

# NANDHA ENGINEERING COLLEGE

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE, New Delhi)  
Erode-638 052, Tamilnadu, India, Phone: 04294 – 225585



Curriculum and Syllabus  
for  
Master of Computer Applications [R15]

(This Curriculum and Syllabi are applicable to Students admitted from the academic year [2015-2016] to [2016-2017])

**JUNE 2017**

Approved by Fifth Academic Council

**NANDHA ENGINEERING COLLEGE**  
**(Autonomous Institution Affiliated to Anna University, Chennai)**  
**DEPARTMENT OF COMPUTER APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS**  
**(For the students admitted during 2015-2016 and onwards)**

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

The following Programme Educational Objectives are designed for M.C.A. programme in Computer Applications based on the Department Mission to provide higher education and motivate research in the field of Computer Applications

- PEO1 To excel in fundamentals, problem solving and programming skills in the various computing fields of IT Industries or for to pursue higher studies in the fields of teaching and research.
- PEO2 To demonstrate the capabilities in scientific knowledge, logical thinking and fundamental concepts of Computer Application.
- PEO3 To develop the ability to plan, analyze, design, code, test, implement & maintain software products for real time system.
- PEO4 To experience the students in finding solutions and developing system based applications for real time problems in various domains involving technical, managerial, entrepreneurial, economical & social constraints.

**PROGRAMME OUTCOMES (POs)**

Students in the Department of Computer Applications M.C.A programme should at the time of their graduation are in possession of:

- PO1. Understand and Apply mathematical foundation, computing and domain knowledge for the conceptualization of computing model of problems.
- PO2. Identify, Analyze the computing requirements of a problem and solve them using computing principles.
- PO3. Design and Evaluate a computer based system, components and process to meet the specific needs of applications.
- PO4. Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.
- PO5. Apply understanding of management principles with computing knowledge to manage projects in multidisciplinary environments.
- PO6. Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
- PO7. Understand economical, environmental, social, health, legal, ethical issues within local and global contexts and consequential responsibilities relevant to professional practice.
- PO8. Function effectively in a team environment to accomplish a common goal.
- PO9. Identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.
- PO10. Use knowledge to analyze, interpret the data and synthesis the information to derive valid conclusions using research methods.
- PO11. Ability to use the techniques, skills, and be familiar with modern software tools necessary for Computer Application practice.
- PO12. Expertise in developing application with required domain knowledge.



**NANDHA ENGINEERING COLLEGE (AUTONOMOUS), ERODE – 638 052**

**REGULATIONS – 2015**

**MASTER OF COMPUTER APPLICATIONS**

**CURRICULA: I - VI SEMESTERS**

**SYLLABI: V & VI SEMESTERS**

<b>SEMESTER : I</b>								
<b>SL. No.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>CONTACT PERIOD</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>								
1.	15CA101	Mathematical Foundation of Computer Science	BS	5	3	2	0	4
2.	15CA102	Problem Solving Techniques	PC	3	3	0	0	3
3.	15CA103	Programming in C	PC	3	3	0	0	3
4.	15CA104	Data Structures	PC	3	3	0	0	3
5.	15CA105	Accounting and Financial Management	HS	3	3	0	0	3
<b>PRACTICALS</b>								
6.	15CA111	Programming in C Laboratory	PC	2	0	0	2	1
7.	15CA112	Data Structures Laboratory	PC	2	0	0	2	1
8.	15CA113	Office Automation Laboratory	PC	2	0	0	2	1
9.	15CA114	Functional English-I	HS	2	0	0	2	1
<b>TOTAL</b>				25	15	2	8	20

<b>SEMESTER : II</b>								
<b>SL. No.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>CONTACT PERIOD</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>								
1.	15CA201	Object Oriented Programming	PC	3	3	0	0	3
2.	15CA202	Organizational Behavior	HS	3	3	0	0	3
3.	15CA203	Digital Fundamentals & Computer Organization	PC	3	3	0	0	3
4.	15CA204	Design and Analysis of Algorithms	PC	5	3	2	0	4
5.	15CA205	Operating Systems	PC	3	3	0	0	3
<b>PRACTICALS</b>								
6.	15CA211	Object Oriented Programming Laboratory	PC	2	0	0	2	1
7.	15CA212	Operating Systems Laboratory	PC	2	0	0	2	1
8.	15CA213	Algorithms Laboratory	PC	2	0	0	2	1
9.	15CA214	Functional English-II	HS	2	0	0	2	1
<b>TOTAL</b>				25	15	2	8	20

SEMESTER : III								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>THEORY</b>								
1.	15CA301	Resource Management Techniques	BS	5	3	2	0	4
2.	15CA302	Database Management Systems	PC	3	3	0	0	3
3.	15CA303	Software Engineering	PC	3	3	0	0	3
4.	15CA304	Object Oriented Programming with Java	PC	3	3	0	0	3
5.	15CA305	Advanced Data Structures and Algorithms	PC	3	3	0	0	3
<b>PRACTICALS</b>								
6.	15CA311	Database Management Systems Laboratory	PC	4	0	0	4	2
7.	15CA312	Object Oriented Programming with Java Laboratory	PC	4	0	0	4	2
8.	15CA313	Advanced Data Structures and Algorithms Laboratory	PC	4	0	0	4	2
9.	15CA314	Career Development Skills – I	HS	2	0	0	2	0
<b>TOTAL</b>				31	15	2	14	22

SEMESTER : IV								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>THEORY</b>								
1.	15CA401	Computer Networks	PC	3	3	0	0	3
2.	15CA402	Open Source Systems	PC	3	3	0	0	3
3.	E1	Elective I	PE	3	3	0	0	3
4.	E2	Elective II	PE	3	3	0	0	3
5.	E3	Elective III	PE	3	3	0	0	3
<b>PRACTICALS</b>								
6.	15CA411	Computer Networks Laboratory	PC	4	0	0	4	2
7.	15CA412	Open Source Systems Laboratory	PC	4	0	0	4	2
8.	E1L	Elective I Laboratory	PE	4	0	0	4	2
9.	15CA413	Career Development Skills – II	HS	2	0	0	2	0
<b>TOTAL</b>				29	15	0	14	21

SEMESTER : V								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>THEORY</b>								
1.	15CA501	Object Oriented Analysis and Design	PC	3	3	0	0	3
2.	15CA502	Data Science and Analytics	PC	3	3	0	0	3
3.	15CA503	Software Testing	PC	3	3	0	0	3
4.	E4	Elective IV	PE	3	3	0	0	3
5.	E5	Elective V	EEC	3	3	0	0	3
<b>PRACTICALS</b>								
6.	15CA511	Case Tools Laboratory	PC	4	0	0	4	2
7.	15CA512	Data Science and Analytics Laboratory	PC	4	0	0	4	2
8.	15CA513	Mini Project	PC	4	0	0	4	2
<b>TOTAL</b>				27	15	0	12	21

SEMESTER : VI								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CA631	Project Work	PC	-	0	0	24	12
<b>TOTAL</b>				-	0	0	24	12

**TOTAL NO. OF CREDITS: 116**



Approved by Fifth Academic Council

BASIC SCIENCES (BS)								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CA101	Mathematical Foundation of Computer Science	BS	5	3	2	0	4
2.	15CA301	Resource Management Techniques	BS	5	3	2	0	4

HUMANITIES AND SOCIAL SCIENCES (HS)								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CA105	Accounting and Financial Management	HS	3	3	0	0	3
2.	15CA202	Organizational Behavior	HS	3	3	0	0	3
3.	15CA114	Functional English - I	HS	2	0	0	2	1
4.	15CA214	Functional English –II	HS	2	0	0	2	1
5.	15CA314	Career Development Skills – I	HS	2	0	0	2	0
6.	15CA413	Career Development Skills – II	HS	2	0	0	2	0

PROFESSIONAL CORE (PC)								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CA102	Problem Solving Techniques	PC	3	3	0	0	3
2.	15CA103	Programming in C	PC	3	3	0	0	3
3.	15CA104	Data Structures	PC	3	3	0	0	3
4.	15CA201	Object Oriented Programming	PC	3	3	0	0	3
5.	15CA203	Digital Fundamentals & Computer Organization	PC	3	3	0	0	3
6.	15CA204	Design and Analysis of Algorithms	PC	5	3	2	0	4
7.	15CA205	Operating Systems	PC	3	3	0	0	3
8.	15CA302	Database Management Systems	PC	3	3	0	0	3
9.	15CA303	Software Engineering	PC	3	3	0	0	3
10.	15CA304	Object Oriented Programming with Java	PC	3	3	0	0	3
11.	15CA305	Advanced Data Structures And Algorithms	PC	3	3	0	0	3
12.	15CA401	Computer Networks	PC	3	3	0	0	3
13.	15CA402	Open Source Systems	PC	3	3	0	0	3
14.	15CA501	Object Oriented Analysis and Design	PC	3	3	0	0	3
15.	15CA502	Data Science and Analytics	PC	3	3	0	0	3
16.	15CA503	Software Testing	PC	3	3	0	0	3

PROFESSIONAL ELECTIVES (PE) – E1								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CAX01	C# and .Net Framework	PE	3	3	0	0	3
2.	15CAX02	Unix and Network Programming	PE	3	3	0	0	3
3.	15CAX03	Dynamic Programming Language	PE	3	3	0	0	3
4.	15CAX04	Scripting Language Programming	PE	3	3	0	0	3
5.	15CAX05	Web Application Development	PE	3	3	0	0	3

PROFESSIONAL ELECTIVES (PE) – E1L								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CAW11	C# and .Net Framework Laboratory	PE	4	0	0	4	2
2.	15CAW12	Unix and Network Programming Laboratory	PE	4	0	0	4	2
3.	15CAW13	Dynamic Programming Language Laboratory	PE	4	0	0	4	2
4.	15CAW14	Scripting Language Programming Laboratory	PE	4	0	0	4	2
5.	15CAW15	Web Application Development Laboratory	PE	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE) – E2								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CAX06	Professional Ethics	PE	3	3	0	0	3
2.	15CAX07	Principles of Management	PE	3	3	0	0	3
3.	15CAX08	Software Project Management	PE	3	3	0	0	3
4.	15CAX09	E-Commerce and M-Commerce	PE	3	3	0	0	3
5.	15CAX10	Management of Information System	PE	3	3	0	0	3

PROFESSIONAL ELECTIVES (PE) – E3								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CAX11	Cloud Computing	PE	45	3	0	0	3
2.	15CAX12	Mobile Computing	PE	45	3	0	0	3
3.	15CAX13	Cryptography and Network Security	PE	45	3	0	0	3
4.	15CAX14	TCP/IP Networks	PE	45	3	0	0	3
5.	15CAX15	Advanced Database Management Systems	PE	45	3	0	0	3

PROFESSIONAL ELECTIVES (PE) – E4								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CAX16	Technical Documentation	PE	3	3	0	0	3
2.	15CAX17	Data Mining and Data Warehousing	PE	3	3	0	0	3
3.	15CAX18	DB Administration	PE	3	3	0	0	3
4.	15CAX19	Ethical Hacking	PE	3	3	0	0	3
5.	15CAX20	Health Care Management	PE	3	3	0	0	3
6.	15CAX21	Social Network Analysis	PE	3	3	0	0	3
7.	15CAX22	Business Intelligence	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC) – E5								
SL. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD	L	T	P	C
<b>PRACTICALS</b>								
1.	15CAX23	Mobile Apps Development	EEC	3	3	0	0	3
2.	15CAX24	Designing Enterprise Applications	EEC	3	3	0	0	3
3.	15CAX25	Cloud Suite Business and Syteline Environment	EEC	3	3	0	0	3
4.	15CAX26	Internet of Things	EEC	3	3	0	0	3

## SEMESTER I

### 15CA101 MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

L	T	P	C
3	2	0	4

#### OBJECTIVES:

The course aims to provide necessary mathematical support and confidence to tackle the real life problems and getting prepared for industry demands for compiler engineers.

#### COURSE OUTCOMES:

At the end of the course the students would be able

CO1. To understand matrix and its usage in data representation.

CO2. To aware about the fundamental models of computation that underline modern computer hardware, software and programming languages.

CO3. To earn the foundations of automata theory.

#### UNIT I MATRIX ALGEBRA

(9+3)

Matrices, Rank of Matrix, Solving System of Equations-Eigen Values and Eigen Vectors-Inverse of a Matrix - Cayley Hamilton Theorem.

#### UNIT II BASIC SET THEORY

(9+3)

Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion - partitions- Permutation and Combination.

#### UNIT III MATHEMATICAL LOGIC

(9+3)

Propositions and logical operators - Truth table - Propositions generated by a set, Equivalence and implication - Basic laws- Some more connectives – Functionally complete set of connectives- Normal forms - Proofs in Propositional calculus – Predicate calculus.

#### UNIT IV FUNCTIONS & RELATIONS

(9+3)

Relations-Properties of relations - Matrices of relations - Closure operations on relations -Functions - injective, surjective and bijective functions.

#### UNIT V FORMAL LANGUAGE & FINITE STATE AUTOMATA

(9+3)

Languages and Grammars-Phrase Structure Grammar-Classification of Grammars-Pumping Lemma For Regular Languages-Context Free Languages.

Finite State Automata-Deterministic Finite State Automata(DFA), Non Deterministic Finite State Automata (NFA) - Equivalence of DFA and NFA-Equivalence of NFA and Regular Languages.

**TOTAL = 60 PERIODS**

#### REFERENCES:

1. Kenneth H.Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, Fourth Edition, 2002 (Unit 1,2 & 3).
2. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002. (Unit 4, 5).
3. A.Tamilarasi & A.M.Natarajan, "Discrete Mathematics and its Application", Khanna Publishers, Second Edition, 2005.
4. M.K.Venkataraman "Engineering Mathematics", Volume II, National Publishing Company, Second Edition, 1989.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x		x			x		
2	x	x	x	x	x	x	x	x	x	x	x	x
3	x	x	x	x	x	x	x		x	x		

## 15CA102 PROBLEM SOLVING TECHNIQUES

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To provide deep knowledge about various computer problem-solving methods and techniques.
- To improve logical thinking that is needed for computer programming.
- To learn about execution of methodology of programming constructs.
- To learn about text processing and pattern searching.

### COURSE OUTCOMES:

At the end of the course the students would be able to

- CO1. Gain fundamentals of algorithms and its efficiency.
- CO2. Understand and know how to use factoring methods.
- CO3. Acquire knowledge about array techniques and use it.
- CO4. Undertake problems and solve using various sorting and searching techniques.
- CO5. Gain knowledge about various text processing and pattern searching.

### UNIT I INTRODUCTION TO COMPUTER PROBLEM-SOLVING

(9)

Introduction – The Problem-Solving Aspect – Top-down Design-Implementation of Algorithms - Program Verification – The Efficiency of Algorithms. Fundamental Algorithms – Exchanging the values of Two Variables – Counting – Summation of set of Numbers – Factorial Computation-Sine function computation – Generation of the Fibonacci sequence – Reversing the Digits of an Integer – Base Conversion Character to Number conversion.

### UNIT II FACTORING METHODS

(9)

Finding the square Root of a number – The Smallest Divisor of an Integer – The Greatest Common Divisor of Two Integers – Generating Prime Numbers – Computing the Prime Factors of an Integer Generation of Pseudo-random Numbers – Raising a Number to a Large Power – Computing the  $n^{\text{th}}$  Fibonacci number.

### UNIT III ARRAY TECHNIQUES

(9)

Array Order Reversal - Array Counting – Finding the Maximum Number in a Set – Removal of Duplicates from an Ordered Array – Partitioning an Array – Finding the  $k^{\text{th}}$  Smallest Element – Longer Monotone Subsequence.

### UNIT IV SORTING AND SEARCHING

(9)

The Two-way Merge – Sorting by Selection - Sorting by Exchange - Sorting by Insertion – Sorting by Diminishing Increment – Sorting by Partitioning – Binary search – Hash Searching.

### UNIT V TEXT PROCESSING AND PATTERN SEARCHING

(9)

Text Line Length Adjustment – Left and Right Justification of Text – Keyword Searching in Text-Text Line editing – Linear Pattern Search – Sub Linear Pattern Search.

**TOTAL = 45 PERIODS**

### TEXT BOOK :

1. R.G. Dromey, "How to solve it by Computer", Pearson Education, India, 2007.

### REFERENCE:

1. Seymour Lipschutz, "Essentials of Computer Mathematics", Schaums' outlines series, Tata McGrawHill Edition, 2004.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x	x			x			
2	x	x	x	x	x	x		x		x		x
3		x	x		x	x				x	x	
4		x	x		x		x	x	x	x	x	x
5		x	x	x	x	x	x		x	x	x	x

**OBJECTIVES:**

- To learn basic concepts of 'C' language.
- To gain knowledge about functions, arrays, pointers and file concepts.
- To analyze the concepts of 'C' language.
- To get familiarize with designing and developing programs in 'C'.

**COURSE OUTCOMES:**

At the end of the course the students would be able

CO1. To acquire background and basic knowledge about the C language.

CO2. To use of arrays and functions.

CO3. To identify and apply knowledge of structures, unions, pointers and files in programs.

CO4. To design and develop application using C.

**UNIT I INTRODUCTION TO C LANGUAGE****(9)**

Overview of 'C' language – Constants, Variables and Data Types – Operators, Expressions and Assignment statements – Managing Input/output Operations – Formatted I/O – Decision Making – Branching – IF, Nested IF – Switch – go to – Looping – while, do, for statements.

**UNIT II ARRAYS AND FUNCTIONS****(9)**

Arrays – dynamic and multi-dimensional arrays – Character arrays and Strings – String handling Functions – User defined Functions – Categories of Functions – Recursion.

**UNIT III STRUCTURES AND UNIONS****(9)**

Basics of Structures-Declaring a Structure – Array of Structures – Passing Structures elements to Functions- Passing entire Structure to Function – Structures within Structures – Union – Union of Structures – Enumerated Data Types – typedef Statement.

**UNIT IV POINTERS****(9)**

Pointers – Declaration, Accessing a variable, dynamic memory allocation, Pointers vs. Arrays, Array of Pointers, Pointers of functions and Structure Pointers.

**UNIT V FILE MANAGEMENT****(9)**

File Management in C – Data hierarchy – Files and Streams – Sequential access file – Random access file - Pre-processors.

**TOTAL = 45 PERIODS****TEXT BOOKS :**

1. Yashavant P.Kanetkar," Let us C", Infinity Science Press, Eighth Edition, 2008.
2. Kamthane, Ashok N, "Programming in C", Pearson Education, Second Edition, 2013.

**REFERENCES:**

1. Gottfried B.S., "Theory and problems of Programming with C", Schaum's Outline Series, Tata McGraw Hill, 1997. (Chapter 01 – 12)
2. Kanetkar Y, "Let us C", BPB Publications,1995.
3. Deitel H.M. & Deitel .P.J., "How to Program C", Prentice Hall India, 2001.
4. Kamthane, Ashok N., "Programming in C", Pearson Education, Second Edition, 2013.
5. Yashavant Kanetkar, "Exploring C", BPB Publications, Second Edition, 2003.

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x			x	x			x		x
2			x	x	x	x	x	x	x	x		x
3		x	x	x	x	x			x	x	x	x
4		x	x		x	x	x	x	x	x	x	x

**OBJECTIVES:**

- To provide a clear knowledge about the different types of data structures.
- To learn how to implement data structures in programming language.
- To understand different types of algorithms.
- To learn how to apply the data structure concepts to solve the problem.

**COURSE OUTCOMES:**

At the end of the course the students would be able to

- CO1. Understand the various ADTs so as to use them in program design.
- CO2. Design algorithms to various problems based on the design strategies.
- CO3. Analyze algorithms to find out their time complexity.
- CO4. Understand different types of algorithms specifically available for sorting and searching, and how they can be applied on different types of data structures.

**UNIT I DATA STRUCTURES****(9)**

Introduction – Arrays – Structures – Stack: Definition and examples, Representing Stacks - Queues and lists: Queue and its Representation, lists – Applications of Stack, Queue and Linked Lists.

**UNIT II TREES****(9)**

Binary Trees- Operations of binary trees – Binary Tree Representations – node Representation , internal and external nodes, implicit array representation – Binary tree Traversals – Huffman Algorithm – Representing Lists as Binary Trees.- Binary Search Tree- AVL Tree- B+ Tree.

