book for Study:

1. SrinivasanDesikan and Gopalswamy Ramesh, ***"Software Testing: Principles and Practices"***, PearsonEducation Publication

Books for Reference:

1. Ron Patton, "***Software Testing***", 2nd Edition, Pearson education , 2004
2. RenRajani, Pradeep Oak, "***Software testing – effective methods tools, techniques***" TMH, 2004

Web References:

1. https://www.slideshare.net/testplan.ppt
2. https://www.template.org/testplan
3. https://www.softwaretestinghelp.com

Course Outcomes

On completion of the Course, the student will be able to

CO1: explain testing life cycle models	**K2**
CO2: distinguish different testing techniques	**K3**
CO3:illustrate test plans and test cases preparation	**K2**
CO4: apply the test cases to verify and validate the software product	**K3**
CO5: choose tools for test automation	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	M	M	M	S	S	M	M	S
CO2	S	M	M	M	M	M	M	S	S	M	M	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Dr.D.Jayachitra
Verified By	Dr.M.Muralidharan

Course Code & Title	BIG DATA ANALYTICS		
EC4a	Semester V	Credits: 4	Hours: 4
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand the evolution and basics of Big data ➢ study mining of Data streams ➢ learn Hadoop, map reduce and its environment ➢ familiar with the features and working of map reduce ➢ inculcate the creation of Hadoop cluster and extend the framework of Big Data Analytics		

Prerequisite

Data mining and warehousing

UNIT – I

The Fundamentals of Big Data: The Evolution of Data Management-Understanding the Waves of Managing Data-Defining Big Data-Big Data Management Architecture-Traditional and advanced analytics. **Big Data Types:**Defining Structured Data-Defining Unstructured Data. **Technology Foundations of Bigdata:** Big data Stack(technology Components) – Big data Analytics- Big data Applications. **Virtualization and Distributed Computing:** Understanding the basics of virtualization- importance of virtualization to Big Data**. [15 Hrs]**

UNIT – II

MINING DATA STREAMS : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window. [**15 Hrs]**

Self-Study: Real time Analytics Platform(RTAP) Applications.

UNIT – III

HADOOP: History of Hadoop- The Apache Hadoop Project –The Hadoop Distributed File System:Design of HDFS-HDFS Concepts-The command Line Interface- Java interfaces- Data Flow: Anatomy of a File Read- Anatomy of a File Write**. MAP REDUCE**: How Map Reduce Works:Anatomy of a Map Reduce Job run – Progress and Status updates – Failures – Job Scheduling -Shuffle and Sort: The Map side – The Reduce side – Configuration Tuning.

[15 Hrs]

UNIT –IV

Map Reduce Types and Formats: Map Reduce types – Input Formats – Output Formats. **Map Reduce Features:** Counters: Built-in Counters– User Defined java Counters – Dynamic Counters- User-Defined Streaming Counters-Sorting-Joins. **HADOOP ENVIRONMENT**: Setting up a Hadoop Cluster - Cluster specification –Network Topology - Cluster Setup and Installation - Hadoop Configuration.**[15 Hrs]**

UNIT -- V

ADMINISTRATING HADOOP: HDFS: Persistent Data Structures – Safe Mode – Audit Logging – Tools.Monitoring - Maintenance: Routine Administration Procedures-Commissioning and Decommissioning Nodes-Upgrades.**FRAMEWORK:**Pig : Installing and Running Pig- Grunt-Comparison with Databases-Pig Latin: Structure – Statements – Expressions- Data processing operators: Loading and Storing – Filtering data – Grouping and Joining Data – Sorting Data- Combining and Splitting Data.**[15 Hrs]**

