



# **SNS COLLEGE OF TECHNOLOGY**

*(An Autonomous Institution)*

**Approved by AICTE, Recognized by UGC &  
Affiliated to Anna University**

**Accredited by NBA-AICTE, NAAC-UGC with 'A+' Grade**



SNS Kalvi Nagar, Sathy Main Road (NH 209),  
Saravanampatti (Po),  
COIMBATORE -641035



**MASTER OF COMPUTER APPLICATIONS**

**(MCA)**

**REGULATION 2019**



# SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Coimbatore- 35



## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS (MCA)

### ABOUT THE DEPARTMENT

The department of MCA (Master of Computer Applications) offers three year Master degree Programme started in the academic year 2005 with the intake of 60, and it has emerged into a very successful one. The programme is designed to provide comprehensive knowledge of computer science, with emphasis on applications. Our students are performed well in academics and richly contributed to the growth of the college by bagging 25 University ranks for the past years. The advancement in technology is challenged by the excellence of Master of Computer Applications, which occupies a prominent place in this college.

The department is provided with excellent academic infrastructure like ICT enabled class rooms, well equipped laboratory with state of the art technology and department library with digital contents. The well qualified, experienced and committed faculty of the department strives for developing new and smart generation of computer professionals with proper transformation of leadership, commitment and moral values. The employability opportunities are more bright and available to the students through regular industry interaction, industry recommended curriculum and development, seminars and workshops and career development courses. The department maintains an exclusive question bank and course notes in digital form prepared by our faculty.



# SNS COLLEGE OF TECHNOLOGY

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Coimbatore- 35



## DEPARTMENT OF MASTER OF COMPUTER APPLICATION

### VISION

Our Vision is to emerge as a Centre of Excellence and Research in the field of Computer Education and Application with distinct identity and character in all areas of its dimensions

### MISSION

Our Mission is to provide very high quality education in Computer Applications and thereby develop a new and smart generation of Computer Application Professionals with proper transformation of leadership, commitment and moral values.

### PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- PEO 1:** To prepare students to excel in postgraduate programmes or to succeed in industry/technical profession through global, rigorous education, and flexible to undertake advance studies in information technology.
- PEO 2:** To provide an academic environment with excellence, leadership, written ethical codes and guidelines, and the enduring learning needed for a successful professional career for students.
- PEO 3:** To provide skills with a firm foundation in Mathematical, Technical and Programming fundamentals require to solve real time problems and also to pursue higher studies.
- PEO 4:** To train students with good technical and managerial skills so as to grasp, analyze, design and develop novel applications and solutions for real time problems.
- PEO 5:** To encourage students in professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach and ability to relate computer applications to broader social context..

### PROGRAMME OUTCOMES (PO)

At the end of the program, graduate will be able to:

- |             |  |  |
|-------------|--|--|
| <b>PO-a</b> | Engineering Knowledge                      | Apply knowledge of mathematics, computing and management as it applies in the field of software development.   |
| <b>PO-b</b> | Problem Analysis                           | Identify, formulate, design and solve intricate computing problems, as well as to analyze and interpret data.  |
| <b>PO-c</b> | Design/ Development of solutions           | Develop algorithms, implement in programming languages and execute experiments.  |
| <b>PO-d</b> | Conduct Investigations of complex problems | Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |

<b>PO-e</b>	Modern Tool usage	Create and use the techniques, expertise, and modern computing tools necessary to solve complex computing problems.
<b>PO-f</b>	Professional Ethics	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.
<b>PO-g</b>	Life-long Learning	Experience life-long learning with a capacity to engage in continuous self-improvement, personal enrichment and professional development.
<b>PO-h</b>	Project management and finance	Demonstrate knowledge and understanding of the project domain and principles, and apply these to manage their project.
<b>PO-i</b>	Communication Efficacy	Effectively communicate technical information, complex computing problems as effective reports, documentation, and make effective presentations.
<b>PO-j</b>	Societal and Environmental Concern	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
<b>PO-k</b>	Individual and Team Work	A talent to have a multidisciplinary view with an ability to work effectively as members of a team composed of individuals from different disciplines.
<b>PO-l</b>	Innovation and Entrepreneurship	Identify a timely opportunity and using innovation to pursue that opportunity for the betterment of the individual and society at large.

### PROGRAM SPECIFIC OUTCOMES (PSO's)

At the end of this program, graduate will be able to:

**PSO 1:** Understand and apply knowledge on analysis, design and development of applications in the computing discipline.