**UNIT III SORTING AND SEARCHING****(9)**

General Background – Exchange sorts – Selection and Tree Sorting – Insertion Sorts – Merge and Radix Sorts – Basic Search Techniques – Tree Searching – General Search Trees – Hashing.

**UNIT IV GRAPHS AND THEIR APPLICATIONS****(9)**

Graphs – An application of graphs – Representation of Graphs – transitive closure – Warshall's algorithm – Shortest path algorithm – a flow Problem – Dijkstra's algorithm – Graph Traversals- Topological sorting.

**UNIT V STORAGE MANAGEMENT****(9)**

General Lists: Operations, Linked List Representation, using Lists, Freeing List Nodes - Automatic List Management: Reference Count Method, Garbage Collection, Algorithms, Collection and Compaction.

**TOTAL = 45 PERIODS****TEXT BOOK :**

1. Weiss, "Data Structures and Algorithm Analysis in C", Addison Wesley, Second Edition, 2007.

**REFERENCES:**

1. Robert Kruse & Clovis L. Tondo, "Data Structures and Program Design in C", Prentice Hall, Second Edition, 2007.
2. Tanaenbaum A.S., Langram Y. Augestein M.J, "Data Structures using C", Pearson Education, First Edition, 2004.

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x		x		x	x	x	
2		x	x		x	x	x	x	x	x	x	x
3		x	x	x	x	x	x			x	x	x
4			x		x	x			x	x	x	x

## 15CA105 ACCOUNTING AND FINANCIAL MANAGEMENT

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To acquire a reasonable knowledge in Accounts
- To learn analysis and evaluate Financial Statements
- To comprehend the Technique of making decisions related to Finance Function

### COURSE OUTCOMES:

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

CO1. Prepare and Analyze the Financial Statement to determine Optimal Managerial Decisions.

CO2. Apply and Analyze different types of Financial Management tools through the preparation of Estimates.

CO3. Analyze a firm's financial performance to determine its Strengths and weaknesses, and be able to use Financial Analysis to improve Performance.

### UNIT I FINANCIAL ACCOUNTING

(9)

Meaning and Scope of Accounting – Accounting Principles: Concepts and Conventions – Accounting Standards – Trial Balance – Final Accounts: Trading Account, Profit and Loss Account and Balance Sheet.

### UNIT II RATIO ANALYSIS

(9)

Introduction to Financial Statement analysis – Ratio Analysis: Classification of Ratios: Profitability Ratios, Liquidity Ratios, Solvency Ratios and Turnover Ratios – Advantages and Limitations of Ratio Analysis.

### UNIT III COST ACCOUNTING

(9)

Meaning and Objectives – Classification of cost – Elements of Cost – Cost Sheet preparation – Break Even Analysis.

### UNIT IV BUDGET AND BUDGETING CONTROL

(9)

Meaning, Objectives and Significance – Types of Budget: Flexible Budget, Cash Budget and Functional Budgets – Introduction to Master Budget and Zero Base Budgeting.

### UNIT V INVESTMENT DECISION IN FINANCIAL MANAGEMENT

(9)

Objectives and Functions of Financial Management – Risk-Return Relationship -Time Value of Money Concepts – Capital Budgeting Techniques: Payback period, Accounting Rate of Return, Net Present Value.

**TOTAL = 45 PERIODS**

### TEXT BOOKS :

1. S.N.Maheswari, "Financial and Management Accounting", Sultan Chand & Sons, 2003.
2. I.M.Pandey, "Financial Management", Vikas Publications, 4th Reprint, 2002.

### REFERENCES:

1. S.P.Iyengar, "Cost and Management Accounting", Sultan Chand & Co.
2. I.M.Pandey, "Elements of Management Accounting" Vikas Publishing House, 1993.

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x		x			x		
2	x	x			x	x	x			x	x	
3	x	x			x		x			x	x	x

## 15CA111 PROGRAMMING IN C LABORATORY

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To learn basic concepts of 'C' language for developing program.
- To learn about functions, arrays, pointers and file concepts.
- To understand developing applications in 'C' language.
- To familiarize designing and developing pointers and files.

### COURSE OUTCOMES:

At the end of the laboratory the students would be able

- CO1. To develop programs using the C language.
- CO2. To write programs using of arrays and functions.
- CO3. To write programs using structures and union.
- CO4. To get a deep practical knowledge about the pointers and files.

1. Display the following:
  - (i) Floyd's triangle
  - (ii) Pascal Triangle
2. Generate the following series of numbers:
  - (i) Armstrong numbers between 1 to 100
  - (ii) Prime numbers between 1 to 50
  - (iii) Fibonacci series up to N numbers
3. Manipulate the strings with following operations.
  - (i) Concatenating two strings
  - (ii) Reversing the string
  - (iii) Finding the substring
  - (iv) Replacing a string
  - (v) Finding length of the string
4. Find the summation of the following series:
  - (i) Sine
  - (ii) Cosine
  - (iii) Exponential
5. Create the sales report for M sales persons and N products using two dimensional arrays.
6. Simulate following Banking operations using functions.
  - (i) Deposit
  - (ii) Withdrawal
  - (iii) Balance Enquiry
7. Implement using recursion
  - (i) Find the solution of Towers of Hanoi problem using recursion.
  - (ii) Fibonacci number generation.
  - (iii) Factorial
8. Generate Student mark sheets using structures.
9. Create a collection of books using arrays of structures and do the following:
  - (i) Search a book with title and author name
  - (ii) Sorts the books on title.
10. Perform string operations using pointers.
11. Program to implement dynamic memory allocation.
12. Creating, Reading and displaying a sequential and random access file.

**TOTAL = 30 PERIODS**

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x		x		x			x		x
2		x	x	x	x	x			x	x	x	x
3		x	x	x	x	x			x	x	x	x
4		x	x	x	x	x	x	x	x	x	x	x

## 15CA112 DATA STRUCTURES LABORATORY

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To learn how to implement data structures in programming language.
- To learn concepts of arrays, linked lists and trees.
- To understand different types of algorithms.
- To learn how to solve and implement problems using data structure concepts.

### COURSE OUTCOMES:

At the end of the laboratory the students would be able to

CO1. Analyze algorithms for solving the problems.

CO2. Design algorithms to various problems based on the design strategies.

CO3. Develop programs for arrays, linked lists, searching and sorting.

CO4. Implement programs for different types of algorithms.

Write C programs for the following concepts :

1. Stack : Using Array and Linked List
2. Queue: Using array and Linked List
3. Expression conversion and evaluation
4. Linked List : Singly, Doubly and circular Linked list
5. Binary tree Traversals
6. Binary search Tree operations
7. Sorting
8. Searching
9. Graph Traversals
10. Warshall's Algorithm
11. Dijkstra's Algorithm
12. Floyd's Algorithm
13. Huffman's Algorithm

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x			x	x	x	x	x		
2		x	x	x	x	x	x		x	x	x	x
3		x	x	x	x		x		x	x	x	x
4		x	x		x	x	x	x	x	x	x	x

## 15CA113 OFFICE AUTOMATION LABORATORY

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To learn about Microsoft Word, Excel, Power Point, Access and Tally.

### COURSE OUTCOMES:

At the end of the laboratory the students would be able

- CO1. To create documents with simple formatting, merge files and working with tables.
- CO2. To create Excel documents, presentation charts and what-if analysis.
- CO3. To develop Presentation with animation, text and images and self running presentations.
- CO4. To develop the Trading and Profit and Loss accounts, balance sheets using Tally.

### MICROSOFT WORD

1. Creating and formatting a simple document (using Bulleted and Numbered list, adding Headers, Footers and Page numbers).
2. Working with Tables (Creating tables, Editing tables, Formatting tables, Converting tables, Sorting table contents, etc.)
3. Mail Merge

### MICROSOFT EXCEL

4. Formatting the worksheets (Formatting the cells, rows and columns) & working with Functions and formulae.
5. Presenting Data with charts, performing What – If analysis with Data table & Summarizing the data using Pivot table.

### MICROSOFT POWER POINT

6. Presentation of Animation with Text, Images and Media file.
7. Creating PowerPoint Slides with graph, creating self running Presentations & Hiding and Showing the slides.

### MICROSOFT ACCESS

8. Creating a Database with key and field properties setting & Entering and Editing data using Forms.
9. Retrieving data from more than one related table using Queries & Generating Report using Report Wizards.

### TALLY

10. Creation of Accounts Masters, Accounts Voucher with Voucher Entry, conversion, Interest Calculation & Printing of voucher using Tally.
11. Creation of Trading Account, Profit/Loss Account & Balance Sheet using Tally.

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x	x	x	x		x			x	x	
2	x	x	x		x	x	x	x	x	x		x
3		x	x		x		x	x	x	x	x	x
4	x	x	x	x			x		x	x	x	x

## 15CA114 FUNCTIONAL ENGLISH - I

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To develop inter personal skills and be an effective goal oriented team player.
- To develop professionals with idealistic, practical and moral values.
- To develop communication in writing techniques.
- To re-engineer attitude and understand its influence on behaviour.

### COURSE OUTCOMES:

At the end of this course, student shall be able to

CO1. Analyze their strength and weakness.

CO2. Get exposure about the fundamentals of GDs and Interviews.

CO3. Communicate and present their ideas.

CO4. Know how to prepare Resume and write Report efficiently.

### UNIT I

(6)

Self-Analysis – Self Introduction – Ice breaking - Identify strength and weakness – Self- esteem and Confidence.

### UNIT II

(6)

Non-Verbal – Body Language of self and others.

Presentation Skills – Stages involved in an effective presentation – Selection of topic, content, aids – Engaging the audience - Time management.

### UNIT III

(6)

Group Discussion – Understanding the objective and skills tested in GD – Types of GD – Roles in a GD – Do's & Don'ts – Video Modules, fundamentals of placement techniques.

Interview Skills – Self preparation checklist – Grooming tips (Do's& Don'ts) – Video Modules.

### UNIT IV

(6)

Out of box thinking and General behaviours.

### UNIT V

(6)

Preparing Resume and Report.

**TOTAL = 30 PERIODS**

### REFERENCE:

1. Andrews, Sudhir. 1988. *How to Succeed at Interviews*. 21<sup>st</sup> Reprint. Tata McGraw-Hill. New Delhi.

### CONTINUOUS ASSESSMENT:75 %

**The following activities are to be done with a weightage of 15 marks each**

#### Activity 1

Have a discussion with the participants and make a list of 20 words that are frequently mispronounced.

#### Activity 2

“Nobody can make you feel inferior without your permission.”

Have a group discussion about this quote.

#### Activity 3.

Rashmi joined a company which had both western formals and Indian dress as options for their formal

dress. Since Rashmi belonged to an orthodox family in the south, she naturally chose south Indian dress for her wear. She had lovely long hair, which she left free; to keep it in place she used perfumed coconut oil, and the effect was really eye-catching. She put only white, nicely-smelling flowers in her hair. She did not put on any make-up, but only accented her eyes with heavy kajal. She did not use bindis, since she had read that the stick-on ones cause skin problems sometimes, but she wore a large regular kumkum on her forehead. She always wore a silk sari and matching blouse, with tasteful jewelry, and she wore closed shoes on her feet to avoid any accidents.

**Question for the group:** Do you think Rashmi was dressed appropriately? Critique on some of the well-intentioned but common mistakes that she has made?

#### Activity 4

Divide the students into small groups and give each group a different Out of box thinking activity

#### Activity 5

Each student will give a presentation on any topic for 5 minutes.

### END SEMESTER EXAMINATION: 25 %

Situation role plays

=25 Marks

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x	x	x	x		x	x	x
2	x	x	x	x	x	x	x	x	x	x		
3	x	x	x	x	x	x	x	x	x	x	x	x
4	x	x	x	x	x	x	x		x	x	x	x

## SEMESTER II

### 15CA201 OBJECT ORIENTED PROGRAMMING

L	T	P	C
3	0	0	3

#### OBJECTIVES:

- To know the fundamentals about programming concepts and language paradigms.
- To understand about object oriented programming concepts.
- To learn how to handle the errors using exception handling.

#### COURSE OUTCOMES:

At the end of the course the students would be able

- CO1. To familiarize Object Oriented Programming Concepts.
- CO2. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++.
- CO3. To implement templates in programs.
- CO4. To design and develop application using C++.

#### UNIT I FUNDAMENTALS

(9)

Object-Oriented Programming concepts – Encapsulation – Programming Elements – Program Structure – Enumeration Types — Functions and Pointers – Function Invocation – Overloading Functions – Scope and Storage Class – Pointer Types – Arrays and Pointers – Call-by-Reference – Assertions – Standard template library.

#### UNIT II IMPLEMENTING ADTs AND ENCAPSULATION

(9)

Aggregate Type struct – Structure Pointer Operators – Unions – Bit Fields – Data Handling and Member Functions – Classes – Constructors and Destructors – Static Member – this Pointer – reference semantics – implementation of simple ADTs.

#### UNIT III POLYMORPHISM

(9)

ADT Conversions – Overloading – Overloading Operators – Unary Operator Overloading – Binary Operator Overloading – Function Selection – Pointer Operators – Visitation – Iterators – Containers – List – List Iterators.

#### UNIT IV TEMPLATES

(9)

Template Class – Function Templates – Class Templates - Parameterizing – STL – Algorithms – Function Adaptors.

#### UNIT V INHERITANCE

(9)

Derived Class – Typing Conversions and Visibility – Code Reuse – Virtual Functions – Templates and Inheritance – Run-Time Type Identifications – Exceptions – Handlers – Standard Exceptions.

**TOTAL = 45 PERIODS**

#### REFERENCES:

1. Ira Pohl, "Object-Oriented Programming Using C++", Pearson Education, Second Edition, 2003.
2. Stanley B.Lippman, Josee Lajoie, "C++ Primer", Pearson Education, Fourth Edition, 2004.
3. Kamthane, "Object Oriented Programming with ANSI and Turbo C++", Pearson Education, First Edition, 2002
4. Bhawe, "Object Oriented Programming With C++", Pearson Education, Second Edition, 2012.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x		x		x			x		
2		x	x	x	x	x	x	x	x	x	x	x
3		x	x		x	x	x		x	x	x	x
4		x	x		x		x	x	x	x	x	x

## 15CA202 ORGANIZATIONAL BEHAVIOR

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To study individual and group behavior in organizational context.
- To understand the overall structure of any organization in particular to IT industry.
- To enable the learner for aspiring careers with different IT companies.

### COURSE OUTCOMES:

At the end of this course the learner is expected:

- CO1. To earn the various Organizational concepts.
- CO2. To evaluate the Individual and group behavior of an organizational setting.
- CO3. To describe the Leadership qualities.
- CO4. To understand the Organizational structure and culture.

### UNIT I INTRODUCTION

(9)

Nature of OB-Definition of OB-Contributing Disciplines of OB-Approaches to the study of OBChallenges and opportunities for OB- Historical evolution of OB-Hawthorne studies-Foundations of individual behavior-Personal factors-Environmental factors-Organizational system and Resources.

### UNIT II PERSONALITY AND MOTIVATION

(9)

Nature and Theory of personality, Shaping of personality - Determinants of personality- Personality Traits- Perception-Perceptual process-Meaning and definition of learning-Principles of learning-Nature of motivation-Theories of motivation-Process theories.

### UNIT III JOB SATISFACTION AND GROUP BEHAVIOR

(9)

Nature and components of attitudes-Formation and Functions of attitudes-Changing attitudes-Values-Job satisfaction-Nature and Types of Groups-Group development-Group structuring-Small groups in organization

### UNIT IV LEADERSHIP, POWER AND POLITICS

(9)

Nature of leadership - Leadership and management-Theories and leadership-Power-Politics-Meaning and definition of work stress-Work stress model-Burnout-Stress management.

### UNIT V ORGANIZATIONAL STRUCTURE AND DESIGN

(9)

Organizational structure-Key factors of organizational design-Types of organizational design- Meaning and definition of organization Culture-Culture dimension and effects-Organizational change-Organizational development.

**TOTAL = 45 PERIODS**

### TEXT BOOK :

1. K.Aswathappa, "Organizational Behavior", Himalaya Publishing House- Fifth Edition – 2002. (Chapter 1, 2, 4, 5-14, 17, 18, 20, 21)

### REFERENCE:

1. Stephen Robbins, "Organizational Behavior", Prentice Hall of India - 9th Edition – 2001.
2. Fred Luthans, "Organizational Behavior", McGraw Hill – 1998.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x		x	x	x		x		
2		x	x	x	x	x	x	x	x	x	x	
3		x	x		x	x	x	x	x	x	x	x
4		x		x	x	x	x	x	x	x	x	x

## 15CA203 DIGITAL FUNDAMENTALS & COMPUTER ORGANIZATION

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To impart the knowledge in the field of digital electronics.
- To impart knowledge about the various components of a computer and its internals.
- To design and realize the functionality of the computer hardware with basic gates and other components using combinational and sequential logic.
- To understand the importance of the hardware-software interface.

### COURSE OUTCOMES:

At the end of the course the students would be

- CO1. Able to design digital circuits by simplifying the Boolean functions.
- CO2. Able to understand the organization and working principle of computer hardware components.
- CO3. Able to understand mapping between virtual and physical memory.
- CO4. Acquire knowledge about multiprocessor organization and parallel processing.
- CO5. Able to trace the execution sequence of an instruction through the processor.

### UNIT I DIGITAL FUNDAMENTALS

(9)

Number Systems and Conversions – Boolean Algebra and Simplification – Minimization of Boolean Functions – Karnaugh Map, Logic Gates – NAND – NOR Implementation.

### UNIT II COMBINATIONAL AND SEQUENTIAL CIRCUITS

(9)

Design of Combinational Circuits – Adder / Subtractor – Encoder – Decoder – MUX / DEMUX – Comparators, Flip Flops – Triggering – Master – Slave Flip Flop – State Diagram and Minimization – Counters – Registers.

### UNIT III BASIC STRUCTURE OF COMPUTERS

(9)

Functional units – Basic operational concepts – Bus structures – Performance and Metrics – Instruction and instruction sequencing – Hardware – Software Interface – Addressing modes – Instructions sets – RISC and CISC – ALU design – Fixed point and Floating point operation.

### UNIT IV PROCESSOR DESIGN

(9)

Processor basics – CPU Organization – Data path design – Control design – Basic concepts – Hard wired control – Micro programmed control – Pipeline control – Hazards – Super scalar operation.

### UNIT V MEMORY AND I/O SYSTEM

(9)

Memory technology – Memory systems – Virtual memory – Caches – Design methods – Associative memories – Input/Output system – Programmed I/O – DMA and Interrupts – I/O Devices and Interfaces.

**TOTAL = 45 PERIODS**

### TEXT BOOKS :

1. Morris Mano, "Digital Design", Prentice Hall of India, Fourth Edition, 2007.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Tata McGraw Hill, Fifth Edition, 2002.

**REFERENCES:**

1. Charles H. Roth, Jr., "Fundamentals of Logic Design", Jaico Publishing House, Mumbai, Eighth Edition, 2004.
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Pearson Education, Eighth Edition, 2010.
3. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Morgan Kaufmann, Fourth Edition, 2010.
4. John P. Hayes, "Computer Architecture and Organization", Tata McGraw Hill, Third Edition, 1998.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x		x	x	x	x		
2		x	x		x	x	x	x		x	x	
3				x	x	x	x		x	x	x	x
4	x	x	x			x	x			x		
5					x	x	x	x	x	x	x	x

**OBJECTIVES:**

- To provide the students with solid foundations in the learning of designing and analyzing of various algorithms.
- To understand mathematical aspects in analyzing algorithms
- To understand different types of algorithms specifically available for sorting and searching.

**COURSE OUTCOMES:**

At the end of the course the students would be able to

- CO1. Classify important problem types in designing algorithms.
- CO2. Implement mathematical and non- mathematical aspects in analyzing algorithms.
- CO3. Gain knowledge of different algorithms for sorting and searching, and how they can be applied.
- CO4. Undertake problem identification, formulation and solution of algorithms.

**UNIT I INTRODUCTION****(9+3)**

Fundamentals of algorithmic problem solving – Important problem types – Fundamentals of the analysis of algorithm efficiency – Analysis frame work – Asymptotic notations – Mathematical analysis for recursive and non-recursive algorithms.