Books for Study

1. Judith Hurwitz, Alan Nugent, Dr.FernHalper and Marcia Kaufman,"***Big data for dummies"***, John Wiley & Sons, Inc 2013.ISBN: 978-1-118-50422-2.UNIT I: Chapters 1,2,4&5
2. AnandRajaraman and Jeffrey David Ullman, "***Mining of Massive Datasets***", Cambridge University Press, 2012.UNIT-II:Chapter 4(4.1-4.7)
3. Tom White "***Hadoop: The Definitive Guide***" Fourth Edition, O'reilly Media, 2012.**UNIT III**: Chapter I, III,VI**UNIT IV**: VII, VIII, IX **UNIT V**: Chapters X & XI

Books For reference

1. Michael Berthold, David J. Hand, "***Intelligent Data Analysis***", Springer, 2007.
2. Alan Gates, ***"Programming Pig"***, O'reilly Media, First Edition 2011

Web References

1. https://youtu.be/TG48mumSlaw: Flajolet Martin Algorithm
2. https://youtu.be/JZDNBfnYwe4: AMS algorithm
3. https://pig.apache.rg/docs/latest/start.html
4. www.hadoop.apache.org

Course Outcomes

On completion of the Course, the student should be able to

CO1: Analyze evolution and concepts of big data	**K2**
CO2: Predict mining data from data sets using various methods and techniques	**K3**
CO3: Outline Hadoop and Mapreduce functions and its environment	**K2**
CO4: Explain different working principles of Mapreduce	**K3**
CO5: Formulate Hadoop cluster and select appropriate tool	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	W	W	M	M	M	S	S	M	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	M	M	M	M	M	M	S	S	M	M	S
CO4	S	S	M	M	S	S	M	S	S	M	S	S
CO5	S	S	S	S	S	S	M	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi &Mrs.R.Jaya
Verified By	Dr.M.Muralidharan

Course Code & Title	COMPUTER FORENSICS		
EC4b	Semester V	Credits: 4	Hours: 4
Cognitive	**K – 1:** Recall		

Level	**K – 2:** Understand **K – 4:** Analyze
Learning Objectives	**The course aims to** ➢ learn the basics of Computer Forensics ➢ give an exposure selection of workstation and data acquisition ➢ imbibe the importance of registry ➢ **i**mpart knowledge on current tools ➢ **k**now about various forensics & ethics

PREREQUISITIES

Cyber Security

UNIT – I:

Computer Forensics and Investigation: Understanding Computer Forensics – Understanding computer investigation: Preparing a Computer Investigation – Systematic Approach – procedures for Corporate High-Tech investigations – Setting up Workstations – Conducting an Investigation. **[15 Hrs]**

UNIT- II:

Selecting a Basic Forensic Workstation – Data Acquisition: Storage Formats and Digital Evidence – Determining best acquisition method – Planning for Image acquisition – Using acquisition Tools – Using Remote Network Acquisition tools – Other Tools. [**15 Hrs]**

UNIT –III

Processing Crime and incident scenes: rules for controlling digital evidence- guidelines for processing law enforcement crime scenes - steps in preparing for an evidence search - secure a computer incident or crime scene - procedures for storing digital evidence - obtain a digital hash – Working with Windows and Dos Registry: File Systems – File Structure – Examining NTFS Disks – Disk encryption – Windows Registry. **[15 Hrs]**

UNIT –IV:

Current Forensics Tools: Evaluating Computer Forensics Tool Needs- Types of Forensics Tools- Tasks performed by Computer Forensic Tools- Tool Comparisons- Computer Forensics Software Tools- Computer Forensics Hardware Tools- validating and testing forensics software – Forensics analysis and Validation: Determining data to collect and analyze – Validating forensic data – Addressing Data Hiding Techniques – Methods of performing remote acquisition. .

[**15 Hrs]**

UNIT – V:

Recovering Graphic Files – Email Investigations – Cell Phone and Mobile Device Forensics – Guidelines for writing reports- Preparing Testimony- Applying Ethics and Code to Expert Witnesses. **[15 Hrs]**

Book for Study:

1. Bill Nelson, Amella Phillips and Christopher Steuart, ***"Guide to Computer Forensics and Investigations"***, Fourth Edition.