**PSO 2:** Use modern technologies, skill and knowledge for computing practice with commitment on societal, ethical, environmental, cyber and legal values.

### MAPPING OF PEOs WITH POs & PSOS)

PEOs	PO												PSO	
	a	b	c	d	e	f	g	h	I	j	k	l	I	II
<b>I</b>	*		*	*								*	*	
<b>II</b>						*			*		*			*
<b>III</b>	*	*			*		*		*				*	
<b>IV</b>		*	*	*							*			*
<b>V</b>						*	*		*	*		*	*	

**SNS COLLEGE OF TECHNOLOGY**  
 COIMBATORE – 641035  
 (AN AUTONOMOUS INSTITUTION)  
 REGULATION – 2019  
 CHOICE BASED CREDIT SYSTEM  
 CURRICULUM (I – IV SEMESTERS)  
**MASTER OF COMPUTER APPLICATIONS (MCA)**  
**SEMESTER I**

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
<b>THEORY</b>									
1.	19MAT602	Computational Mathematics	FC	4	3	1	0	4	-
2.	19CAT601	Web Programming Essentials	PC	3	3	0	0	3	-
3.	19CAT602	Data structures and Algorithms	PC	3	3	0	0	3	-
4.	19CAT603	Data Communication and Network	PC	3	3	0	0	3	-
5.	19GET601	Professional Development	EEC	3	1	0	2	2	-
6.	19MEB601	Design Thinking	EEC	3	1	0	2	2	-
<b>PRACTICAL</b>									
7.	19CAP601	Web Programming Essentials Laboratory	PC	4	0	0	4	2	-
8.	19CAP602	Data Structures & Algorithms laboratory	PC	4	0	0	4	2	-
<b>Non Academic credits</b>									
9.	Sports / Club Activities		NAC	2	0	0	2	1	-
	Online Testing / Contest / Competition / Hackathon		NAC	0	0	0	0	1	-
	Weekend online practices: 1. VQAR 2. Tool/iTech 3. Domain (6 tests / week)		NAC	0	0	0	0	1	-
<b>TOTAL</b>				<b>29</b>	<b>14</b>	<b>1</b>	<b>14</b>	<b>21</b>	

**SEMESTER II**

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
<b>THEORY</b>									
1.	19MAT609	Optimization Techniques	FC	4	3	1	0	4	-
2.	19CAT607	Principles of Management	PC	3	3	0	0	3	-
3.	19CAT608	Java Programming	PC	3	3	0	0	3	-
4.	19CAT609	Database Management	PC	3	3	0	0	3	-

		System							
5.	E1	Elective-I	PE	3	3	0	0	3	-
6.	O1	Open Elective-I	OE	3	3	0	0	3	
<b>PRACTICAL</b>									
7.	19CAP604	Database Management System Laboratory	PC	4	0	0	4	2	-
8.	19CAP605	Java Programming Laboratory	PC	4	0	0	4	2	-
9.	19CAP606	Mini project	EEC	-	0	0	0	1	-
10.	19CAB607	VQAR	EEC	3	2	0	1	2	-
<b>Non Academic credits</b>									
11.	Sports / Club Activities		NAC	2	0	0	2	1	-
	Online Testing / Contest / Competition / Hackathon		NAC	0	0	0	0	1	-
	Weekend online practices: 1. VQAR 2. Tool/iTech 3. Domain (6 tests / week )		NAC	0	0	0	0	1	-
<b>TOTAL</b>				<b>32</b>	<b>20</b>	<b>1</b>	<b>11</b>	<b>26</b>	

### SEMESTER III

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
<b>THEORY</b>									
1.	19CAT701	Mobile Application Development	PC	3	3	0	0	3	-
2.	19CAT702	Big Data Analytics	PC	3	3	0	0	3	-
3.	19CAT703	Machine Learning	PC	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>PRACTICAL</b>									
6.	19CAP701	Data Analytics Laboratory (Python)	PC	4	0	0	4	2	-
7.	19CAP702	Mobile Application Development Laboratory	PC	4	0	0	4	2	-
8.	19CAP703	Life Skills	EEC	3	1	0	2	2	-
<b>Non Academic credits</b>									
9.	Sports / Club Activities		NAC	2	0	0	2	1	-
	Online Testing / Contest / Competition / Hackathon		NAC	0	0	0	0	1	-
	Weekend online practices: 1. VQAR 2. Tool/iTech 3. Domain (6 tests / week )		NAC	0	0	0	0	1	-
<b>TOTAL</b>				<b>28</b>	<b>16</b>	<b>0</b>	<b>12</b>	<b>21</b>	