**UNIT II DIVIDE AND CONQUER METHOD AND GREEDY METHOD****(9+3)**

Divide and conquer methodology – Merge sort – Quick sort – Binary search – Binary tree traversal – Multiplication of large integers – Strassen's matrix multiplication – Greedy method – Prim's algorithm – Kruskal's algorithm -Dijkstra's algorithm.

**UNIT III DYNAMIC PROGRAMMING****(9+3)**

Computing a binomial coefficient – Warshall's and Floyd's algorithm – Optimal binary search tree – Knapsack problem- Memory functions.

**UNIT IV BACKTRACKING AND BRANCH AND BOUND****(9+3)**

Backtracking – N-Queens problem – Hamiltonian circuit problem – Subset sum problem – Branch and bound – Assignment problem – Knapsack problem – Travelling salesman problem.

**UNIT V NP-HARD AND NP-COMPLETE PROBLEMS****(9+3)**

P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem – Knapsack problem.

**TOTAL = 60 PERIODS****TEXT BOOK :**

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Education, Second Edition, 2005.

**REFERENCE:**

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, "Introduction to algorithms", Prentice Hall, Second Edition, 2001.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x			x	x			x		x
2		x	x	x	x	x				x		x
3		x	x		x		x		x	x	x	x
4		x	x		x	x	x	x	x	x	x	x

## 15CA205 OPERATING SYSTEMS

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To become familiar with the fundamental concepts of operating systems.
- To learn overview of operating systems.
- To get an in-depth knowledge of three major OS subsystems: process management, memory management, file systems, and operating system support.

### COURSE OUTCOMES:

At the end of the course the students would

CO1. Become competent in recognizing operating systems features and issues.

CO2. Have sufficient understanding of operating system design.

CO3. Know OS design and its impacts on application systems design and performance.

CO4. Become familiar with the inner workings of mainstream operating systems like DOS, Windows and UNIX.

### UNIT I INTRODUCTION

(9)

Introduction – Operating Systems and services – Processes – CPU Scheduling approaches.

### UNIT II PROCESS SYNCHRONIZATION

(9)

Process synchronization – Semaphores – Deadlocks – Handling deadlocks – Multithreading.

### UNIT III MEMORY MANAGEMENT

(9)

Memory management – Paging – Segmentation – Virtual Memory – Demand paging – Replacement Algorithms.

### UNIT IV DISK SCHEDULING

(9)

Disk Scheduling approaches – File systems – Design issues – User interfaces to file systems – I/O device management.

### UNIT V CASE STUDIES

(9)

Case study –Design and implementation of the UNIX OS, Process model and structure – Memory management - File system – UNIX I/O management and device drivers – Windows – System components – Process Management.

**TOTAL = 45 PERIODS**

### TEXT BOOK :

1. Abraham Silberschatz Peter B. Galvin, G. Gagne, "Operating System Concepts", Addison Wesley Publishing Co., Eighth Edition, 2010.

### REFERENCE:

1. M. J. Bach, "Design Of The Unix Operating System", Pearson Education, Fifth Edition, 1990.
2. Willam Stalling, "Operating System", Pearson Education, Fifth Edition, 2005.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x		x	x			x		
2		x			x	x	x			x		
3			x	x				x	x	x	x	x
4								x	x	x	x	x

## 15CA211 OBJECT ORIENTED PROGRAMMING LABORATORY

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To understand how to program using object oriented programming concepts.
- To learn to develop programs by applying the concept of constructors, Destructors.
- To know about function overloading and operator overloading.
- To familiarize with inheritance and exception handling mechanisms.

### COURSE OUTCOMES:

At the end of the laboratory the students would be able

- CO1. To explore and implement programs for implementing the various features of OOP such as Constructors, Inheritance, Polymorphism, Stack and Queues.
- CO2. To develop programs for implementing the Exception Handling, and Templates using C++.
- CO3. To gain in-depth knowledge for developing programs using virtual functions.
- CO4. To design and develop application using C++.

1. C++ Program to illustrate Enumeration and Function Overloading
2. C++ Program to illustrate Scope and Storage class
3. Implementation of ADT such as Stack and Queues
4. C++ Program to illustrate the use of Constructors and Destructors and Constructor Overloading.
5. Program to illustrate Static member and methods
6. Program to illustrate Bit fields
7. Program to overload as binary operator, friend and member function
8. Program to overload unary operator in Postfix and Prefix form as member and friend function
9. Program to illustrate Iterators and Containers
10. C++ Program to illustrate function templates
11. C++ Program to illustrate template class
12. C++ Programs and incorporating various forms of Inheritance
13. C++ Program to illustrate Virtual functions
14. Exception Handling

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x		x			x		x
2		x	x		x		x		x	x	x	x
3		x	x		x				x	x		x
4		x	x		x	x	x	x	x	x	x	x

## 15CA212 OPERATING SYSTEMS LABORATORY

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To have a thorough knowledge about operating systems.
- To garner insight into how a computer functions at its innermost levels.

### COURSE OUTCOMES:

At the end of the laboratory the students would be able

- CO1. Students will learn essential operating systems skills including how to use, setup, configure, troubleshoot and maintain a current microcomputer operating system.
- CO2. Explore the resource control functions and algorithms of operating systems on processor, memory, file management, back storage management with case studies and examples.
- CO3. Understand Process management in operating systems as part of a uniform device abstraction.
- CO4. Be able to distinguish different styles of memory management in operating system design.

1. Program to report the behavior of the OS to get the CPU type and model, kernel version.
2. Program to get the amount of memory configured into the computer, amount of memory currently available.
3. Implement the various process scheduling mechanisms such as FCFS, SJF, Priority, round –robin.
4. Implement the solution for reader –writer’s problem.
5. Implement the solution for dining philosopher’s problem.
6. Implement Banker’s algorithm.
7. Implement the first fit; best fit and worst fit file allocation strategy.
8. Write a program to create processes and threads.

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x	x	x	x		x	x	
2		x	x	x	x		x		x	x	x	
3		x	x	x	x		x		x	x	x	x
4		x	x	x	x		x		x	x		

## 15CA213 ALGORITHMS LABORATORY

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To provide solid foundations in the learning of designing and analyzing of various algorithms.
- To solve different problems using Divide and Conquer method, Greedy method
- To get the knowledge of problems using Dynamic Programming, Backtracking method, Branch and Bound Technique.
- To understand problems of Searching and Sorting Techniques.

### COURSE OUTCOMES:

At the end of the laboratory the students would be able

CO1. Undertake problem identification, formulation and find solution for problems using algorithms.

CO2. To develop programs for Sorting and Searching Techniques.

CO3. To implement the algorithms in programs for Divide and conquer, Dynamic programming, Branch and Bound and Backtracking.

CO4. Apply knowledge in implementing programs for sorting and searching, and how they can be applied.

Write a program for the following concepts in C++ language.

1. Quick Sort
2. Binary Search
3. Binary Tree Traversal
4. Warshall's Algorithm
5. Dijkstra's Algorithm
6. Prim's Algorithm
7. Knapsack Problem – Dynamic Programming
8. Subset Sum Problem – Backtracking
9. Travelling salesperson problem – Branch and Bound
10. Strassen's matrix multiplication

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x		x	x	x			x		x
2			x		x	x	x		x	x	x	x
3			x	x	x	x	x	x				
4			x		x		x	x	x	x	x	x

**OBJECTIVES:**

- To re-engineer attitude and understand its influence on behaviour.
- To recognize stress symptoms & develop stress deflecting strategies.
- To improve time management, organizational skills and goal setting.
- To develop leadership skills to improve teamwork, creativity, efficiency & productivity.

**COURSE OUTCOMES:**

At the end of this course, student shall be able to

- CO1. Narrate stories by their own.
- CO2. Develop their leadership qualities for the betterment of the team.
- CO3. Acquire strategic knowledge about how to manage time.
- CO4. Overcome stress making factors in society.

**UNIT I****(6)**

Effective presentation strategies – Story telling – Visual communication.

**UNIT II****(6)**

Team work – Importance of team work – Leadership skills - attributes of a successful team – barriers involved- dealing with people- Group decision making.

**UNIT III****(6)**

Life and Managerial skills – Effective ways of dealing with people – Emotional intelligence- Types of conflicts (Inter and Intra group conflicts).

**UNIT IV****(6)**

Time Management – Tips and strategies- Time wasters – Procrastination – Advantages of time management.

**UNIT V****(6)**

Stress management – Management of various forms of fear (examination fear, stage fear and public speaking fear).

**TOTAL = 30 PERIODS****TEXT BOOK :**

1. Swaminathan. V.D & Kaliappan.K.V(2001), "Psychology for Effective Living", Chennai, The Madras Psychology Society.

**REFERENCE:**

1. Robbins, S.B.(2005). Organizational Behavior. New Delhi: Prentice Hall of India.
2. Smith, B (2004). Body Language. Delhi: Rohan Book Company.
3. Hurlock, E.B (2006). Personality Development, 28<sup>th</sup> Reprint. New Delhi: Tata Mc-Graw Hill.

**CONTINUOUS ASSESSMENT:75 %**

**The following activities are to be done with a weightage of 15 marks each**

**Activity 1**

Divide the students in small groups and ask them to develop a short story giving suitable title, theme and moral.

## Activity 2

For each of the situations given below, ask the following three questions:

1. Name the feeling.
2. What's a helpful way to deal with it?
3. What's a harmful way to deal with it?

### SITUATION:

- What do you feel when you're blamed for something you didn't do?
- What do you feel when someone keeps cheating in a cricket match?
- What do you feel if you are expecting to see a friend, and he or she backs out at the last moment for no good reason?
- How do you feel when you work really hard for something and you succeed?
- What do you feel when your team keeps losing?
- What do you feel when a teacher praises your work?
- What do you feel when you do poorly on an exam because you didn't study?
- What do you feel when your parent hasn't understood you?

## Activity 3

Divide the students in small groups and ask them to list out top ten time wasting activities in daily routine life.

## Activity 4

### Discussion

Take a controversial/debatable topic like: Euthanasia (Mercy Killing), Capital punishment, Gay marriages, Outsourcing, etc.

- Divide the students on the basis of whether they favor or oppose a particular topic.
- Ask them to discuss/share their points of view for 10 minutes.

## Activity 5

Each student will give a presentation on any topic for 5 minutes.

### END SEMESTER EXAMINATION: 25 %

Case study & Problem solving

= 25Marks

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x	x	x	x	x			
2	x	x	x	x	x	x	x	x	x	x	x	x
3	x	x	x	x	x					x	x	
4	x	x	x	x	x		x	x	x	x	x	x

## SEMESTER III

### 15CA301 RESOURCE MANAGEMENT TECHNIQUES

L	T	P	C
3	2	0	4

#### COURSE OBJECTIVES:

- To provide the concept and an understanding of basic concepts in Operations Research.
- To provide Techniques for Analysis and Modeling in Computer Applications.
- To understand, develop and solve mathematical model of linear programming problems.
- To understand, develop and solve mathematical model of Transport and assignment problems.
- To understand network modeling for planning and scheduling the project activities.

#### COURSE OUTCOMES:

On completion of this course the student able to understand:

- CO1. Construct and solve linear programming models to answer business optimization problems.
- CO2. Apply transportation and assignment models to find optimal solution in warehousing and Travelling.
- CO3. Appraise theoretical predictions obtained from Game Theory analyses against real world conflicts.
- CO4. Prepare project scheduling using PERT and CPM.
- CO5. Identify and analyze appropriate queuing model to reduce the waiting time in queue.

#### UNIT I LINEAR PROGRAMMING MODELS

(9+3)

Mathematical Formulation - Graphical Solution of Linear Programming Models - Simplex Method - Big-M Method - Variants of Simplex Method.

#### UNIT II TRANSPORTATION AND ASSIGNMENT MODELS

(9+3)

Mathematical Formulation of Transportation Problem - Methods for Finding Initial Basic Feasible Solution: North West Corner Rule, Least Cost Method, VAM - Optimum solution – Degeneracy – Mathematical Formulation of Assignment Models – Hungarian Algorithm – Variants of the Assignment Problem.

(9+3)

#### UNIT III GAME THEORY

Definition - Pay-off - Two Person Zero - Sum Games -The Maximin-Minimax Principle - Games without Saddle Points (Mixed Strategies) - 2x2 Games without Saddle Points - Graphical Method for 2xn or mx2 Games - Dominance Property.

#### UNIT IV SCHEDULING BY PERT AND CPM

(9+3)

Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.

#### UNIT V QUEUEING MODELS

(9+3)

Characteristics of Queuing Models – Poisson Queues – (M/M/1): (FIFO/ $\infty/\infty$ ), (M/M/1): (FIFO/N/ $\infty$ ), (M/M/C): (FIFO/ $\infty/\infty$ ), (M/M/C): (FIFO/N/ $\infty$ ) Models.

**TOTAL: 60 HOURS**

#### TEXT BOOK:

1. Taha, H.A. "Operations Research: An Introduction", 8<sup>th</sup> Edition, Pearson Education, 2008.

**REFERENCES:**

1. A .M. Natarajan, P. Balasubramani, A.Tamilarasi, "Operations Research" , Pearson Education, Asia, 2005.
2. Prem Kumar Gupta , D.S. Hira "Operations Research", S. Chand & Company Ltd., New Delhi, Third Edition, 2003.
3. V.Sundaresan,K.S.Ganapathy Subramanian, K.Ganesan, "Resource Management Techniques", A.R.Publication, 2002.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X										
2			X		X					X		
3			X	X								
4		X	X		X							
5		X	X						X	X		



## 15CA302 DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To understand the fundamentals of Data Models and conceptualize and depict a database system using ER Diagram
- To make a study of SQL and Relational Database Design

### COURSE OUTCOMES:

On completion of this course the student able to understand:

- CO1. About database architecture and data models.
- CO2. Design a database using ER diagrams and map ER into Relations and normalize the Relations.
- CO3. Acquire the knowledge of query evaluation to monitor the performance of the DBMS
- CO4. Develop a simple Database Applications using Normalization

### UNIT I INTRODUCTION

(9)

Database and Database users-Database Systems-Concepts and Architecture-Data Modeling using Entity Relationship Model.

### UNIT II DATA MODEL, ALGEBRA & ER DIAGRAM

(9)

Relational data model and Relational Database Constraints-Relational Algebra-Relational Database Design using ER and EER to Relational Mapping.

### UNIT III BACK END PROGRAMMING

(9)

SQL and PL/SQL Data Types- Specifying Constraints in SQL- Schema change statement in SQL- Basic Queries in SQL- More Complex SQL Queries- Insert, Delete and Update Statement in SQL- Specifying Constraints as Assertions and Triggers- Additional features of SQL.

### UNIT IV RELATIONAL DATABASE DESIGN

(9)

Relational Database Design-Informal guidelines for Relational Schemas-Functional Dependencies-Normal forms based on primary keys-General definition of Second and Third Normal form- Boyce-Codd Normal Form.

### UNIT V DB ADMINISTRATION INTRODUCTION

(9)

Database Architecture-Getting Started with the Oracle Architecture-An Overview of Databases and Instances-Oracle Logical Storage Structures-Oracle Physical Storage Structures-Oracle Memory Structures.

**TOTAL: 45 HOURS**

### TEXT BOOKS:

1. Elmasri.R, S.V. Navathe. "Fundamentals of Database Systems", Sixth Edition, Pearson, New Delhi, 2013.
2. Kevin Loney, Bob Bryla, "Oracle Database DBA Handbook", Tata McGraw Hill Edition, Tata McGraw Hill Publication, 2005.

**REFERENCES:**

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", 6<sup>th</sup> Edition, McGraw Hill, 2010.
2. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, New Delhi, 2003.
3. C. J. Date, "An Introduction to Database Systems", 8<sup>th</sup> Edition, Addison Wesley, 2004.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X										
2			X	X								
3				X	X				X	X	X	
4				X	X						X	X



## 15CA303 SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- Practice to software components and Improvement in design languages reusable code
- Participatory design and Interactive debugging.

### COURSE OUTCOMES:

On completion of this course the student able:

- CO1. To understand various quality assurance techniques
- CO2. To identify and analyze various kinds of requirements and develop prototype of software.
- CO3. To know various testing and automated analysis tools
- CO4. To create a project plan and analyzing design models & use of CASE tools

### UNIT I INTRODUCTION

(9)

Introduction - Software Process-Life Cycle Models: Waterfall - Incremental - Spiral - WINWIN Spiral -Evolutionary - Prototyping - Object Oriented - Fourth Generation Techniques - Agile Process Models-Computer Based System-System Engineering Lifecycle Process-System Engineering Hierarchy.

### UNIT II SOFTWARE REQUIREMENTS

(9)

Functional and Non Functional Requirements - User Requirements - System Requirements - Requirement Engineering Process - Software Prototyping - Prototyping in Software Process - Rapid Prototyping Techniques - User Interface Prototyping - Software Document.

### UNIT III ANALYSIS AND DESIGN CONCEPTS

(9)

Analysis and Modeling - Data Modeling - Functional Modeling - Behavioral Modeling - Structural Analysis -Design Concepts - Modular Design - Architectural Style - Transform and Transaction Mapping.

### UNIT IV TESTING

(9)

Introduction - Test Activities - Black box Testing - White box Testing - Structural Testing - Unit Testing -Integration Testing - System Testing - Strategic Approach and Issues - Debugging.

### UNIT V SOFTWARE PROJECT MANAGEMENT

(9)

Measures and Measurement - Software Cost Estimation - Function Point Models - COCOMO Model - Delphi Model - Defining Task Network - Scheduling - Earned Value Analysis - Taxonomy of Case Tools.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. Roger S. Pressman, "Software Engineering: A Practitioner Approach", 8<sup>th</sup> Edition, McGraw-Hill, 2015.

### REFERENCES:

1. Sommerville, "Software Engineering", 10<sup>th</sup> Edition, Addison Wesley Longman, Pearson Education, 2015.
2. Pankaj Jalote, "A concise Introduction to Software Engineering", Springer Verlag, 2008.
3. Jibitesh Mishra, Ashok Mohanty, "Software Engineering", First Edition, Pearson Education, 2012.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X			X								
2	X	X	X									
3	X	X	X								X	
4				X							X	X



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## 15CA304 OBJECT ORIENTED PROGRAMMING WITH JAVA

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

The course helps the students to understand the concept of oops with basic Java , AWT, Spring Framework and Servlet concepts.

### COURSE OUTCOMES:

At the end of the course the students would be able:

- CO1. To get an overview on oops concepts.
- CO2. To understand the basics of java, AWT and string handling
- CO3. To acquire knowledge in java spring framework and able to develop programs using it.
- CO4. To develop programs in java and java servlets.

### UNIT I OOP Paradigms (9)

Introduction – Classes and Objects – Features of Object Oriented Programming – Modularity – Design a Class – Design strategies in OOP – Comparison of Structured and Object Oriented Programming – OOP Languages – Advantages of OOP – Limitations and Applications of Object Oriented Programming.

### UNIT II Basics of Java (9)

Introduction - Data types, Variables and Arrays - Operators - Control Statements - Methods & Classes - Inheritance - Packages and Interfaces - Exception Handling - Multithread programming .

### UNIT III Java Library (9)

String handling - Input / Output - Networking - Applets - Event handling - Introduction to AWT - AWT controls - Layout managers - Menus - Images - Graphics.

### UNIT IV Spring Framework (9)

Spring Framework Basics: Working with Classes and Dependencies - Applying Different Configurations – Using Beans Scopes – Testing Spring Application. Adding Persistence – Showing Spring Application on the Web – Integrating Spring Applications with External Systems – Adding Email and Scheduling Tasks.

### UNIT V Java Servlet (9)

Basics of Servlet - Life Cycle of a Servlet - Java Servlet Development Kit – Simple Servlet - Servlet API - javax.servlet Package - javax.servlet.http Package - Handling HTTP Requests and Responses – Cookies - Session Tracking.

**TOTAL: 45 HOURS**

### REFERENCES:

1. Rajkumar Buyya, S.Thamarai Selvi, Xingchen Chu, “Object–Oriented Programming with JAVA: Essentials and Applications”, Fourth Edition, Tata McGraw Hill Education Private Limited, 2013.
2. Felipe Gutierrez , “ Introducing Spring Framework : A Primer ” Apress, 2014.
3. Herbert Schildt , “ Java: The Complete Reference ”, Ninth Edition, McGraw-Hill , 2014.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X										
2	X	X										
3			X	X	X				X	X	X	X
4			X	X	X			X		X	X	X



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## 15CA305 ADVANCED DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To learn the basic techniques of algorithm analysis.
- To understand the concepts of notations and analysis.
- To familiar with writing recursive methods.
- To understand the concepts of Heaps and Search structures.
- To familiar with advanced algorithms.