Book for Reference:

1. Dr. Darren R.Hayes,***"A Practical Guide to Computer Forensics Investigation"***, Pearson Education Inc, 2015

Web Reference:

1. https://study.com/articles/become_a_computer_forensics_investigator_career_roadmap

Course Outcomes:

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

CO1: describe forensics evolution, type and benefits	**K1**
CO2: explain the workstation selection and data acquisition	**K2**
CO3: handle file systems and registry	**K2**
CO4: analyze various tools	**K4**
CO5: familiar with different forensics and ethics	**K1**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	W	W	W	S	W	M	S	S	M	M	S
CO2	S	M	M	W	S	M	S	S	S	M	S	S
CO3	S	S	M	M	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	M	M	M	M	M	M	S	S	M	M	S

Prepared By	Dr.S.Murugan
Verified By	Dr.M.Muralidharan

Course Code & Title	**SOFTWARE PROJECT MANAGEMENT**		
EC4c	**Semester V**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K1:** Recall **K2:** Understand **K3:**Apply **K4:** Analyze		
Learning	**The course aims to**		

Objectives	➢ study the importance and evolution of Software Project Management ➢ understand the Framework and architectures ➢ know about planning and automation ➢ distinguish process control and software metrics ➢ conversantwith risk management concepts

PREREQUISITIES

Software Engineering

UNIT –I

Software Management Renaissance: Conventional Software Management –Evolution of Software Economics: Software Economics – Pragmatic Software Cost Estimation - Improving Software Economics: Reducing Software Product Size – Improving Software processes – Improving team effectiveness – Improving Automation through Software Environments – Achieving required quality - The Old Way and the New: The principles of conventional Software Engineering – The Principles of Modern Software Management – Transitioning to an iterative process.**[15 Hrs]**

UNIT –II

A Software Management Project Management Process Framework: Life-Cycle Phases: Engineering and Production phases – Inception phase – Construction phase –. Elaboration phase - Transition phase.Artifacts of the Process: Artifact sets – The management artifacts – Engineering artifacts – Pragmatic artifacts- Model-Based Software Architectures - Work Flows of the Process - Check Points of the Process. **[15 Hrs]**

UNIT –III

Software Management Disciplines: Iterative Process Planning: Work Break down structures – Planning Guidelines - The cost and schedule estimating process – The iteration planning process. Project Organizations and Responsibilities: Line of business organizations – Project organizations – Evolution of organizations. Process Automation: Tools: Automation building blocks – The Project Environment.**[15 Hrs]**

UNIT –IV:

Software Management Disciplines: Project Control and Process Instrumentation: The seven core metrics - Management indicators – Quality indicators – Life cycle expectations – Pragmatic Software metrics – Metrics automation -Tailoring the Process: Process discriminants . **[15 Hrs]**

UNIT –V:

Risk Management: Introduction - Risk - Categories of risk - A framework for dealing with risk - Risk Identification - Risk assessment - Risk planning - Risk management -Evaluating risks to schedule - Applying the PERT technique - Monte Carlo simulation- Critical chain concepts.

[15 Hrs]

Books for Study:

1. Walker Royce, ***"Software Project Management"***, First Edition, Pearson Education. **ISBN-10:** 8177583786, **ISBN-13:** 978-8177583786 Unit I: Chapters 1-4 Unit II: Chapters 5 – 9 Unit III: Chapters 10-12 Unit IV: Chapters 13 & 14
2. Joel Henry, "***Software Project Management: A Real world guide to Success"***, Pearson Education. ISBN-13: 97881 317179290201758658
3. Roger S. Pressman, "***Software Engineering",*** TMH Publications

Course Outcomes:

On completion of the course the student will be able to

CO1: explain conventional software management and software economics **K1**

CO2: illustrate Project management framework **K3**

CO3: describe process planning, project organizations and process automation **K2**

CO4: familiar with software management disciplines **K2**

CO5: Identify various risk management policies **K1**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	W	W	M	S	S	S	S	M	W	S
CO2	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	M	M	W	W	W	M	S	S	M	M	S
CO5	S	M	M	W	M	M	M	S	S	S	M	S

Prepared & Verified By	Dr.M.Muralidharan

Course Code & Title	ONLINE COURSE(MOOCS)		
OC	Semester V	Credit:1	Hours: 2
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning			

Objectives	The course aims to ➢ motivate the students to sharpen their creativity, logical thinking and Professional approach in solving the problems.