**SEMESTER IV**

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
<b>Theory Courses</b>									
1	E4	Elective-IV (online mode)	PC	3	3	0	0	3	
<b>PRACTICAL</b>									
2.	19CAP704	Project Work	EEC	24	0	0	0	12	-
				<b>27</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>15</b>	

**TOTAL NO. OF CREDITS: 83****\*Not included in the calculation of CGPA**

**FOUNDATION COURSES (FC)**

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	19MAT601	Computational Mathematics	4	3	1	0	4	-
2.	19MAT609	Optimization Techniques	4	3	1	0	4	-
3.	19CAT703	Principles of Management	3	3	0	0	3	-

**PROFESSIONAL CORE (PC)**

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	19CAT601	Web Programming Essentials	3	3	0	0	3	-
2.	19CAT602	Data structures and Algorithms	3	3	0	0	3	-
3.	19CAT603	Data Communication and Network	3	3	0	0	3	-
4.	19CAP605	Web Programming Essentials Laboratory	4	0	0	4	2	-
5.	19CAP606	Data Structures & Algorithms laboratory	4	0	0	4	2	-
6.	19CAT607	Machine Learning	3	3	0	0	3	-
7.	19CAT608	Java Programming	3	3	0	0	3	-
8.	19CAB609	Database Management System	3	2	0	2	3	-
9.	19CAP610	Python Programming Laboratory	4	4	0	4	2	-
10.	19CAP611	Java Programming Laboratory	4	4	0	4	2	-
11.	19CAT701	Mobile Application Development	3	3	0	0	3	-
12.	19CAT702	Big Data Analytics	3	3	0	0	3	-
13.	19CAT703	Principles of Management	3	3	0	0	3	-
14.	19CAP704	Open Source Application Laboratory	4	4	0	4	2	-
15.	19CAP705	Mobile Application Development Laboratory	4	4	0	4	2	-



**PROFESSIONAL ELECTIVES (PE)**

<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CONTACT PERIODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>PRE-REQUISITES</b>
1.	19CAE709	Software Testing and Quality Assurance	3	3	0	0	3	-
2.	19CAE710	Soft Computing	3	3	0	0	3	-
3.	19CAE711	Enterprise Resource Planning	3	3	0	0	3	-
4.	19CAE712	Cloud Computing & Virtualization Techniques	3	3	0	0	3	-
5.	19CAE713	Accounting and Financial Management	4	0	0	4	2	-
6.	19CAE714	Advanced databases	3	3	0	0	3	-
7.	19CAE715	Aspect Oriented Programming	3	3	0	0	3	-
8.	19CAE716	Data Science	3	3	0	0	3	-
9.	19CAE717	Human Resource Management	3	3	0	0	3	-
10.	19CAE718	Ad hoc and Sensor Networks	3	3	0	0	3	-
11.	19CAE719	Information Security	3	3	0	0	3	-
12.	19CAE720	Business Intelligence	3	3	0	0	3	-
13.	19CAE721	Project Management in Smart city	3	3	0	0	3	-
14.	19CAE722	Electronic Commerce	3	3	0	0	3	-
15.	19CAE723	Energy Aware Computing	3	3	0	0	3	-
16.	19CAE724	Remote sensing Geographical Information System	3	3	0	0	3	-
17.	19CAE725	Sensor Networks and Internet of Things	3	3	0	0	3	-
18.	19CAE726	Linux Administration and Network Programming	3	3	0	0	3	-
19.	19CAE727	Application Development Frameworks	3	3	0	0	3	-
20.	19CAE728	Human Computer Interactions	3	3	0	0	3	-

**EMPLOYMENT ENHANCEMENT COURSES (EEC)**

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	19MEP615	Design Thinking	5	1	0	4	2	-
2.	19CAB603	Professional Development	3	1	0	2	2	-
3.	19CAB607	VQAR	3	2	0	0	2	-
4.	19CAP609	Mini project	2	0	0	0	1	-
5.	19CAP703	Life Skills	3	1	0	2	2	-
6.	19CAP703	Project Work	24	0	0	24	12	-