### COURSE OUTCOMES:

On completion of this course the students will be able to:

- CO1. Use recursive design.
- CO2. Implement the main data structures and use them to solve computational problems.
- CO3. Master different algorithm design techniques.
- CO4. Apply and implement learned algorithm design techniques to solve problems.

### UNIT I FUNDAMENTALS

(7)

Introduction to Linear and Non Linear data structures – Notion of Algorithm – Characteristics of Algorithm – Fundamentals of Algorithm Analysis - Asymptotic Notations – Recurrence Equations – Solving Recurrence Equations.

### UNIT II HEAP STRUCTURES

(9)

Single and Double Ended Priority Queues - Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Pairing Heaps – Symmetric Min-Max Heaps.

### UNIT III SEARCH STRUCTURES

(10)

Optimal Binary Search Trees – AVL Trees – Red-Black trees – Splay Trees- Multi-way Search Trees: m-way Search Trees - B – Trees - B+ Trees.

### UNIT IV DIVIDE AND CONQUER AND GREEDY METHOD

(9)

Binary Search – Finding the Maximum and Minimum – Merge Sort – Quick Sort – Selection – Strassen's Matrix Multiplication – Convex Hull – Knapsack Problem – Tree Vertex Splitting – Job Sequencing with Deadlines – Minimum-cost Spanning Trees – Single-Source Shortest Paths.

### UNIT V DYNAMIC PROGRAMMING, TRAVERSAL AND SEARCH TECHNIQUES AND BACKTRACKING

(10)

Multistage Graphs – All Pairs Shortest Paths – Single-Source Shortest Paths – Optimal Binary Search Trees – 0/1 – Knapsack – Traveling Salesperson Problem – Flow Shop Scheduling – Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Bi-Connected Components and DFS - The 8-Queens Problem – Sum of Subsets – Graph coloring – Hamiltonian Cycles – Knapsack Problem.

**TOTAL: 45 HOURS**

### TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, "Fundamentals of Data Structures in C++", Second Edition, University Press, 2010.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Computer Algorithms/C++", University Press, 2010.

**REFERENCES:**

1. Alfred V. Aho, John E. Hopcroft, and Jeffrey D. Ullman, "Data Structures and Algorithms", First Edition, Addison Wesley Publications., 2010.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition, Pearson Education, 2014.
3. Puntambekar A.A , " Advanced Data Structures" , First Edition, Technical Publications, 2008.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X	X							
2	X		X									
3			X	X	X					X		
4			X	X	X					X	X	X



## 15CA311 DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVES:

- To have a thorough knowledge in Database.
- To make a study of SQL and relational database design.
- To know about data storage techniques a query processing.

### COURSE OUTCOMES:

At the end of the laboratory the students would be able:

- CO1. To understand and query database using SQL statements.
- CO2. To write programs as stored procedures and functions.
- CO3. To develop a simple database applications using normalization.

### List of Experiments:

1. Data Definition Language (DDL) commands.
2. Data Manipulation Language (DML) commands.
3. Data Control Language (DCL) commands.
4. High-level language extension with Cursors.
5. High level language extension with Triggers.
6. Procedures and Functions.
7. Design the Application for Students Management System.
8. Design the Application for Payroll Processing System.
9. Design the Application for Telephone Management System.
10. Design the Application for Text Editor.

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
Cos	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X									
2		X	X	X	X							
3					X			X	X	X	X	X

*St*

## 15CA312 OBJECT ORIENTED PROGRAMMING WITH JAVA LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVES:

- To develop programs by applying the concept of object oriented programming concepts.

### COURSE OUTCOMES:

At the end of the laboratory the students would be able:

CO1. To develop programs in Java for implementing the various features of OOP such as class, objects, inheritance, polymorphism, exceptional handling, and packages.

CO2. To develop programs in Java Applets and Servlet

CO3. To get knowledge about Spring Framework.

### List of Experiments:

1. Write a program in Java for illustrating, overloading, over riding and various forms of inheritance.
2. Write programs to create packages and multiple threads in Java.
3. Write programs in Java for event handling Mouse and Keyboard events.
4. Write programs in Java using Layout Manager create different applications.
5. Write programs in Java to create and manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using swing/AWT.
6. Create an application using Java Applets.
7. Create any one application using Java Servlet.
8. Create any one application using Spring Framework.

**TOTAL = 45 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X									
2		X	X	X	X							
3					X			X	X	X	X	X



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## 15CA313 ADVANCED DATA STRUCTURES AND ALGORITHMS LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVES:

- To design and code algorithms for problem solutions.
- Understand the concept of linear structures.
- Understand applicability for the various data structures.

### COURSE OUTCOMES:

On completion of this course, students will be able to:

- CO1. Design and analyze the time and space efficiency of the data structure
- CO2. Identify the appropriate data structure for given problem
- CO3. Have practical knowledge on the application of data structures

### List of Experiments:

1. Implementation of the following Heap Structures Min-Max Heap ( Insertion, Delete Min, Delete Max)  
Binomial Heap (Priority Queue operations) Fibonacci Heap (Priority Queue operations).
2. Implementation of the following Search Structures AVL Trees (Insertion, Deletion and Search) Splay  
Trees (Insertion, Deletion and Search) B-Trees (Insertion, Deletion and Search) Red- Black Trees.
3. Implementation of Convex Hull.
4. Implementation of Knapsack Problem.
5. Implementation of Merge Sort & Quick Sort.
6. Implementation of Minimum-cost Spanning Trees.
7. Implementation of Single-Source Shortest Paths.

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X									
2		X			X				X	X		
3					X			X	X	X	X	X



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## 15CA314 CAREER DEVELOPMENT SKILLS – I

L	T	P	C
0	0	2	0

### COURSE OBJECTIVES:

To enable students

- To use appropriate grammar learned to describe ideas.
- To use verbal communication appropriately at the right time.
- To interpret information from variety of mass media.

### COURSE OUTCOMES:

At the end of this course, student shall be able to

- CO1. Use appropriate grammar learned to describe ideas.
- CO2. Use verbal communication appropriately at the right time.
- CO3. Interpret information from variety of mass media.

### UNIT I (10)

Tenses – Verb (Auxiliary and Modal) – ‘Yes/No’ Type Questions – Reported Speech – Gerund – Phrasal Verbs

### UNIT II (10)

Self-Introduction – Presentation Skills - Visual Communication

### UNIT III (10)

Time Management – Group Discussion - Public Speaking

**TOTAL: 30 HOURS**

### REFERENCES:

1. Murphy, Raymond, “Essential Grammar in Use”, Cambridge University Press, UK, 2007.
2. Rizvi, Ashraf M., “Effective Technical Communication”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1						X				X		
2				X	X	X			X		X	
3				X		X		X		X	X	



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## SEMESTER IV

### 15CA401 COMPUTER NETWORKS

L	T	P	C
3	0	0	3

#### COURSE OBJECTIVES:

- To understand networking concepts and basic communication model.
- To understand network architectures and components required for data communication.
- To analyze the function and design strategy of physical, data link, network layer and transport layer
- To Acquire knowledge of various application protocol standard developed for internet

#### COURSE OUTCOMES:

At the end of the course the students would be:

- CO1. Acquire knowledge in networking concepts.
- CO2. Able to identify the components required to build different types of networks.
- CO3. Able to understand the functionalities needed for data communication into layers.
- CO4. Able to know about various functionalities of protocols and its usage.

#### UNIT I DATA COMMUNICATIONS

(9)

Components – Data Flow – Physical Structures - Network Types – Internet and its standards - Protocol Layering - TCP/IP Protocol Suite - OSI Model – Transmission Media: Guided Media and Unguided Media – Line Coding and its Schemes - Transmission Modes.

#### UNIT II DATA LINK LAYER

(9)

Introduction of DLL – Link-Layer Addressing - Error Detection and Correction: Types of Errors, Block Coding - Cyclic Codes – Checksum - Forward Error Correction: Hamming Distance – Data Link Control: Services - Flow and Error Control - Stop and Wait Protocol – HDLC. Wired LANs: Standard Ethernet - Fast Ethernet - Gigabit Ethernet - Wireless LAN: IEEE 802.11 Project – Bluetooth.

#### UNIT III NETWORK LAYER

(9)

Switching – Circuit Switched Networks - Packet Switching – Structure of a Switch – Network Layer Services and Performance – Classful Addressing – Classless Addressing – Routing Algorithms: Distance Vector Routing – Link State Routing – BGP.

#### UNIT IV TRANSPORT LAYER

(9)

Transport Layer - Services - Transport-Layer Protocols - User Datagram Protocol (UDP) - Transmission Control Protocol (TCP) – Quality of Service.

#### UNIT V APPLICATION LAYER

(9)

World Wide Web and HTTP – FTP – Electronic Mail – TELNET – Secure Shell (SSH) - Domain Name Space (DNS).

**TOTAL: 45 HOURS**

#### TEXT BOOK:

1. Behrouz A. Forouzan, "Data communication and Networking", Fifth Edition, Tata McGraw-Hill, 2013.

**REFERENCES:**

1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach", Sixth Edition, Pearson, 2012.
2. Andrew S. Tanenbaum, David J. Wetherall "Computer Networks", PHI, Fifth Edition, 2010.
3. William Stallings, "Data and Computer Communication", Tenth Edition, Pearson Education, 2013.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X								
2		X	X	X	X							
3	X	X	X		X	X						X
4	X	X		X						X	X	X



## 15CA402 OPEN SOURCE SYSTEMS

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- Provide knowledge about open source such as PHP, MySQL and Perl. It helps to do web based programming.
- It allows the students to learn about cookies.

### COURSE OUTCOMES:

At the end of the course the students would be

- CO1. Able to understand and do the programming using PHP, MySQL and Perl.
- CO2. Able to demonstrate knowledge of working in PHP Framework.
- CO3. Get knowledge to design and implement a small to medium size web-enabled information storage and retrieval system using PHP & MySQL.
- CO4. Able to write code for session control in PHP for a web site.

### UNIT I INTRODUCTION

(9)

Introduction to Open Sources – Need of Open Sources – Advantages of Open Sources – Applications of Open Sources - Open Source Operating Systems: Linux –Introduction - General Overview – Kernel Mode and User Mode – Process – Advanced Concepts.

### UNIT II OPEN SOURCE DATABASE

(9)

MySQL – Setting up Account – Starting, Terminating and Writing SQL Programs – Record Selection Technology – Working with Strings – Date and Time – Sorting Query Results – Generating Summary – Working with Metadata – Using Sequences – My SQL and Web.

### UNIT III OPEN SOURCE PROGRAMMING LANGUAGE

(9)

PHP – Language Basics: Data Types, Variables, Expressions and Operators, Flow Control Statements, Embedding PHP in Web Pages – Functions - String Manipulation and Regular Expression – Arrays- Objects – Databases: Using PHP to Access a Database, Relational Databases and SQL, MySQLi Object Interface, SQLite.

### UNIT IV PHP FRAMEWORK

(9)

Introduction to Symfony, CakePHP and ZEND Framework - Working with databases - First applications on three frameworks.

### UNIT V PERL

(9)

Perl – Scalar Data : Numbers, Strings, Scalar Variables, Control structure – Lists and Arrays – Input and output : Input from standard input, Output to standard output, Formatted output with printf, Filehandles, Opening a file handle, Fatal errors with die – Introduction to Python.

**TOTAL: 45 HOURS**

### TEXT BOOKS:

1. Remy Card, Eric Dumas & Frank Mevel “The Linux Kernel Book”, Wiley Publications, 2003. (Unit I)
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002. (Unit II)

3. Rasmus Lerdorf, Kevin Tatroe & Peter MacIntyre, "Programming PHP", O'Reilly Media, 3<sup>rd</sup> Edition, 2013. (Unit III)
4. Bartosz Porebski, Karol Przystalski and Leszek Nowak, "Building PHP Applications with Symphony, CakePHP, and Zend Framework", Worx publications, 2011. (Unit IV)
5. Randal L. Schwartz, brain d foy, and Tom Phoenix "Learning Perl", O'Reilly Media 6<sup>th</sup> Edition, 2011. (Unit V)

#### REFERENCES:

1. Steve Suehring, Tim Converse, and Joyce Park "PHP 6 and MySQL Bible", Wiley- India Pvt Ltd, New Delhi, 2009.
2. Vikram Vaswani, "PHP: A Beginner's Guide", Tata McGraw-hill Edition 2009.
3. Steven Holzner, "PHP : The Complete Reference", 2<sup>nd</sup> Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint , 2009.
4. Vikram Vaswani, "MySQL: The Complete Reference", 2<sup>nd</sup> Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint, 2009.

#### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X	X					X	X	X
2			X	X	X					X	X	X
3			X							X	X	X
4			X		X					X	X	X



## 15CA411 COMPUTER NETWORKS LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVES:

- To have a thorough knowledge in computer layers concepts.
- To understand the basics & working of the various networking protocols.
- To have knowledge in implementation of socket programming and networking algorithms

### COURSE OUTCOMES:

On completion of this course, students will be:

CO1: Able to demonstrate knowledge of computer layers concepts.

CO2: Acquire knowledge that how to use and implement various protocols.

CO3: Able develop socket programming and know how to apply algorithms in programs.

### List of Experiments:

1. Network Layer Concepts (Identification of Network Components, Configuration of IP)
2. Implementation of Network commands.
3. Network Design for an organization.
4. Transport Layer: Datagram (UDP) socket programming.
5. Transport Layer: Stream (TCP) socket Programming.
6. Implementation of Routing and Flow Control algorithms.
7. Application Layer: SMTP and HTTP programming.
8. Experiment on packet capturing and analyzing tools.
9. A study on Network Simulator tools: NS2, NS3, etc.

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X	X							
2		X	X	X	X							
3					X			X	X	X	X	X

## 15CA412 OPEN SOURCE SYSTEMS LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVES:

- To provide how to install different kind of installation
- To provide knowledge about PHP with MySQL, Python and Perl

### COURSE OUTCOMES:

On completion of this course, students will be:

- CO1. Able to know about installation of various software.
- CO2. Able to have programming knowledge in PHP, Python and Perl.
- CO3. Able to know how to connect MYSQL with PHP.
- CO4. Able to develop application PHP with MYSQL and Perl.

### List of Experiments:

1. Installation in different modes (User mode, GUI, Single user, Server, MySQL Installation, Apache Installation).
2. PHP Program using statement and function.
3. PHP Program using regular expression and string manipulation.
4. PHP Program using arrays and objects.
5. Data base connectivity with MYSQL.
6. PHP with Database Connectivity.
7. Development of an application using PHP and MYSQL.
8. Write a Python program to get the Python version, display the current date and time.
9. Write a Python program to print the calendar of a given month and year.
10. Perl Programming.

**TOTAL = 45 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X				X				X	X		
2	X		X	X	X	X		X				
3								X	X	X	X	X
4								X	X	X	X	X



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## 15CA413 CAREER DEVELOPMENT SKILLS – II

L	T	P	C
0	0	2	0

### COURSE OBJECTIVES:

- To understand the usage of English grammar and its structure.
- To develop the students to workout solution for problems that involves mathematical aptitude.
- To develop the students to workout solutions for problems that involves general reasoning.

### COURSE OUTCOMES:

At the end of this course, student shall be able to

- CO1. Solve aptitude problems with ease.
- CO2. Solve reasoning problems with ease.
- CO3. Improve written communication skills in English.

### UNIT I VERBAL

(10)

Articles – Adjectives – Conjunctions – Prepositions – Phrasal verbs.

### UNIT II APTITUDE

(10)

Number system -Factorial-Matrix-Average-Percentage-Age-Ratio & Proportion-Partnership-Profit & loss Mixture & Allegation-Simple and Compound Interest-Probability-Permutation and Combination-Speed & Distance-Train-Time & Work-Calendar-Clock-Volume & surface areas.

### UNIT III REASONING

(10)

Odd Man Out - Number Series - Diagrammatic Question - Figure Series - Venn Diagram – Syllogism - Coding & Decoding - Seating Arrangement, Height Arrangement - Logical Puzzle - Cube Problems – Analogy - Blood Relations – Directions - Data Interpretation - Data Sufficiency - Statement & Assumption.

**TOTAL: 30 HOURS**

### REFERENCES:

1. Khattar, Dinesh, "The Pearson Guide to Quantitative Aptitude for Competitive Examinations", Pearson Education, 2013.
2. Prasad, Hari Mohan & Sinha, Uma Rani, "Objective English for Competitive Examination", McGraw Hill Education, 2014.
3. R. S. Aggarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning", S. Chand and Co. Ltd, 2010.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X	X	X	X			X	X	
2	X	X		X	X	X	X	X		X	X	
3				X	X	X	X	X	X	X		



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## PROFESSIONAL ELECTIVES – E 1

### 15CAX01 C# AND .NET FRAMEWORK

L	T	P	C
3	0	0	3

#### COURSE OBJECTIVES:

- To learn programming language C#
- To learn about connectivity with ADO.NET
- To learn about Web Services
- To design web applications and web services

#### COURSE OUTCOMES:

At the end of the course the students would be able:

- CO1. To understand programming concepts in C#
- CO2. To understand about connectivity with ADO.NET
- CO3. To understand designing of various form controls.
- CO4. To design web applications and web services

#### UNIT I INTRODUCTION TO C#

(9)

Introducing C# - Understanding .NET - Overview of C# - Literals – Variables - Data Types – Operators – Expressions - Branching – Looping - Methods - Arrays – Strings – Structures - Enumerations.

#### UNIT II OBJECT ORIENTED ASPECTS OF C#

(9)

Classes – Objects – Inheritance – Polymorphism – Interfaces - Operator Overloading - Delegates – Events - Errors and Exceptions.

#### UNIT III WINDOWS APPLICATION DEVELOPMENT ON .NET

(9)

Introduction to .NET – Windows Applications: Creation-Execution-Window Forms –Common Controls: Menu controls-MDI Forms – ADO.NET.

#### UNIT IV WEB BASED APPLICATION DEVELOPMENT ON .NET

(9)

Overview of ASP.NET – Developing Web Applications – Standard Controls – Validation and Login Controls.

#### UNIT V MORE .NET CONCEPTS

(9)

Assemblies – Versioning – Attributes – Reflection – Advance .NET Concepts: WPF – WCF – WF - Exploring Silverlight - Ajax Controls

**TOTAL: 45 HOURS**

#### TEXT BOOKS:

1. E. Balagurusamy, "Programming in C#", 3<sup>rd</sup> edition, Tata McGraw-Hill, 2010.(Unit I,II)
2. Lalit Arora, Anjali Arora, "C# Using .NET Framework", First Edition, 2010.(Unit III,IV)
3. Herbert Schildt, "The Complete Reference: C# 4.0", Tata Mc Graw Hill, 2012.(Unit V)
4. Chirag Patel, "Advance .NET Technology", 2<sup>nd</sup> Edition, Dreamtech Press, 2011.(Unit V)

**REFERENCES:**

1. Andrew Troelsen, "Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O'Reilly, 2010.
3. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X		X	X	X							
2	X	X	X		X					X	X	X
3	X	X	X	X	X			X		X	X	X
4			X					X	X	X	X	X



## 15CAX02 UNIX AND NETWORK PROGRAMMING

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To learn about basic commands in Unix
- To make understand about Unix file system, processes and IPC
- To learn about networking in Unix environment through sockets

### COURSE OUTCOMES:

On completion of the course the students would be able:

- CO1. To understand Unix OS environment and gain good understanding of various commands.  
CO2. To get knowledge about how to create processes and intercommunicate two processes.  
CO3. To create client / server programs through sockets using TCP, UDP and SCTP protocols.

### UNIT I INTRODUCTION TO UNIX COMMANDS

(7)

Introduction to Unix File System Directory Hierarchy - vi Editor – General Purpose Utilities: cal – date – calendar – who – passwd – echo. Navigating File System: pwd – cd – mkdir – rmdir – ls. File Handling: cat – cp – rm – mv – lp – wc - cmp – comm – diff. Network Commands: telnet – ftp – rlogin – rcp – rsh. Filters: pr – head – tail – cut – paste – sort. Regular Expressions: grep – egrep – fgrep.

### UNIT II FILE SYSTEM

(10)

Overview of UNIX OS - File I/O - Files and Directories – Standard I/O library – System Data Files and Information.