Methodology:
The Student shall undergo a professional skill oriented courses which will create employability, inculcate entrepreneurship and converting a trainee into a trainer.

The Courses may be offered by the college or by the University or Any Recognised Institute or through Massive Open Online Courses (MOOC). The student shall submit a certificate and grading awarded by the institute concern to earn the credit.

Courses Updated based on UGC-NET Syllabus

UGC-NET Syllabus	**MCA Programme Courses**
Unit-I: Discrete Structures and Optimization	Mathematical Foundation in Computer Science: Unit III & Unit V
	Statistics and Linear Programming: Unit V
Unit 2: Computer System Architecture	Digital Design and Architecture
Unit 3: Programing languages and Computer Graphics	Problem solving using C and C++
	Programing in JAVA
	Distributed Programming using J2EE – Unit II
	Computer graphics
Unit 4: Database management Systems	Data base system
	Data mining and warehousing
	Big data Analytics: Unit I to IV
Unit 5: System Software and Operating System	Principles of Operating System
Unit 6: Software Engineering	Software Engineering
	Software Testing: Unit I & IV

Unit 7: Data Structures and Algorithms	Data Structures and Algorithms
Unit 8: Theory of Computation and compilers	Compiler Design
Unit 9: Data Communication and Computer Networks	Computer Network
	Mobile Computing: Unit I, II &III
	Cloud Computing: Unit I & II
	Internet of Things- Unit I & II

2019-20		
Semester	**Title**	**Changes Made**
I	Problem Solving using C &C++	C++ is added with Programming in C to form a new course
	Principles of Operating System	No Change
	Digital Design and Architecture	No Change
	C& C++ Lab	C Lab moved from Semester II & C++ is combined
	Shell Programming Lab	System Administration is changed to Shell Programming
II	Programming in JAVA	Moved from Semester III to II
	Data Base System	No Change
	Data Structures and algorithms	No Change
	JAVA Lab	Moved from Semester III to II
	Data Base lab	No Change
III	Scripting languages	New Course
	Web Design & Development [PHP, MySql, AJAX and JOOMLA]	Added CMS & removed OOP
	Data Mining and Warehousing	Moved from Elective course to Core course
	Scripting Lab	New Course
	Web Design Lab	No Change

Semester	Title	Changes Made
IV	Game Design and Development using Python	Updated the contents
	Distributed Programming using J2EE	No Change
	Software Engineering	Case Study or document preparation is added
	Game Development Lab	No Change
	J2EE Lab	No Change
V	Mobile Application Development	No Change
	.NET Programming	Added C#.NET
	Compiler Design	No Change
	Mobile Application Development Lab	No Change
	.NET Lab	No Change

ELECTIVES-2019

TITLE	CHANGES MADE
Service Oriented Architecture	AWS added
Computer Graphics	
Mobile Computing	
Machine Learning	
Cyber Security	New Course
Functional Programming	Clojure added
Cloud Computing	
Digital Image Processing	
Software Testing	
Big Data Analytics	Contents modified
Computer Forensics	New course
Software Project Management	
IOT (OEC)	New course
Embedded System(OEC)	New course

Salient Features

- Core Courses forentrepreneur(Software Development) : Web, Game & Mobile Apps
- Electives based on current technologies: Big Data Analytics, Cloud Computing, Machine Learning and IOT
- Problem Solving Assignments forPractical Courses
- One Credit Courses
  - Coding Skill
  - Online Courses(MOOCs)