(9)

### UNIT III PROCESSES

Environment of a UNIX process – Process control – Process Relationships – Signals -Threads.

### UNIT IV INTERPROCESS COMMUNICATION

(9)

Introduction - Message passing (XSI) - Pipes – Co-processes - FIFO – Message Queues – Semaphores –Shared Memory.

### UNIT V SOCKETS

(10)

Introduction Socket - TCP Sockets – UDP Sockets – SCTP Sockets – Socket Options - I/O Multiplexing - Name and Address Conversions.

**TOTAL: 45 HOURS**

### TEXT BOOKS:

1. W.Richard Stevens, Stephen A. Rago, “Advanced Programming in the UNIX Environment”, Third Edition, Pearson Education Inc., 2013.
2. W.Richard Stevens, Bill Fenner, Andrew Rudoff, “Unix Network Programming - The Sockets Networking API, Volume 1, Third Edition, Pearson Education, 2014.
3. Sumitabha Das, “Your UNIX/Linux: The Ultimate Guide”, Third Edition, Tata-McGraw Hill Education, 2012.

### REFERENCES:

1. Christopher Negus, Christine Bresnahan, “Linux Bible”, Eighth Edition, Wiley Publications, 2012.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X			X					X		X
2		X	X	X	X					X	X	
3			X		X			X	X	X	X	X



## 15CAX03 DYNAMIC PROGRAMMING LANGUAGE

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To understand programming constructs of Ruby
- To learn Rails Techniques.
- To use Rails conventions to avoid redundant code.
- To deploy Ruby on Rails.

### COURSE OUTCOMES:

On completion of this course the student will be:

- CO1. Able to understand Rails framework and also know program constructs in Ruby.
- CO2. Able to develop application in Ruby on Rail.
- CO3. Acquire knowledge about Object-Relational Mapping with ActiveRecord.
- CO4. Apply knowledge to deploy Rails.

### UNIT I PROGRAMMING IN RUBY

(9)

What's Ruby? – Hello Application – Nature of Ruby – Object Oriented Programming – Ruby basics – Classes, Objects and Variables – Built-in Classes and Modules: Scalar Objects – Collections. Control Flow: Conditionals – Loops, Blocks, and Iterators – Exception handling – Advanced Ruby Techniques.

(8)

### UNIT II RAILS FRAMEWORK

What Is Rails?- History of Rails- Installing Rails on Windows, Linux – Setting Development Environment – What is Ruby on Rails – Rails Architecture – Rails Scripts – Creating First Rails Application.

### UNIT III MODEL, VIEW AND CONTROL

(10)

Active Record – Basics – Setting up a Model – Migrations – CRUD Operations – Defining Relationships – implementing Validations – Custom Validations – Advanced Active Record. ActionController – Routing – Creating and using Controllers – Using Filters – Working with Sessions – Caching. ActionView – Embedded Ruby – Layouts – Partial – Helpers – JavaScript, Ajax and RJS.

(10)

### UNIT IV DEVELOPING RAILS APPLICATION

Developing Book Shelf: Application Overview – Creating a Skeleton – Create Home Page – Implementing Users. Adding Core Functionality: Adding Support – Refactor Sidebar Code – Implementing Search – Implementing Addition and Deletion Operations – Display content. Testing Application: Using Test::Unit – Testing Rails – Test Database – Functional Test – Unit Tests – Integration Tests – Running, Test Coverage and Debugging Techniques.

### UNIT V ADVANCED CONCEPTS IN RAILS

(8)

Prototype : Overview – Extension to JavaScript – OOP with Prototype – Event Handling - Ajax. Script.aculo.us: Overview – Visual Effects – Controls – Drag and Drop – JavaScript Testing. Extending Rails: Generators – Plugins – Writing Plugins – Techniques used to develop plugins – Pagination – exception\_notifier – Adding User Authentication. RESTful Rails – Working with Legacy Databases – Using ActionMailer – ActiveResource and XML – Deploying with Capistrano.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. Timothy Fisher, "Ruby on Rails Bible", Wiley India Pvt. Ltd., 2009.

**REFERENCES:**

1. Chad Pytel, Tammer Saleh, "Rails AntiPatterns: Best Practice Ruby on Rails Refactoring", First Edition, Addison-Wesley, 2010.
2. David A. Black, "The Well-Grounded Rubyist", Manning Publications, Second Edition, 2014.
3. Peter Cooper, "Beginning Ruby: From Novice to Professional", Apress, Third Edition, 2016.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X								
2		X	X	X	X					X	X	X
3	X	X	X	X						X	X	X
4								X	X	X	X	X



## 15CAX04 SCRIPTING LANGUAGE PROGRAMMING

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To understand basics of Scripting Language Programming concepts using Python.
- To learn the usage of Python syntax.
- To learn and use the Object Oriented paradigm in Python programs.
- To understand the usage of Python Regular Expression capabilities for data verification.

### COURSE OUTCOMES:

On completion of this course the student will have the

- CO1. Ability to gain knowledge in Python.
- CO2. Ability to analyze and synthesis program.
- CO3. Ability to solve problem using Python.
- CO4. Ability to create software using Python language.

### UNIT I INTRODUCTION TO PYTHON

(9)

Introduction – History of Python – versions – Features – Downloading and Installing python – Running Python- Python Documentation – Comparing Python – Statements and Syntax – Variable Assignment – Identifiers and Keywords – Basic Style Guidelines – Memory Management - Python Objects – Standard Types – Standard Type Operators – Standard Type Built-in Functions - Type Factory Functions –Numbers: Integers – Floating Point Real Numbers – Complex Numbers.

### UNIT II LANGUAGE COMPONENTS & COLLECTIONS

(9)

Conditionals and Loops : if statement – else statement – elif statement – Conditional Expressions - While statement – for statement – break and continue statement – pass statement - Iterators – Operators – Sequences: Strings - Lists – Tuples - Mapping Type: Dictionaries and Set Types.

### UNIT III FUNCTIONS AND MODULES

(9)

Create Function – Call Function - Passing Function - Formal Arguments - Variable – Length Arguments – Functional Programming – Variable Scope – Module: Modules and Files - Namespaces – importing Modules – Built-in Functions - Packages . Standard Modules: Sys, math and dir Function.

### UNIT IV EXCEPTIONS AND FILES

(9)

Exceptions in Python – Detecting and Handling Exceptions – Context Management – Raising Exceptions – Assertions - Standard Exceptions - Creating Exceptions – Files - File Objects – Built-in Functions – Built-in Methods – Built –in Attributes – Standard Files – Command Line Arguments – File System.

### UNIT V OBJECT ORIENTED PROGRAMMING AND REGULAR EXPRESSIONS

(9)

Object Oriented Programming - Classes – Class Attributes – Instances – Instance Attributes – Binding and Method Invocation – Static Method – Class Methods – Inheritance. Regular Expressions – Introduction – Special Symbols and Characters – REs and Python.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. Wesley J.Chun, “Core Python Programming “, Second Edition, Pearson Education, 2010.

## REFERENCES:

1. John V.Guttag, "Introduction to computation and programming using python", MIT press, 2013.
2. David M. Beazely, "Python Essential Reference", Fourth Edition, Addison-Wesley Professional, 2009.
3. Naomi R.Ceder, "The Quick python Book", Second Edition, Manning Publications, 2010.
4. Paul Barry, "Head first python paperback-Import", First Edition, O'Reilly, 2010.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X								
2		X	X	X	X					X		
3			X	X	X					X	X	X
4			X					X	X	X	X	X



## 15CAX05 WEB APPLICATION DEVELOPMENT

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

The course helps the students to design and develop interactive client side and server side applications.

### COURSE OUTCOMES:

At the end of the course the students would be able

- CO1. To get an overview of World Wide Web.
- CO2. To understand how to use HTML tags and Style Sheets.
- CO4. To get an idea about Scripting Language and how to develop code.
- CO5. To provide knowledge about Java Server pages.

### UNIT I WORLD WIDE WEB

(9)

Protocols and Programs - Secure Connections - Application And Development Tools- Web Browser - Web Design: Web Site Design Principles - Planning the Site and Navigation.

### UNIT II HYPER TEXT MARKUP LANGUAGE 5

(9)

Introduction to HTML and HTML 5 – Formatting and Fonts – Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists –Tables – Frames – HTML Forms.

### UNIT III CASCADE STYLE SHEET 3

(9)

Overview – syntax - inclusion – colors – background – fonts – text – images – links – tables – borders – margins – lists – padding – cursors – outlines – dimension – scrollbars – visibility – positioning – layers.

### UNIT IV SCRIPTING

(9)

Scripting basics - Client side and server side scripting - Java Script Object – names – literals - operators and expressions - statements and features - events - windows - documents - frames - data types - built-in functions.

### UNIT V JSP and JSF

(9)

Overview of JSP - JDBC and JSP concepts – configuring the JSP server – handling JSP errors – using the include directive - Java Server Pages and inheritance - JSP and HTML forms. Overview of JSF – Life cycle – Basic tags – Composite components – Ajax – event handling – JDBC integration.

**TOTAL: 45 HOURS**

### REFERENCES:

1. Herbert Schildt , “ Java: The Complete Reference ”, Ninth Edition, Mcgraw-Hill , 2014.
2. David Flanagan, “ Java Script : The Definitive Guide ” ,Sixth Edition , O'Reilly Media , 2011.
3. David Geary, Cay S Horstmann ,Marty Hall "Core JavaServer Faces ", Fourth Edition , Pearson Education, 2016.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X								
2	X	X	X	X						X	X	
3	X	X	X		X					X	X	
4	X		X		X		X			X	X	



## PROFESSIONAL ELECTIVES- E1L

### 15CAW11 C# AND .NET FRAMEWORK LABORATORY

L	T	P	C
0	0	4	2

#### COURSE OBJECTIVES:

- To learn to program in C# language using its concepts
- To learn about connectivity with ADO.NET
- To learn about Web Services
- To design web applications and web services

#### COURSE OUTCOMES:

On completion of this course, students will be able:

- CO1. To understand programming concepts in C#
- CO2. To understand about database connectivity of C# with ADO.NET
- CO3. To develop web services and implement it in other programs.
- CO4. To design windows application and web applications

#### List of Experiments:

1. Programs using Branching, Looping.
2. Programs using Methods, Arrays, Strings.
3. Programs using Structures, Enumerations.
4. Programs using Inheritance.
5. Programs using Polymorphism.
6. Programs using Interfaces.
7. Programs using Operator overloading.
8. Programs using Delegates, Events, Errors and Exceptions.
9. Program to build a Calculator widget
10. Develop a windows application program in .NET
11. Develop a web application program in .NET
12. Programs to implement web service in an application.

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X						X	X	
2	X		X		X					X	X	X
3			X	X		X		X	X	X	X	X
4			X			X	X	X	X	X	X	X



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## 15CAW12 UNIX AND NETWORK PROGRAMMING LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVES:

- To learn about basic utility commands in Unix
- To learn about system calls, inter process communication concepts
- To learn about socket and client / server communication

### COURSE OUTCOMES:

On completion of this course, students will be able to:

CO1. Work and attain knowledge in using of utility commands such basic, network, filter utilities

CO2. Create IPC using pipes, message queues and shared memory

CO3. Create communication programs between client / server.

### List of Experiments:

1. Program using simple Unix commands
2. Program using basic network commands
3. Program using system calls : create, open, read, write, close, stat, fstat, lseek
4. Program to implement inter process communication using pipes
5. Program to perform inter process communication using message queues
6. Program to perform inter process communication using shared memory
7. Program to perform synchronization using semaphores
8. Program to capture packets : sniffer
9. Program using TCP sockets (Client and Server).
10. Program using UDP sockets (Client and Server).

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X	X							
2		X	X	X	X			X	X	X	X	X
3			X	X				X	X	X	X	X

## 15CAW13 DYNAMIC PROGRAMMING LANGUAGE LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVES:

- To learn dynamic programming language concepts using Ruby on Rail.
- To understand the Rail Framework.
- To gain knowledge in programming language constructs of Ruby
- To know how to deploy Ruby on Rails.

### COURSE OUTCOMES:

On completion of this course, students will be:

- CO1. Able to work on Rails framework and also do the program using constructs of Ruby.
- CO2. Able to develop simple applications in Ruby.
- CO3. Acquire knowledge to apply object oriented concepts in developing application.
- CO4. Able to connect database and perform CRUD operation
- CO5. Apply knowledge to develop and deploy programs in Rails.

### List of Experiments:

1. Create a Ruby program using conditional and looping statements.
2. Create a Ruby program using string objects.
3. Create a Ruby program using Collections such as arrays, hashes and ranges.
4. Create a ruby program with classes, objects, getter and setter.
5. Create a ruby program that handles File Operations.
6. Create ruby program that connect with database to perform CRUD operation.
7. Create a ruby program with inheritance and modules.
8. Create a rails application with some static web pages.
9. Create a rails application for basic authentication with sign-in and sign-out, user must sign in to see the content.
10. Create a rails application for real time application like online shopping, micro blog, etc.

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X									
2		X	X	X						X	X	X
3	X	X	X							X	X	X
4		X	X	X	X					X	X	X
5				X			X	X	X	X	X	X

*St*

## 15CAW14 SCRIPTING LANGUAGE PROGRAMMING LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVES:

- To understand the scripting language programming concepts using Python.
- To learn the usage of Python syntax
- To learn and use the Object Oriented paradigm in Python programs
- To understand the usage of Python Regular Expression capabilities for data verification

### COURSE OUTCOMES:

On completion of this course the student will have the

CO1. Ability to install Python

CO2. Ability to analyze and synthesis a program.

CO3. Ability to solve problem using Object Oriented paradigm in Python

CO4. Ability to create applications using Python language

### List of Experiments:

1. Python Installation
2. String operations
3. Simple input and output operations
4. Control flow statements
5. Collections
6. Functions
7. Modules
8. Exception Handling
9. File operations
10. Directories
11. Classes
12. Regular Expressions

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X		X	X					X	X		
2		X								X		
3		X	X	X	X					X	X	X
4								X	X	X	X	X



## 15CAW15 WEB APPLICATION DEVELOPMENT LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVES:

- To provide the practical knowledge on Web Application Development.
- To gain an idea about web based applications using HTML, CSS and JSP.

### COURSE OUTCOMES:

On completion of this course, students will be able:

- CO1. To understand basic tags and able to create web page using HTML.
- CO2. To understand formatting tags and able to create web page using CSS.
- CO3. To validate the data using Java Script and able to develop applications.
- CO4. To connect the database using JSP and able to develop applications.

### List of Experiments:

1. Write a HTML code to create a registration web page.
2. Write a HTML code to create your Institute website, Department Website.
3. Create a HTML web page with the following:
  - i) To embed an image map in a web page
  - ii) To fix the hot spots
  - iii) Show all the related information when the hot spots are clicked.
4. Write an HTML code to demonstrate the usage of internal CSS.
5. Write an HTML code to demonstrate the usage of external CSS.
6. Write a Java Script program using user defined function to get array of values and sort them in ascending order.
7. Design HTML form for keeping student record and validate it using Java Script.
8. To design the scientific calculator and make event for each button using Java Script
9. Write JSP program to implement form data validation to accept correct data.
10. Write a JSP program for database Connection to display all the values in the table.

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X					X	X	X	
2	X	X	X	X	X				X	X	X	
3			X	X	X				X	X	X	X
4			X	X	X				X	X	X	X



## PROFESSIONAL ELECTIVES - E 2

### 15CAX06 PROFESSIONAL ETHICS

L	T	P	C
3	0	0	3

#### COURSE OBJECTIVES:

- To understand the core values that shapes the ethical behavior of an engineer.
- To inculcate a spirit of togetherness, unity and team work in an organization.
- To make him reasonably a 'good' professional conscious of his duties to the society.
- To give an overview of sense of social responsibility and security.

#### COURSE OUTCOMES:

A student who successfully completes the course will have the ability to:

- CO1. Deal with complex situations with the people in the society in making the work environment congenial, encouraging and loving.
- CO2. Understand the basic ethical theories discussing the ethics of good and bad patterns of character.
- CO3. Understand the basics regarding the leadership.
- CO4. Implement the concepts in one's career for achieving excellent job satisfaction.

#### UNIT I HUMAN VALUES

(8)

Morals, Values and Ethics – Integrity, Work Ethic and Service Learning – Virtues – Respect for Others – Living Peacefully – Caring, Sharing and Honesty – Courage, Valuing Time and Co-operation – Commitment, Empathy and Self-Confidence – Challenges in the Work Place – Spirituality.

#### UNIT II ENGINEERING ETHICS

(8)

Senses of 'Engineering Ethics' - Variety of moral issues - Types of inquiry - Moral Dilemmas - Moral Autonomy – Moral Development - Consensus and Controversy – Profession – Self-Respect and Senses of Responsibility - Theories about Right action – Self –interest, customs and religion.

#### UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION

(9)

Engineering as experimentation - Engineers as responsible experimenters - Codes of Ethics – Industrial Standards - A balanced outlook on law – Case Study: The challenger.

#### UNIT IV THE ENGINEER'S RESPONSIBILITY FOR SAFETY

(10)

Safety and risk - Assessment of safety and risk - Risk benefit analysis and reducing risk – Case Study: Three mile island and Chernobyl. Collegiality and Loyalty - Respect for Authority - Collective Bargaining - Confidentiality - Conflicts of Interest - Occupational crime - Human rights and Employee rights.

#### UNIT V GLOBAL ISSUES

(10)

Multinational corporations - Environmental ethics - Computer ethics - Engineers as managers - Consulting engineers - Engineers as expert witnesses and advisors - Moral leadership.

**TOTAL: 45 HOURS**

#### TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York, 2006.
2. R. S. Naagarazan, "A textbook on Professional Ethics and Human Values", New Age International Publishers, New Delhi, 2006.

**REFERENCES:**

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004.
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.  
<http://www.learningace.com/textbooks/11111-ethics-and-the-conduct-of-business-7th-Edition>.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X			X	X	X	X					
2	X	X	X	X	X		X		X			
3	X	X		X	X	X						
4	X				X	X	X				X	



## 15CAX07 PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To understand how an organization functions.
- To identify the various issues were faced by the manager in business firms.

### COURSE OUTCOMES:

On completion of this course the student will be able:

- CO1. To understand how to apply management skill to plan, organize and control processes
- CO2. Describe various theories related to the development of leadership skills, motivation techniques, team work and effective communication.
- CO3. To acquire knowledge about process control, budgetary control, productivity and quality control.

### UNIT I INTRODUCTION TO MANAGEMENT

(9)

Organization-Management-Role of managers - Evolution of management thought-Organization and the environmental factors-Managing globally -Strategies for International business.

### UNIT II PLANNING

(9)

Introduction-Nature of planning-Purpose of Planning-Types of Planning-Objectives-Setting objectives-Process of Managing by Objectives-Strategies-Policies and Decision Making.

### UNIT III ORGANIZING

(9)

Nature and purpose of organizing -Organization structure -Formal and informal groups / organization - Line and staff authority -Departmentation -Span of control -Centralization and decentralization -Delegation of authority -Staffing - Selection and Recruitment -Orientation -Career development - Career stages -Training -Performance appraisal.

### UNIT IV DIRECTING

(9)

Directing Scope-Human Factors in Managing-Creativity and Innovation-Harmonizing objectives- Leadership-Motivation-Motivation Techniques-Job Enrichment-Communication.

### UNIT V CONTROLLING

(9)

Process of controlling - Types of control - Budgetary and non-budgetary control techniques -Managing productivity -Cost control -Purchase control -Maintenance control -Quality control -Planning operations.

**TOTAL: 45 HOURS**

### TEXT BOOKS:

1. Andrew J. Dubrin, "Essentials of Management", Thomson Southwestern, Ninth Edition, 2012.
2. Samuel C. Certo and Tervis Certo, "Modern Management: Concepts and Skills", Pearson Education, Twelfth Edition, 2012.
3. Harold Koontz and Heinz Weihrich, "Essentials of management: An International & Leadership Perspective", Ninth Edition Tata McGraw-Hill Education, 2012.

### REFERENCES:

1. Stephen P.Robbins, David A.DeCenzo and Mary Coulter, Fundamentals of Management, Prentice Hall of India, 2012.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X			X	X	X					
2	X	X		X	X	X	X	X				
3				X	X	X	X			X	X	



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## 15CAX08 SOFTWARE PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To know of how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.
- To understand the quality concepts for ensuring the functionality of the software.

### COURSE OUTCOMES:

On completion of this course the student able to

- CO1. Understand the activities during the project scheduling of any software application.
- CO2. Apply the risk management activities and the resource allocation for the projects.
- CO3. Apply software estimation techniques and recent quality standards for evaluating software projects.
- CO4. Acquire knowledge to create reliable, replicable cost estimation that links to the requirement of project planning and managing.

### UNIT I SOFTWARE PROJECT MANAGEMENT CONCEPTS

(9)

Introduction to software project management - An Overview of Project Planning: Select Project, Identifying Project Scope and objectives, Infrastructure, Project Products and Characteristics, Estimate Efforts, Identify Activity Risks and Allocate Resources.

### UNIT II SOFTWARE EVALUATION AND COSTING

(9)

Project Evaluation: Strategic Assessment, Technical Assessment, Cost-Benefit Analysis, Cash Flow Forecasting, Cost-Benefit Evaluation Techniques, Risk Evaluation - Selection of an Appropriate Project Approach: Introduction, Choosing Methodologies and Technologies, Choice of Process Models, Structure versus speed of delivery, Waterfall Model, Spiral Model, Software Prototyping, Agile methods.

### UNIT III SOFTWARE ESTIMATION TECHNIQUES

(9)

Software Effort Estimation: Problems with over and under Estimations, Basis of Software Estimation, Software Effort Estimation Techniques, Expert Judgement, Estimation by Analogy - Activity Planning: Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Networks Planning Models, Formulating a Network Model, Adding the time dimension, Forward Pass, Backward Pass, Critical Path, Activity on Arrow Networks.

### UNIT IV RISK MANAGEMENT

(9)

Risk Management: Introduction, Categories of risk, Framework for dealing with risk, Risk Identification and Assessment, Risk Planning, Risk Management, Evaluating risks to the schedule, Applying PERT techniques - Resource Allocation: Scheduling resources, Critical Paths, Cost Scheduling - Monitoring and Control: Creating Framework, Cost Monitoring, Prioritizing Monitoring.

### UNIT V SOFTWARE QUALITY MANAGEMENT

(9)

Software Quality: Defining Software Quality, ISO9126, Product vs Process Quality Management, Quality Management Systems, Process Capability Models, Techniques to help enhance Software Quality, Testing, Quality Plans.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. Bob Hughes & Mike Cotterell, "Software Project Management", Tata McGraw – Hill Publications, Fifth Edition, 2012.

**REFERENCES:**

1. S.A. Kelkar, "Software Project Management", PHI, New Delhi, Third Edition, 2013.
2. Richard H. Thayer, "Software Engineering Project Management", IEEE Computer Society.
3. Futrell, "Quality Software Project Management", Pearson Education India, 2008.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X									
2	X				X		X		X	X	X	
3	X	X	X		X		X			X	X	
4			X	X	X					X	X	



## 15CAX09 E-COMMERCE AND M-COMMERCE

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

The course helps the students to obtain knowledge of fundamental e-business concepts and basic of mobile commerce and technology.

### COURSE OUTCOMES:

At the end of the course the students would be able

- CO1. To get knowledge about basic concepts of e-commerce.
- CO2. To understand the e-marketing strategies.
- CO3. To understand the concept of electronic payment systems.
- CO4. To provide knowledge about mobile commerce technology.

### UNIT I E-COMMERCE

(9)

Introduction – Electronic Commerce Framework – Electronic Commerce and Media Convergence – Anatomy of E-Commerce Applications – Electronic Commerce Consumer Applications – Electronic Commerce Organization Applications.

### UNIT II E-MARKETING

(9)

Traditional Marketing – Identifying Web Presence Goals – Browsing Behaviour Model – Online Marketing – E-advertising – Internet Marketing Trends – Target Markets – E-branding – Marketing Strategies.

### UNIT III E- PAYMENT SYSTEMS

(9)

Introduction – Types of Electronic Payment Systems – Digital Token-Based Electronic Payment Systems – Smart Cards and Electronic Payment Systems – Credit Card-Based Electronic Payment Systems – Risk and Electronic Payment Systems – Designing Electronic Payment Systems.

### UNIT IV MOBILE COMMERCE

(9)

Introduction – Infrastructure of M-Commerce – Types of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non- Internet Applications In M-Commerce – Wireless/Wired Commerce Comparisons.

### UNIT V MOBILE COMMERCE: TECHNOLOGY

(9)

A Framework For The Study Of Mobile Commerce – NTT Docomo's I-Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks –The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks.

**TOTAL: 45 HOURS**

### REFERENCES:

1. Ravi Kalakota, B.Andrew Whinston, "Frontiers of Electronic Commerce", Pearson Education, Ninth Edition, 2009.
2. E.Brian Mennecke, J.Troy Strader, "Mobile Commerce: Technology, Theory and Applications", Idea Group Inc., IIR press, 2003.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X								
2	X	X	X	X								
3	X						X		X		X	
4		X		X	X		X		X		X	



## 15CAX10 MANAGEMENT OF INFORMATION SYSTEM

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To provide a complete, comprehensive coverage of various management information system.
- To develop techniques of various management information systems.
- To enable the learner to aim for career opportunities in various ERP implementations, ERP support and MIS development.

### COURSE OUTCOMES:

On completion of this course students will be able:

- CO1. To understand various MIS applications like Finance, Marketing, Material management etc.  
CO2. To know about Database and user interface for various MIS applications.  
CO3. To acquire knowledge about decision making process and planning of information system.  
CO4. To appreciate the applications of Information Communication Technology(ICT) in computer applications.

### UNIT I SYSTEM CONCEPTS & STRUCTURE OF MIS

(8)

Introduction to MIS& MIS as an evolving concept- MIS and other academic disciplines – Subsystems of MIS - Role of MIS Professional - Operating Elements of an Information System - MIS structure based on organizational function- I - MIS structure based on organizational function- II – Synthesis and Some Issues of MIS Structure.

### UNIT II SURVEY OF INFORMATION SYSTEMS TECHNOLOGY

(8)

Computer Hardware & Data Representation - Classes of Computers and their languages Communication Facilities and Networks - Wide Area Network and Distributed Systems Physical & Logical Models of Data - File & Database Organizations - Transaction Processing Cycle – Message & Document Communication, Information Processing Control.

### UNIT III CONCEPTUAL FOUNDATIONS &SYSTEM SUPPORT

(11)

Phases in decision Making Process - Methods of decision making process - Documenting and communicating decision rules - The Basic model of Organizational structure, power & change - Organization Structure Implications for Information System Design - Decision Support systems and Expert Systems - Approaches to develop decision support systems Knowledge work and different types- Technology in support of knowledge work -Software support facilities for knowledge work - User developed systems and impact of technology.

### UNIT IV INFORMATION SYSTEM REQUIREMENTS

(9)

Planning for information systems - Three stage model of planning process - Analysis of organizational information requirements - Three levels of information requirements and constraints - A strategy approach to determine information requirements - Database Requirements- Data model concepts and terminology- Approaches in determining Data Requirements- User Interface Requirements and Interactive User Dialogue -Alternate interaction mechanisms.

### UNIT V DEVELOPMENT, IMPLEMENTATION AND MIS RESOURCES

(9)

Prototyping approach to application development - Life cycle approach to application development - Project Management and Implementation of Information Systems - Organizational functions for control and quality assurance- Quality assurance with user developed systems and post audit evaluation - Organization of information resources functions - Organization and management of end user computing - Merger of Computers and Communications Technology - Impact of information technology on organizations and society.

**TOTAL: 45 HOURS**

**TEXT BOOKS:**

1. Gordon B.Davis and Margrethe H. Olson. – Management Information Systems Conceptual Foundations, Structure and Development – 2<sup>nd</sup> edition, McGraw-Hill ,2013.
2. Kenneth C.Laudon and Jane P.Laudon - Management Information Systems-Managing the Digital Firm - Pearson Education Asia - 2013.

**REFERENCES:**

1. Waman S Jawadekar, "Management Information Systems: A Global Digital Enterprise Perspective", Fifth Edition, Tata McGraw-Hill Education Pvt. Ltd, 2013.
2. James A. O'Brien, George M. Marakas, Ramesh Behl, "Management Information Systems", Tenth Edition, McGraw-Hill 2013.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X	X							
2	X	X								X	X	X
3	X	X	X	X		X	X			X		
4							X			X	X	X



## PROFESSIONAL ELECTIVES – E 3

### 15CAX11 CLOUD COMPUTING

L	T	P	C
3	0	0	3

#### COURSE OBJECTIVES:

- To introduce the broad perceptive of cloud architecture and model.
- To understand the concept of Virtualization and design of cloud Services.
- To be familiar with the lead players in cloud and understand the features of cloud simulator.
- To apply different cloud programming model and learn to design the trusted cloud Computing system.

#### COURSE OUTCOMES:

On completion of this course the student able to

- CO1. Identify the architecture, infrastructure and delivery models of cloud computing.
- CO2. Apply suitable virtualization concept.
- CO3. Choose the appropriate cloud player, Programming Models and approach.
- CO4. Address the core issues of cloud computing such as security, privacy and interoperability
- CO5. Design Cloud Services and Set a private cloud.

#### UNIT I CLOUD ARCHITECTURE AND MODEL

(9)

Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

#### UNIT II VIRTUALIZATION

(9)

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

#### UNIT III CLOUD INFRASTRUCTURE

(9)

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

#### UNIT IV PROGRAMMING MODEL

(9)

Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.

#### UNIT V SECURITY IN THE CLOUD

(9)

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security –Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

**TOTAL: 45 HOURS**

#### REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
4. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India, 2011.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly.
6. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
7. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer.
8. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010.
9. Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, "Mastering Cloud Computing", TMGH, 2013.
10. Gautam Shroff, "Enterprise Cloud Computing", Cambridge University Press, 2011.
11. Michael Miller, "Cloud Computing", Que Publishing, 2008.
12. Nick Antonopoulos, "Cloud Computing", Springer Publications, 2010.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X										
2		X	X	X								
3		X	X	X	X							
4						X	X	X	X	X	X	X
5		X	X	X			X	X	X	X	X	X

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## 15CAX12 MOBILE COMPUTING

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture.
- To have an exposure about wireless protocols.
- To Know the Network, Transport Functionalities of Mobile Communication.
- To understand the concepts of Ad-hoc and Wireless Sensor Networks.

### COURSE OUTCOMES:

On completion of this course student will be able:

- CO1. To understand architectures, challenges and solutions of Wireless Communication
- CO2. To get knowledge about wireless protocols
- CO3. To understand WAP architecture in detail

### UNIT I WIRELESS COMMUNICATION FUNDAMENTALS

(9)

Principles of Cellular Networks- Concept of Cell-Frequency reuse -Operation of Cellular Systems- Handoff, 2G- Overview of TDMA -Advantages and Design Considerations of CDMA, 3G- Design Considerations of WCDMA-TMT 2000, Overview of 4G.

### UNIT II TELECOMMUNICATION SYSTEMS

(9)

GSM-Mobile Services-System Architecture-Protocols-Handling Local Information and Calling - Handover-Security-GPRS Architecture-Services.

(9)

### UNIT III WIRELESS NETWORKS

Wireless LAN-Architecture-Types of Wireless LAN-IEEE 802.11 Architecture-Services- HIPERLAN-Bluetooth.

### UNIT IV NETWORK LAYER

(9)

Mobile IP-Goals, Assumptions and Requirements - Entities and Terminology- Agent Discovery – Registration - DHCP - Mobile Ad-hoc Networks - Overview of DSDV & DSR, Ad-hoc Routing Protocols.

### UNIT V TRANSPORT AND APPLICATION LAYERS

(9)

Overview of Traditional TCP- Congestion Control- Slow Start- Fast Retransmit/Fast Recovery, Classical TCP improvements - Indirect TCP- Snooping TCP - Mobile TCP- Selective Retransmission-Transaction Oriented TCP, TCP over 2.5/3G Wireless Networks -WAP Architecture.

**TOTAL: 45 HOURS**

### TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Second Edition (revised), Prentice Hall of India, Pearson Education, 2014.
2. Andreas F. Molisch, "Wireless Communications", Second Edition, Wiley Publication, 2010.

### REFERENCES:

1. B.S.Manoj, C.Siva Ram Murthy, "Adhoc Wireless Networks", Pearson Education, 2014.
2. Rappaport, "Wireless Communications: Principles and Practice", Pearson Education, India, 2009.
3. William Stallings, "Wireless Communications and Networks", Pearson Education, 2007.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X								
2	X	X	X	X								
3	X	X	X	X					X	X		



Approved by Fourth Academic Council

## 15CAX13 CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- Understand the basic concept of Cryptography and Network Security, their mathematical models
- Network security, virus, worms and firewall.
- Acquire knowledge in security issues, services, goals and mechanism.
- Understand mathematical foundation required for various cryptographic Algorithms.
- Encrypt and decrypt messages using block ciphers.

### COURSE OUTCOMES:

On completion of this course student will be able:

- CO1. To know high-level understanding of how information security functions in an organization.
- CO2. To understand information security governance, and related legal and regulatory issues.
- CO3. To know about external and internal threats to an organization.
- CO4. To know about public cryptography and protocols for security services.

### UNIT I SYMMETRIC CIPHERS (9)

Overview – Classical Encryption Techniques - Block Ciphers and the Data Encryption Standard – Euclid's Algorithm - Polynomial Arithmetic - Advanced Encryption Standard.

### UNIT II PUBLIC – KEY ENCRYPTION (9)

Introduction to Number Theory - Public Key Cryptography and RSA - Key Management: Diffie Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

### UNIT III HASH FUNCTIONS (9)

Cryptographic Hash Functions – Message Authentication Codes: Message Authentication Requirements, Functions, Security of MACs, MACs based on Hash Functions and Block Ciphers – Digital Signatures.

### UNIT IV NETWORK SECURITY PRACTICE (9)

Network Access Control and Cloud Security - Wireless Network Security: Mobile Device Security, IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security - Electronic Mail Security: Pretty Good Privacy, S/MIME - IP Security.

### UNIT V SYSTEM SECURITY (9)

Malicious Software: Types of Malicious Software, Propagation, Payload - Intruders: Intrusion Detection, Password Management – Firewalls: Need for Firewalls, Characteristics, Types, Firewall Basing, Location and Configuration.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Sixth Edition, Pearson Education, 2014.

## REFERENCES:

1. Atul Kahate, "Cryptography and Network Security", Third Edition, Tata McGraw Hill Education (India) Private Limited, 2013.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger and Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, 2015.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X								
2		X		X	X	X	X					
3						X	X	X	X			
4		X		X			X		X	X	X	



## 15CAX14 TCP/IP NETWORKS

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To learn advanced networking concepts.
- To learn about various protocols and its services.
- To learn about routing protocols.

### COURSE OUTCOMES:

On completion of this course students will be able:

- CO1. To gain knowledge about the networking concepts.
- CO2. To understand details about protocols and its services.
- CO3. To understand routing protocols such as Unicast and Multicast Protocols in detail.

### UNIT I INTRODUCTION

(9)

The OSI Model, TCP/IP Protocol Suite, Addressing. IP Addresses: Classful Addressing, Classless Addressing, NAT. IP Packets: Delivery, Forwarding, Structure of a Router.

(9)

### UNIT II INTERNET PROTOCOL

Network Layer Services, Datagrams, Fragmentation, Checksum, IP Package. Address Resolution Protocol(ARP): Address Mapping, The ARP Protocol, ARP Package. Internet Control Message Protocol(ICMP): Messages, Debugging Tools, ICMP Package, IGMP.

### UNIT III TRANSMISSION CONTROL PROTOCOL

(9)

Transport-Layer Services, Transport-Layer Protocols. User Datagram Protocol : User Datagram, UDP Services, UDP Applications, UDP Package. Transmission Control Protocol(TCP) : TCP Services, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control, TCP Package. Stream Control Transmission Protocol(SCTP) : SCTP Services, Packet Format, An SCTP Association, Flow Control, Error Control, Congestion Control.

### UNIT IV ROUTING PROTOCOLS

(8)

Unicast Routing Protocols : Distance Vector Routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP. Multicast Routing Protocols : Multicast Routing, Multicast Link State Routing: MOSPF, Multicast Distance Vector, DVMRP, CBT, PIM, MBONE, DHCP.

### UNIT V APPLICATION LAYER PROTOCOLS

(10)

DNS, Remote Login : TELNET and SSH, FTP and TFTP, HTTP, SMTP, SNMP, Internet Security.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. Behrouz A. Forouzan, "TCP/IP Protocol Suite", Fourth Edition, McGraw-Hill Education Private Limited, 2010.

### REFERENCES:

1. Kelvin R. Fall, W. Richard Stevens, "TCP/IP Illustrated, Volume-1", Second Edition, Pearson Publication, 2012.
2. Philip M. Miller, "TCP/IP - The Ultimate Protocol Guide, Volume-2 Application Access and Data Security", Dream Tech Press and Brown Walker Press; Combined Edition, 2010.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X								
2		X	X	X	X				X			
3				X	X		X		X	X	X	



## 15CAX15 ADVANCED DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To impart knowledge in Transaction Processing and Recovery Technique
- To make students to understand the various Databases, its security issues and recovery.

### COURSE OUTCOMES:

On completion of this course the student will be able:

- CO1. To know about Transaction Processing, Concurrency Control and Recovery Technique.
- CO2. To gain awareness about object oriented data models and XML models.
- CO3. To familiarize about Distributed Databases, its issues and other advanced applications.

### UNIT I TRANSACTION PROCESSING AND CONCURRENCY CONTROL (9)

Introduction to Transaction Processing - Transaction and System Concepts - Desirable properties of Transaction - Characterizing Schedules based on Recoverability and Serializability. Concurrency Control Techniques: Two-Phase Locking Techniques - Concurrency Control based on Timestamp Ordering – Multi-version and Validation Concurrency Control Techniques.

### UNIT II RECOVERY AND SECURITY (9)

Recovery concepts- Recovery Techniques: Deferred update – Immediate update – shadow paging. Introduction to database security issues- Discretionary Access Control based on Granting and Revoking privileges- Mandatory Access Control and Role-based Access Control for Multilevel security.

### UNIT III OBJECT, OBJECT-RELATIONAL AND XML MODELS (9)

Overview of Object-Oriented concepts- Object Identity, object structure and type constructors- Encapsulation of operations, methods and persistence- Type and class Hierarchies and Inheritance – Complex Objects - Database design for ORDBMS- Comparing RDBMS, OODBMS and ORDBMS. XML: Structured, Semi-structured, and Unstructured Data -XML Hierarchical (Tree) Data Model -XML Documents, DTD, and XML Schema - Storing and Extracting XML Documents from Databases - XML Languages -Extracting XML Documents from Relational Databases.

### UNIT IV DISTRIBUTED DATABASES (9)

Distributed Database Concepts - Types of Distributed Database Systems -Distributed Database Architectures - Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design - Query Processing and Optimization in Distributed Databases -Overview of Transaction Management in Distributed Databases -Overview of Concurrency Control and Recovery in Distributed Databases -Distributed Catalog Management -Current Trends in Distributed Databases -Distributed Databases in Oracle.

### UNIT V ENHANCED DATA MODELS FOR ADVANCED APPLICATIONS (9)

Active Database Concepts and Triggers -Temporal Database Concepts - Spatial Database Concepts -Multimedia Database Concepts -Introduction to Deductive Databases.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. R. Elmasri, S.V. Navathe. "Fundamentals of Database Systems", Sixth Edition, Pearson Education, 2013.

## REFERENCES:

1. Henry F. Korth, Abraham Silberschatz, S. Sudarshan." Database System Concepts", Sixth Edition, McGraw-Hill International Publications, 2010.
2. Date C.J. "An Introduction to Database Systems", Eighth Edition, Addison-Wesley, 2004.
3. Raghu Ramakrishnan. "Database Management Systems", Third Edition. McGraw Hill Education, 2003.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X	X							
2	X		X	X						X		
3	X		X	X					X	X	X	X



## SEMESTER V

### 15CA501 OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	C
3	0	0	3

#### COURSE OBJECTIVE:

- To provide a brief, hands-on overview of object-oriented analysis in software process
- To discuss case studies based project specifications
- To develop object-oriented models and identify implementation strategies.
- To demonstrate and apply basic object oriented techniques to create and modify object oriented analysis and design models.
- To understand and apply testing techniques for object oriented software.

#### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Identify state & behavior of real world objects.

CO2: Understand various object oriented methodologies and choose the appropriate one for solving the problem with the help of various case studies.

CO3: Understand the concept of analysis, design & testing to develop a document for project

CO4: Implement analysis, design & testing phases in developing a software project.

CO5: Understand testing strategies and know about automated testing tools.

#### UNIT I INTRODUCTION

(9)

An overview – Object basics – Object state and properties – Behavior – Methods – Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes – Object oriented system development life cycle.

#### UNIT II METHODOLOGY AND UML

(9)

Introduction – Survey – Rumbaugh, Booch, Jacobson methods – Patterns – Frameworks – Unified approach – Unified modelling language – Static and Dynamic models – UML diagrams – Dynamic modeling – Model organization – Extensibility.

#### UNIT III OBJECT ORIENTED ANALYSIS

(9)

Identifying Usecase – Business object analysis – Usecase driven object oriented analysis – Usecase model – Documentation – Classification – Identifying object, relationships, attributes, methods – Super-sub class – A part of relationships Identifying attributes and methods – Object responsibility.

#### UNIT IV OBJECT ORIENTED DESIGN

(9)

Design process – Axioms – Colollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – Databases – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface OOUI- Designing the system.

#### UNIT V TESTING AND MANAGEMENT ISSUES

(9)

Quality Issues – Non Execution Based Testing – Execution Based Testing – Cost Benefit Analysis – Risk Analysis – Improving the Process – Metrics – CPM/PERT – Choice of Programming Language – Reuse Case Studies – Portability – Planning and Estimating Duration and Cost – Testing the Project Management Plan – Maintenance and the Object Oriented Paradigm – CASE Tools for Maintenance.

**TOTAL: 45 HOURS**

**TEXT BOOK:**

1. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 2008.

**REFERENCES:**

1. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Second Edition, Addison Wesley Long man, 2004.
2. Craig Larman, "Applying UML and Patterns", Third Edition, Pearson Education, 2005.
3. Brahma Dathan, Sarnath Ramnath, "Object Oriented Analysis, Design and Implementation", Universities Press, 2010.
4. Bernd Bruegge, Allen H. Dutoit, "Object Oriented Software Engineering using UML, Patterns and Java", Pearson, 2004.
5. Martin Fowler, "UML Distilled A Brief Guide to Standard Object Modeling Language", Third Edition, Addison Wesley, 2003.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1		X										
2		X										
3		X	X									
4		X	X									
5		X		X					X	X	X	



## 15CA502 DATA SCIENCE AND ANALYTICS

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- To understand the computational approaches to Modeling, Feature Extraction
- To analyze and interpret streaming data
- To learn how to handle large data sets in main memory
- To understand the various search algorithms applicable to Big Data
- To learn the various clustering techniques applicable to Big Data
- To understand the need and application of Map Reduce

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Design algorithms by employing Map Reduce technique for solving Big Data Problems.

CO2: Design algorithms for Big Data by deciding on the apt Features set

CO3: Design algorithms for handling petabytes of datasets

CO4: Design algorithms and propose solutions for Big Data by optimizing main memory consumption

CO5: Design solutions for problems in Big Data by suggesting appropriate clustering techniques.

### UNIT I INTRODUCTION TO DATA SCIENCE

(8)

Data science process: Roles, Stages of a data science project –Loading data into R: working with data from files - working with relational databases. Exploring data: Using summary statistics to spot problems and spotting problems using graphics and visualization. Managing data: cleaning data and sampling for modeling and validation.

### UNIT II BIGDATA ANALYTICS

(9)

Big Data overview – State of the practice in Analytics-Key Roles for the new Big data Ecosystem – Examples- Data Analytics Lifecycle: Discovery-Data preparation – Model Planning – Model Building – Communicate results – Operationalize.

### UNIT III R PROGRAMMING

(9)

Overview – Environment Setup – Basic Syntax – Data Types – Variables – Operators – Decision Making – Loops – Function – Strings – Vectors – Lists – Matrices – Arrays – Factors – Data Frames - R Data Interfaces : CSV Files – Excel files – Binary files – XML files – Databases. R Charts & Graphs: Pie chart – Bar Chart – Box plots – Histograms – Line Graphs – Scatter plots.

### UNIT IV ADVANCED ANALYTICS THEORY AND METHODS

(9)

Clustering: Overview-K means-Association Rules: Apriori Algorithm -Evaluation of Candidate Rules -Applications of Association Rules – Regression: Linear Regression – Logistic Regression.

### UNIT V ADVANCED ANALYTICS: METHODS, TECHNOLOGY AND TOOLS

(10)

Classification: Decision Trees : Overview – General algorithm – Decision Tree Algorithm – Evaluating a Decision Tree. Naive Bayes : Bayes' Theorem – Naïve Bayes Classifier. Time Series Analysis : Overview - ARIMA Model: Autocorrelation Function – Autoregressive Models – Moving Average Models – ARMA and ARIMA Models – Building and Evaluating an ARIMA Model. Technology and Tools: Overview of MapReduce and Hadoop Ecosystem.

**TOTAL: 45 HOURS**

**TEXT BOOKS:**

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", John Wiley & Sons Publications, (UNIT II – V), 2015.
2. John Mount, Nina Zumel, "Practical Data Science with R", Manning Publications (UNIT I), 2016.

**REFERENCES:**

1. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.
2. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc., 2012.
3. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.
4. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, "Practical Data Science Cookbook", Packt Publishing Ltd., 2014.
5. DT Editorial Services, "Big Data", Black Book, Dreamtech Press, 2015

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X			X					X		
2		X	X				X			X		
3			X		X	X	X					
4			X				X					X
5			X				X					



## 15CA503 SOFTWARE TESTING

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### COURSE OBJECTIVE:

- To understand the fundamentals of software testing.
- To provide a complete, comprehensive coverage of various software testing methods.
- To develop test cases using manual testing and to enable the learner to become a Software Tester.
- To learn about open source tool.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Apply the Software Testing Concepts.

CO2: Understand the working of manual testing.

CO3: Design the test cases and to getting familiarity over testing tools.

CO4: Use the techniques, skills and modern software testing tools necessary for testing.

CO5: Use the open source testing tool to check the behavior of the real time application.

### UNIT I INTRODUCTION TO QUALITY AND SOFTWARE TESTING

(9)

Introduction-Historical Perspective of Quality-Definition of Quality-Total Quality Management-Continuous Improvement Cycle-Quality Management System Structure-Important Aspects of Quality Management. Software Development Life Cycle. Definition of Testing-Approaches to Testing-Testing during Development Life Cycle-Requirements Traceability Matrix-Essentials of Software Testing-Important Features of Testing Process-Skills Required by Tester.

### UNIT II MANAGEMENT CONCEPTS AND TESTING TECHNIQUES

(9)

Configuration Management-Configurable Items-Base lining-Configuration Management Planning-Types of Software Risks-Handling of Risks in Testing- Unit Testing- Integration Testing – System Testing – User Acceptance Testing - SRS – Use case Design-Test Case Design-Bug Report Preparation.

### UNIT III TEST PLANNING AND TESTING TOOLS

(9)

Test Planning: Introduction – Test Policy – Test Strategy – Test Plan – Test Plan Template (System Testing) – Test Cases – Test Scripts – Effective Test Cases – Test File – Building Test Data – Tools Used to Build Test Data – Roles and Responsibilities in Testing Life Cycle. Testing Tools: Introduction – Advantage and Disadvantage of using Tools – When to use Automated Test Tools – Testing using Automated Tools – Difficulties while introducing new tools.

### UNIT IV CASE STUDIES (Use Case, Test Case and Bug Report)

(9)

Banking Application – Change Password – ATM – Pen – Pencil – Student Admission System – Employee Management System – Shapes – Any Web Sites.

### UNIT V OPEN SOURCE TOOL

(9)

Introduction to Selenium - How to use Selenium – Test Automation for Web Application-IDE-Building Test Cases-Running Test cases-Script Language-Debugging-Trouble Shooting.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. M.G. Limaye, "Software Testing, Principles Techniques and Tools", Tata McGraw Hill Education Private Limited, New Delhi, 2009. (Unit I, Unit II and Unit III)

**URL:**

[www.google.co.in](http://www.google.co.in) (Unit IV-Case Studies)

[www.seleniumhq.org/](http://www.seleniumhq.org/) (Unit V)

[www.onestoptesting.com](http://www.onestoptesting.com)

**REFERENCES:**

1. Glenford J. Myers, Corey Sandler, Tom Badgett, "The Art of Software Testing", Second Edition, Third Edition, Wiley Publication, 2011.
2. Paul C. Jorgensen, "Software Testing, A Craftsman's Approach", Second Edition, CRC Press, 2007.
3. Renu Rajani, Pradeep Oak, "Software Testing Effective methods, Tools and Techniques", Tata McGraw-Hill, 2005.
4. Boris Beizer, "Software Testing Techniques", Second Edition, DreamTech Press, 2003.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1		X										
2	X	X										
3			X			X		X				
4		X			X						X	X
5											X	X

## 15CA511 CASE TOOLS LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVE:

- To develop knowledge by applying the concept of different modelling in CASE environment such as case tools.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Understand the case tools Rational Rose.

CO2: Understand how to model a business plan and analyze data.

CO3: Understand how to design, program, verify, validate and maintain project.

### List of Experiments:

- Practicing the different types of case tools such as (Rational Rose & other Open Source) used for all the phases of Software development life cycle.
- Data modeling
- Semantic data modeling
- Source code generators
- Re-engineering
- Experimenting CASE Environments
  - Toolkits
  - Language-centered
  - Integrated
  - Fourth generation
  - Process-centered
- Implementation of the following using CASE Workbenches:
  - Business Planning and Modeling
  - Analysis and Design
  - User-Interface Development
  - Programming
  - Verification and Validation
  - Maintenance and Reverse Engineering
  - Configuration Management
  - Project Management

**TOTAL = 30 PERIODS**

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X				X					X		
2	X	X	X		X							
3		X	X		X					X	X	



Approved by Fifth Academic Council

## 15CA512 DATA SCIENCE AND ANALYTICS LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVE:

- To develop knowledge in R Programming.
- To get knowledge about how to visualize data.
- To get practice in data analytics concepts.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Understand OOP concepts in R programming.

CO2: Understand various graphs to plot data to visualize easily.

CO3: Have hands on and well versed in various data analytic concepts such as Association rules, Logistic Regression, Linear Regression, Classification such as Decision Tree and Naïve Bayes.

### List of Experiments:

1. Program using control structures.
2. Program using array, list and vectors.
3. Program using matrix.
4. Program to implement function
5. Program to implement OOP concept
6. Program to exploring different plots
7. Program to implement clustering
8. Program to implement Time series Analysis
9. Program to implement Association rules
10. Program to implement logistic Regression
11. Program to implement linear Regression
12. Program to implement classification – Decision Tree / Naïve Bayes

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X								
2	X	X	X		X						X	
3		X			X					X	X	X

## 15CA513 MINI PROJECT

L	T	P	C
0	0	4	2

### COURSE OBJECTIVE:

- To provide the opportunity to the students to demonstrate independence and originality, to plan and organize a large project over a long period.
- To provide the opportunity to specialize in specific areas of Computer Applications.
- To provide opportunity to demonstrate a wide range of skills and knowledge learned.
- To encourage integration of knowledge gained in the previous course.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Identify the problem and analyze the project requirements.

CO2: Apply current techniques and software tools necessary for solving complex modules.

CO3: Show their individuality and inspiration in the mini project by designing a specific to real time applications.

CO4: Interpret the data and synthesis the information to derive conclusion for implementation of project.

<b>METHODOLOGY</b>	<ul style="list-style-type: none"><li>• Maximum four students per batch.</li><li>• Faculty guide will be allotted for each batch by the HOD.</li><li>• By mutual discussion, the faculty guide will assign a title in the general /subject area to the student.</li><li>• Students have to refer the Journals and magazine and collect the published literature.</li><li>• Using OHP/Power Point, the student has to make presentation for 15 -20 minutes followed by 10 minutes discussion.</li><li>• Each batch have to do the project and present the progress of the project by two project reviews ,one at the middle and the other near the end of the semester.</li><li>• The student batches have to write a Technical Report for about 25 -30 pages (Title page, One page Abstract, Review of Research paper under various subheadings, Concluding Remarks and List of References). The technical report has to be submitted to the HOD one week before the final presentation, after the approval of the faculty guide.</li></ul>
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<b>EXECUTION</b>	<b>Week</b>	<b>Activity</b>
	I	Allotment of Faculty Guide by the HoD
	II	Collection of Technical papers
	III-IV	Finalizing the title with the approval of Faculty Guide
	V	First Project Review
	VI	Progress of the Project
	VII	Second Project Review
	VIII	Report Preparation
	IX	Report submission
	X-XI	Demo & Final presentation
<b>EVALUATION</b>	<ul style="list-style-type: none"> <li>• 50% by Continuous Assessment + 50% by end semester examination</li> <li>• 4 Hrs/week and 2 credit</li> </ul>	
	<b>Component</b>	<b>Weightage</b>
	First Project Review	25%
	Second Project Review	25%
	Project Report	30%
	Demo & Final presentation	20%
	<b>Total</b>	<b>100%</b>

**TOTAL = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X	X	X	X				X	X
2	X	X	X		X				X		X	
3		X	X	X	X	X	X			X	X	X
4				X	X	X	X	X		X	X	X



Approved by Fifth Academic Council

## PROFESSIONAL ELECTIVES – E4

### 15CAX16 TECHNICAL DOCUMENTATION

L	T	P	C
3	0	0	3

#### COURSE OBJECTIVE:

- To learn in developing appropriate process steps and documentation.
- To provides guidelines to develop process and documentation tools that address the particular needs of organization.
- To define strategy for developing a project or product.
- To help readers discover what they need to know in the area of process and documentation.

#### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Ability to develop appropriate process steps and documentation for effective and successful projects and products.

CO2: Ability to develop process and use documentation tools.

CO3: Ability to plan disaster management and recovery.

CO4: Ability to write documentation of projects or products, so that readers can understand the documentation.

CO5: Ability to know standards and templates.

#### UNIT I OVERVIEW

(9)

Introduction - Plan for Success - Elements of Process, Documentation Tools: Types of Documentation, Labeling, Other Documentation Tasks, Symbols, Cross-Referencing Documentation, Specifications.

#### UNIT II STYLE GUIDE AND MEETINGS

(9)

Definition of Document - General Structure of Documents: Page Layout, Standard Writing Practices, Image File Formats - Document Creation and Editing: Permissions, Citing References, Terms, Copyright, Trademark, and Legal Notices, Document Numbering, Maintaining Corporate Image Consistency - Corporate Identity – Reference Books. Organization - Responsibility of the Chairperson, Challenges of Working Remotely, Developing a Scope of Work and Work Plan, Decision Making, Leadership.

#### UNIT III SYSTEMS ENGINEERING

(9)

Systems Theory - Systems Engineering Process, Functional Analysis, Evaluation and Decision, Description of System Elements. Phases of a Typical System Design Project: Electronic System Design, Detailed Design, Budget Requirements Analysis, Feasibility Study and Technology Assessment. Program Management: Executive and Project Manager, System Engineer, Other Project Team Members.

#### UNIT IV CONCURRENT ENGINEERING, DISASTER PLANNING AND RECOVERY

(9)

Team Process - Process View of Production: QFD, DOE, Robust Design. Developing a Disaster Plan – Emergency Management: Planning Process, Managing Risk, Risk Assessment and Business Resumption Planning, Workplace Safety, Outside Plant Communication Links, Emergency Power and Batteries, Air Handling Systems, Water Hazards, Alternate Sites, Security, Managing Fear.

#### UNIT V STANDARDS, REFERENCE AND TEMPLATES

(9)

Standards Development Organization, Professional Society Engineering Committees, History of Modern Standards. Principal Standard Organizations: ISO, IEC, ITU, ANSI, Tabular Data, Final Thoughts.

**TOTAL: 45 HOURS**

#### TEXT BOOK:

1. Jerry C. Whitaker, Robert K. Mancini, "Technical Documentation and Process", CRC Press, Taylor & Francis Group, New York, 2013.

## REFERENCES:

1. Kieran Morgan, "Technical Writing Process", First Edition, Lightning Source Inc, 2015.
2. Thomas T. Barker, "Writing Software Documentation – A Task-Oriented Approach", Second Edition, Pearson Education, 2003.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1		X	X	X	X	X		X				
2		X		X					X	X	X	X
3			X	X	X	X						
4				X	X						X	X
5		X		X		X				X		



## 15CAX17 DATA MINING AND DATA WAREHOUSING

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- To identify the scope and necessity of Data Mining & Warehousing for the society.
- To understand various tools of Data Mining and their techniques to solve the real time problems.
- To meet the challenges of developing large data Warehouses as the industrial market is moving towards Customer satisfactions.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Ability to understand data mining patterns and technologies.

CO2: Ability to know data cleaning, integration and transformation.

CO3: Ability to apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.

CO4: Extract the Knowledge from hidden data in the database.

### UNIT I INTRODUCTION TO DATA MINING

(9)

Data Mining Definition-Why Data Mining-Types of Data can be Mined-Patterns-Technologies-Applications-Issues in Data Mining- Data Objects and Attribute Types-Basic Statistical Descriptions of Data-Data Visualization-Measuring Data Similarity and Dissimilarity.

### UNIT II DATA PREPROCESSING

(9)

Data Preprocessing: An Overview-Data Cleaning-Data Integration-Data Reduction-Data Transformation-Data Discretization.

### UNIT III DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING

(9)

Data Warehouse: Basic Concepts-Data Warehouse Modeling-Data Warehouse Design and Usage-Implementation-Data Generalization.

### UNIT IV PATTERN MINING

(9)

Pattern Mining in Multilevel, Multidimensional Space-Constraint: Based Frequent Pattern Mining-Mining High Dimensional Data and Colossal Patterns-Mining Compressed Patterns-Pattern Exploration and Application.

### UNIT V ADVANCED CONCEPTS

(9)

Artificial Intelligence: Expert Systems-Fuzzy Logic-The Rise and Fall of AI.

Networks: Definition-Where to use Neural Networks-General Ideas-How Neural Network works-Strength and Weakness.

Genetic Algorithm: Definition-Where to use Genetic Algorithm-General Ideas-How Genetic Algorithm works-Strength and Weakness.

**TOTAL: 45 HOURS**

### TEXT BOOKS:

1. Jiawei Han, Micheline Kamber, Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann Publishers, 2012. (Unit-1 to 4)
2. Alex Berson, Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw Hill Edition, Tata McGraw Hill Publications, 2004.(Unit-5)

**REFERENCES:**

1. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", Second Edition John Wiley & Sons Inc, 2008.
2. W.H. Inmon, "Building the Data Warehouse", Fourth Edition, Wiley Dream tech & Sons Inc, 2005.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X								
2		X		X	X					X		
3	X				X					X	X	X
4					X					X	X	X



## 15CAX18 DB ADMINISTRATION

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- To understand the fundamentals of Database.
- To provide a complete, Managing tablespace, Database Management.
- To develop transactions and management to enable the database security.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Apply the database concepts.

CO2: Understand the database architecture

CO3: Design the database management and security.

CO4: Use the techniques, Managing tablespaces and storage management

### UNIT I INTRODUCTION OF DATABASE ARCHITECTURE (9)

An Overview of Databases and Instances-Logical Storage Structures-Logical Database Structures-Physical Storage Structures-Multiplexing Database Files- Memory Structures-Overview of Backup/Recovery-Security Capabilities-Real Application Clusters-Software Installation-Choosing an Upgrade Method-Before Upgrading-Using Export and Import-Using the Data-Copying Method-After Upgrading.

### UNIT II MANAGING TABLESPACES AND STORAGE MANAGEMENT (9)

Planning and Managing Tablespaces: Tablespace Architecture-Installation Tablespaces-Segment Segregation-Physical Database Layouts and Storage Management: Traditional Disk Space Storage- Automatic Storage Management.

### UNIT III DATABASE MANAGEMENT AND MONITORING SPACE (9)

Resource Management and Stored Outlines-Supporting Tables Based on Abstract Datatypes-Quiescing and Suspending the Database-Supporting Iterative Development-Managing Package Development-Common Space Management Problems-Segments, Extents and Blocks-Data Dictionary and Dynamic Performance Views-Space Management Methodologies-Built-in Space Management Tools-Space Management Scripts.

### UNIT IV MANAGING TRANSACTIONS AND DATABASE TUNING (9)

Basics of Transaction-Undo Basics-Managing Undo Tablespaces-Flashback Features-Tuning Application Design-Tuning SQL-Tuning Memory Usage-Tuning Data Access-Tuning Data Manipulation-Tuning Physical Storage-Reducing Network Traffic-Using STATSPACK and the Automatic Workload Repository.

### UNIT V DATABASE SECURITY,AUDITING,RAC,BACKUP AND RECOVERY (9)

Using STATSPACK-Database Authentication-Database Authorization-Auditing-Data Encryption Techniques-RAC Database Characteristics-RAC Maintenance-Logical Backups-Physical Backups-Using Data Pump Export and Import-RMAN Features and Components-Overview of RMAN Commands and Options-Backup Operations-Recovery Operations.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. Kevin Loney, Bob Bryla "Database Administration", Tata McGraw Hill, New Delhi, 2011.

### REFERENCE:

1. Craig S.Mullins, "Database Administration", Second Edition, Pearson Education, 2013.

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X				X					X		
2	X	X		X						X		
3			X		X					X	X	
4					X						X	X



Approved by Fifth Academic Council

## 15CAX19 ETHICAL HACKING

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- To investigate the importance of ethical hacking and its implementation in organizations
- It focuses on latest security threats, advanced attack vectors, and practical real time demonstration of the latest Hacking Techniques, methodologies, tools, tricks, and security measures.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Know about basic hacking tricks.

CO2: Know how to hack networking, web and password.

CO3: Know types of hacking attacks.

CO4: Know latest security threats and Hacking Techniques.

CO5: Develop knowledge of contemporary cyber security issues, and use techniques, skills and modern engineering tools necessary for computer security engineering practice.

### UNIT I INTRODUCTION

(9)

Hacking Windows: BIOS Passwords – Windows Login Passwords - Changing Windows Visuals –Cleaning Tracks – Internet Explorer users – Cookies – Netscape Communicator – Register - The Registry Editor – Description of reg file – other systems files – The Untold – Windows Tips – Tricks –Manual – Cleaning Recent Docs Menu and RUN MRU – Internet Explorer Tricks and Tips.

### UNIT II NETWORK HACKING & WEB HACKING

(9)

Network Hacking: Telnet – Domain Name Systems – Sockets and Ports – PING – Tracert – Netstat – Getting Information about a Domain – Port 23 – FTP Port – FTP Client – FTP commands – FTP Hacks. Web Hacking: HTTP Torn Apart – Get Method – Post Method –Head Method – Web Browser – Post Dial Up Screen Hacking – Making Own Browser – Removing Banners from Free ISPs – Difficult to Detect Port Scanner – GEOCITIES-TRIPOD – XOOM.

### UNIT III PASSWORD HACKING

(9)

Introduction – Password Cracking – Cracking the Windows – Glide Code – Windows Screen Saver Password – XOR – Internet Connection Password – Windows NT Password – Cracking Unix Password Files – HTTP authentication – BIOS Passwords – Cracking other passwords – Remote Access Sharing Password Decoding – Breaking DES Algorithm – Brute Force Password Cracking –Default Passwords.

### UNIT IV ATTACKS

(9)

Input Validation Attacks: The Art of Input Validation Attacks – Input Validation Dangers – Hotmail.com- Apache Web Server. Buffer Overflow Attacks: Types of Buffer Overflows – Basic Programming Errors. Privacy Attacks: Trojan Attacks – Detection – Countermeasures – Keylogger Attacks – Working.TCP/IP: Checksums – Packet Sequencing – Handshaking –Transport Layer – TCP/UDP Protocols – Link layer. Denial of Services Attacks: Ping of Death – DOS Attacks – Teardrop –SYN Attack – Smurf Attacks – UDP Flooding.

### UNIT V LAWS AND ACTS

(9)

Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Policies.

**TOTAL: 45 HOURS**

**TEXT BOOK:**

1. Ankit Fadia, "An Unofficial Guide To Ethical Hacking", Macmillan India Ltd, 2006.

**REFERENCE:**

1. Matt Walker, "CEH Certified Ethical Hacker All-in-One Exam Guide", Second Edition McGraw-Hill Osborne Media, 2014.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1		X		X			X					
2		X		X			X					
3		X		X			X					
4		X		X	X		X				X	
5		X		X	X		X				X	X



## 15CAX20 HEALTH CARE MANAGEMENT

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- To understand the basic concepts of health care system.
- To know about creating and maintaining health care information systems
- To ensure access of clinical information system on the fly
- To understand IT governance and assessment of health care information system

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

- CO1: Develop an understanding of basic research skills applicable to the design, evaluation and implementation of appropriate Healthcare Information Systems (HIS).
- CO2: Define and analyse the impact, strengths and weaknesses of various HIS in any healthcare settings
- CO3: Write reports on the roles of HIS and their impact on facilitating superior healthcare delivery
- CO4: Design a suitable HIS architecture
- CO5: Use research methods and analysis together to plan the successful implementation of an appropriate HIS solution

### UNIT I INTRODUCTION

(9)

Introduction to health care information – Health care data quality – Health care information regulations, laws and standards.

### UNIT II HEALTH CARE INFORMATION SYSTEMS

(9)

History and evolution of health care information systems – Current and emerging use of clinical information systems – system acquisition – System implementation and support.

### UNIT III INFORMATION TECHNOLOGY

(9)

Information architecture and technologies that support health care information systems – Health care information system standards – Security of health care information systems.

### UNIT IV MANAGEMENT OF IT CHALLENGES

(9)

Organizing information technology services – IT alignment and strategic planning – IT governance and management.

### UNIT V IT INITIATIVES

(9)

Management's role in major IT initiatives – Assessing and achieving value in health care information systems. Case study.

**TOTAL: 45 HOURS**

### REFERENCES:

1. Karen A Wager, Frances Wickham Lee, John P Glaser, "Managing Health Care Information Systems: A Practical Approach for Health Care Executives", Second Edition, JohnWiley, 2009.
2. Marion J. Ball, Charlotte Weaver, Joan Kiel, "Healthcare Information Management Systems: Cases, Strategies, and Solutions", Springer, Third Edition, 2010.
3. Rudi Van De Velde and Patrice Degoulet, "Clinical Information Systems: A Component based approach", Springer 2005.
4. Kevin Beaver, Healthcare Information Systems, Second Edition Best Practices, CRC Press, 2002.
5. Marion J. Ball Healthcare Information Management Systems: A Practical Guide Springer-Verlag GmbH, 1995.

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X		X							
2		X	X		X	X	X			X		
3			X			X	X		X			
4			X		X				X	X	X	
5					X	X	X		X	X	X	



Approved by Fifth Academic Council

## 15CAX21 SOCIAL NETWORK ANALYSIS

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- Understand the concept of semantic web and related applications.
- Learn knowledge representation of Web Mining.
- Understand human behavior in social web and related communities.
- Learn visualization of social networks.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

- CO1: Develop semantic web related applications. .
- CO2: Represent knowledge using ontology
- CO3: Predict human behavior in social web and related communities.
- CO4: Visualize Web Content Mining.
- CO5: Understand Web Linkage Mining.

### UNIT I INTRODUCTION

(9)

Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

### UNIT II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION

(9)

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

### UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL AND NETWORKS

(9)

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

### UNIT IV WEB CONTENT MINING

(9)

Web Content Mining: Vector Space Model, Web Search, Activities on Web archiving, Personalized Web Search, Feature Enrichment of Short Texts, Latent Semantic Indexing, Automatic Topic Extraction from Web Documents Opinion.

### UNIT V WEB LINKAGE MINING

(9)

Hyperlinks- co-citation and bibliographic coupling- page rank and HITS algorithm – web community discovery – web graph measurement and modeling- using link information for web page classification.

**TOTAL: 45 HOURS**

### TEXT BOOKS:

1. Guandong xu and Yanchun zhang, "Web mining and social networking: techniques", "Springer Science and Business Media", 2011.
2. Bing Liu, "Web Data Mining", Springer, 2010.
3. Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.
4. Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.

**REFERENCES:**

1. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
4. John G. Breslin, Alexander Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1		X	X	X			X		X	X		
2		X	X	X	X				X	X	X	X
3		X	X	X			X		X	X		
4		X	X	X			X		X	X	X	X
5		X	X	X			X		X	X	X	X



## 15CAX22 BUSINESS INTELLIGENCE

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- Be exposed with the basic rudiments of business intelligence system
- understand the modeling aspects behind Business Intelligence
- understand of the business intelligence life cycle and the techniques used in it
- Be exposed with different data analysis tools and techniques

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Explain the fundamentals of business intelligence.

CO2: Link data mining with business intelligence.

CO3: Apply various modeling techniques.

CO4: Explain the data analysis and knowledge delivery stages.

CO5: Apply business intelligence methods to various situations.

### UNIT I BUSINESS INTELLIGENCE

(9)

Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

### UNIT II KNOWLEDGE DELIVERY

(9)

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

### UNIT III EFFICIENCY

(9)

Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis

### UNIT IV BUSINESS INTELLIGENCE APPLICATIONS

(9)

Marketing models – Logistic and Production models – Case studies.

### UNIT V FUTURE OF BUSINESS INTELLIGENCE

(9)

Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, 9th Edition, Pearson 2013.

## REFERENCES:

1. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
2. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager's Guide", Second Edition, 2012.
4. Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGrawHill, 2007.
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, "The Data Warehouse Lifecycle Toolkit", Wiley Publication Inc.,2007.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X	X							
2	X	X			X							
3	X	X		X	X						X	X
4		X		X	X			X	X	X		
5	X	X	X							X	X	X



## PROFESSIONAL ELECTIVES – E5

### 15CAX23 MOBILE APPS DEVELOPMENT

L	T	P	C
3	0	0	3

#### COURSE OBJECTIVE:

- This course aims to teach mobile app development using Android as the development platform.

#### COURSE OUTCOMES:

At the end of the course, the students would be able to:

- CO1: Appreciate the Mobility landscape
- CO2: Familiarize with Mobile apps development aspects
- CO3: Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
- CO4: Appreciation of nuances such as native hardware play, location awareness, graphics, and Multimedia
- CO5: Develop their own mobile applications.

#### UNIT I GETTING STARTED WITH MOBILITY

(7)

Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development

#### UNIT II BUILDING BLOCKS OF MOBILE APPS

(15)

App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity- states and life cycle, interaction amongst activities.

App functionality beyond user interface - Threads, Async task, Services – states and lifecycle, Notifications, Broadcast receivers, Telephony and SMS APIs.

Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet).

#### UNIT III SPRUCING UP MOBILE APPS

(9)

Graphics and animation – custom views, canvas, animation APIs, multimedia – audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope).

#### UNIT IV TESTING MOBILE APPS

(8)

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk.

#### UNIT V TAKING APPS TO MARKET

(6)

Versioning, signing and packaging mobile apps, distributing apps on mobile market place.

**TOTAL: 45 HOURS**

#### TEXT BOOK:

- Anubhav Pradhan, Anil V Deshpande, "Mobile Apps Development", First Edition, 2013.

**REFERENCES:**

1. Barry Burd, "Android Application Development All in one for Dummies", First Edition, 2013.
2. "Teach Yourself Android Application Development in 24 Hours", SAMS Publication.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X								
2	X	X	X	X						X	X	X
3			X				X		X	X	X	X
4									X	X	X	X
5						X			X	X	X	X



## 15CAX24 DESIGNING ENTERPRISE APPLICATIONS

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- The aim of this paper includes designing and developing high quality enterprise applications and other task related to it.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

- CO1: Familiarize with concept of Enterprise Analysis and Business Modeling.
- CO2: Understand requirements validation, planning and estimation.
- CO3: Design and document the application architecture.
- CO4: Understand the importance of application framework and designing other application components.
- CO5: Construct different solution layers and perform Code review, Code analysis, build process.

### UNIT I (8)

Introduction to enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications.

### UNIT II (9)

Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non-functional requirements, requirements validation, planning and estimation.

### UNIT III (12)

Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture-design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design.

### UNIT IV (9)

Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage.

### UNIT V (7)

Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.

**TOTAL: 45 HOURS**

### TEXT BOOKS:

- Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, Veerakumar Esakimuthu "Raising Enterprise Applications", John Wiley Publication.
- Brett McLaughlin, "Building Java Enterprise Applications", O'Reilly Media Publication.

## REFERENCES:

1. "Software Requirements: Styles & Techniques", Addison-Wesley Professional.
2. "Software Systems Requirements Engineering: In Practice", McGraw-Hill Osborne Media.
3. "Managing Software Requirements: A Use Case Approach", Second Edition, Pearson Publication.
4. "Software Architecture: A Case Based Approach", Pearson Publication.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X								
2	X	X	X	X								
3			X			X			X	X		
4									X	X	X	X
5									X	X	X	X



## 15CAX25 CLOUDSUITE BUSINESS AND SYTELINE ENVIRONMENT

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- To understand the concepts of enterprise resource planning.
- To know the importance of monitoring the progress activities of specific business or industry.
- To understand the necessity of ERP softwares in business aspects.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

- CO1: Understand the CloudSuite Business and Sytelite Environment.
- CO2: Identify the various types of logistical, accounting and financial data.
- CO3: Explain how metadata, IDO and database are related to one another.
- CO4: Describe the basic architecture found in Mongoose development framework.
- CO5: Sequence the steps for creating SSRS report using BIDS.

### UNIT I CLOUDSUITE BUSINESS USER INTERFACE (9)

Introduction: Forms, Records, Fields and Collections – The Explorer- Form View – Form modes – Customizing menu and My Folder –Autorun and PreLoad- Workspace creation – Pin and Unpin – Retrieving data – various operations on records –Notes.

### UNIT II CLOUDSUITE BUSINESS FOUNDATION (9)

Financials, Customers, Items and Vendors – Customer order - Purchase order requisition – Purchase Order – Shipping – Invoice – Accounts Receivable- Accounts Payable –Vouchers – Journal Entries – General Ledger – Reviewing financials.

### UNIT III ADMINISTRATION AND SYTELINE FORM PERSONALIZATION (9)

Framework – Database- Taskman service – background task – Audit trails – Utilities – System data architecture – Customizing form components – inherited attributes –list sources –validators – Strings customization –User Extended tables (USTs) – Event Handlers.

### UNIT IV EXTENDING WITH MONGOOSE AND WORKBENCH (9)

System development environment – design mode – Cost Centers data Maintenance – Employee data maintenance – Expense Report – IDO – Workbench – Data Views – Data Search – Critical Numbers – Data View Actions.

### UNIT V SSRS AND MONGOOSE APPLICATION FOUNDATION (9)

SQL Server Reporting Services (SSRS) overview – BIDS - Syteline Configuration for reports – Report Authorization – Report Server administration – Mongoose Topology – Licensing – Runtime Basics – Access As Identifier – Runtime UI – Derived property classes – Query forms – Subcollections – Issues data maintenance – Global objects – Issues form.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. Infor CloudSuite Business / Syteline v9 Foundation 101.

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X								
2		X		X								
3	X	X		X							X	X
4	X	X		X							X	X
5		X	X	X			X			X	X	X



Approved by Fifth Academic Council

## 15CAX26 INTERNET OF THINGS

L	T	P	C
3	0	0	3

### COURSE OBJECTIVE:

- Learn the basics of IoT.
- Understand sensors and also learn to schedule, Encode and Security.
- Learn about connectivity, Analytics and life cycle management.
- Aware IoT with Arduino.
- Learn about tools, networks and wireless communication with IoT.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Familiar with basics of IoT such as addresses and cellular connectivity.

CO2: Identify sensors and know how to schedule, encode and process.

CO3: Aware about connectivity management, IoT data analytics and life cycle management.

CO4: Understand to manage and deploy IoT solutions.

CO5: Develop their own applications.

### UNIT I INTRODUCTION

(9)

Introduction - Examples of IoT in Use Today - Basic Internet Concepts - Choice of Connectivity - ICANN and IP Addresses - Cellular Connectivity: Types of Cellular Technologies - Cellular Fall-Back - Determining Location.

### UNIT II SENSOR, SCHEDULING AND SECURITY

(9)

IOT Sensors: Typical IoT/M2M Sensors - Conversion to Digital Data - Calibration and Linearization. Data Transmission Schedules - UDP or TCP - Content Encoding - Gateways - Application Servers - Cloud Computing - Fog Computing. Privacy and Security - Security Objectives - Security Issues for IoT/M2M - Risk Management and Assessing Impact of Breaches - Encryption as an IoT Tool - Choice of Encryption Algorithm - Scalability - End-of-Life Management - Scalability and Connectivity.

### UNIT III CONNECTIVITY MANAGEMENT PLATFORMS, ANALYTICS

(9)

Connectivity Management Platform - Difficulties of Managing IoT Connectivity - Essential Connectivity Management Platform Features - IoT Data and Analytics - Types of Analytics - Analytics Tools and Languages. Supply Chain Management - Cellular Operator Selection - Operator Support Service Level Agreement - Device Certification - Normal Operation Considerations - Application Communications Call Flow - Customer Support Process - LifeCycle Management: Planning Checklist - Lifecycle Management Phases - Pitfalls to Avoid - Future of IOT.

### UNIT IV IoT WITH ARDUINO

(9)

IoT with Arduino – Hardware & Software Requirement, Connecting Sensors to Arduino, Testing Sensors, Uploading and Monitoring data in Cloud. Controlling a Lamp from Anywhere – A Weather Station in the Cloud – Wireless Security Camera.

### UNIT V TOOLS, NETWORK AND WIRELESS COMMUNICATION

(9)

Introduction to Tools: Computers of All shapes and sizes, Good Habits, Tools, Using Command line. Simplest Network: Layers of Agreement, Making the Connection, Flow Control. Wireless Communication: Types of Wireless, Working of Radio, WiFi.

**TOTAL: 45 HOURS**

### TEXT BOOK:

1. Syed Zaeem Hosain, "The Definitive Guide to the Internet of Things for Business", Second Edition, Aeries Communications, Inc., 2016. **(Unit-I, Unit-II, Unit-III)**
2. Marco Schwartz, "Internet of Things with Arduino – Build Internet of Things Projects with the Arduino Platform", Open Home Automation. **(Unit-IV)**
3. Tom Igoe, "Making Things Talk", Second Edition, O'Reilly Media Inc., 2011. **(Unit - V)**

Approved by Fifth Academic Council

## REFERENCES:

1. CunoPfister, "Getting Started with the Internet of Things", O'Reilly, 2011.
2. Dieter Uckelmann, Mark Harrison, Florian Michahelles, "Architecting the Internet of Things", Springer, 2011.
3. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley, 2014.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X			X								
2		X	X	X	X				X	X	X	X
3		X	X						X	X	X	X
4			X	X			X	X	X	X	X	X
5			X			X			X	X	X	X



## 15CA631 PROJECT WORK

L	T	P	C
0	0	24	12

### COURSE OBJECTIVES:

- Understand programming language concepts
- Understand software engineering principles and develop an ability to apply them to software design of real life problems in an industry/commercial environment.
- Learn to plan, analyze, design and implement software project.
- Learn to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project.
- Learn about different software development process models and how to choose an appropriate one for a project.

### COURSE OUTCOMES:

At the end of the course, the students would be able to:

CO1: Apply programming language concepts for the project development.

CO2: Apply software engineering principles and have the ability to use them for software design of real life problems in an industry/ commercial environment.

CO3: Acquire knowledge about and go through the software development cycle with emphasis on different processes - requirements, design, and implementation phases.

CO4: Demonstrate the ability to locate and use technical information from multiple sources.

CO5: Plan, analyze, design and implement a software project.

CO6: Get motivation to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project.

CO7: Demonstrate an understanding of professional ethics.

CO8: Demonstrate the ability to communicate effectively in speech and writing.

CO9: Conceptualize, design, and implement a project with their team.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X	X	X		X			X		
2	X	X	X				X				X	
3		X	X		X	X	X	X	X	X	X	
4	X	X	X	X	X	X	X	X	X	X	X	X
5		X	X	X	X		X	X	X	X	X	X
6				X	X	X	X	X	X	X		X
7		X		X	X	X	X	X				
8		X	X	X		X	X	X	X			
9		X	X	X	X	X	X	X	X	X	X	X



Approved by Fifth Academic Council