\*Not included in the calculation of CGPA

**OPEN ELECTIVES OFFERED FOR OTHER DEPARTMENTS (OE)**

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	19CAOOE1	Digital Marketing and SEO	3	3	0	0	3	-
2.	19CAOOE2	Content Management System	3	3	0	0	3	-
3.	19CAOOE3	Business Intelligence for Managers	3	3	0	0	3	-

S.NO	SUBJECT AREA	Credits Per Semester				Total Credits
		I	II	III	IV	
1	FC	4	4	-	-	8
2	PC	13	13	13	-	39
3	PE	-	3	6	3	12
4	OE	-	3	-	-	3
5	EEC	4	3	2	12	21
	<b>TOTAL</b>	<b>21</b>	<b>26</b>	<b>21</b>	<b>15</b>	<b>83</b>
8.	Non-Credit/ Mandatory	3	3	3	-	-

## SEMESTER - I

<b>19CAT601</b>	<b>Computational Mathematics</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

<b>UNIT-I</b>	<b>MATRIX ALGEBRA</b>	<b>9+3</b>
<p>Matrices, Rank of Matrix, Solving System of Equations-Eigen Values and Eigen Vectors-Inverse of a Matrix - Cayley Hamilton Theorem</p>		

<b>UNIT-II</b>	<b>BASIC SET THEORY</b>	<b>9+3</b>
<p>Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion - partitions- Permutation and Combination - Relations- Properties of relations - Matrices of relations - Closure operations on relations - Functions - injective, surjective and bijective functions.</p>		

<b>UNIT-III</b>	<b>MATHEMATICAL LOGIC</b>	<b>9+3</b>
<p>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</p>		

<b>UNIT-IV</b>	<b>FORMAL LANGUAGES</b>	<b>9+3</b>
<p>Languages and Grammars-Phrase Structure Grammar-Classification of Grammars-Pumping Lemma for Regular Languages – Context Free Languages</p>		

<b>UNIT-V</b>	<b>FINITE STATE AUTOMATA &amp; GRAPH THEORY</b>	<b>9+3</b>
<p>Finite State Automata-Deterministic Finite State Automata(DFA), Non Deterministic Finite State Automata (NFA)- Graph Theory – Basic Definitions – Paths, Reachability and Connectedness – Matrix Representation of Graphs – Trees</p>		

<b>L:45</b>	<b>T: 15</b>	<b>T: 60 PERIODS</b>
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<b>TEXT BOOKS</b>	
<b>1</b>	Kenneth H.Rosen, “ Discrete Mathematics and Its Applications”, Tata McGraw Hill, Fourth Edition, 2002. (Unit I, II & III)
<b>2</b>	Hopcroft and Ullman, “Introduction to Automata Theory, Languages and Computation”, Narosa Publishing House, Delhi, 2002. ( Unit IV & V)

## REFERENCES

1. Jean Paul Tremblay, Rampurkar Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, 1997. (Unit V)
2. M.K.Venkataraman "Engineering Mathematics", Volume II, National Publishing Company, Second Edition, 1989. (Unit I)
3. A.Tamilarasi & A.M.Natarajan, "Discrete Mathematics and its Application", Khanna Publishers, Second Edition, 2005. (Unit I, II & III)

## COURSE OUTCOMES

At the end of the course students should be able to

**CO1:** Gain knowledge on basic concepts and applications of matrix algebra.

**CO2:** Think and proceed for the expected solution in terms of set theory.

**CO3:** Learn how to use logical connectives to combine statements and explore how to draw conclusions using various argument forms.

**CO4:** Design grammars and automata for different language classes.

**CO5:** Prove and disprove theorems establishing key properties of formal languages and automata

<b>19CAT601</b>	<b>WEB PROGRAMMING ESSENTIALS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>ADVANCED HTML</b>	<b>9</b>
HTML Basics – HTML 5 : features –new markup elements – media elements - canvas element - form elements - video on the web		

<b>UNIT-II</b>	<b>CSS</b>	<b>9</b>
Introduction – syntax and structure - Backgrounds, ManipulatingText, Margins and Padding- Positioning using CSS -Advanced CSS 4 concepts		

<b>UNIT-III</b>	<b>JAVASCRIPT</b>	<b>9</b>
JAVA SCRIPT – Introduction – Usage of variables – control structures –functions – objects: DOM —Events and Event Handling – form Validations - AJAX basics		

<b>UNIT-IV</b>	<b>ADVANCED JAVASCRIPT</b>	<b>9</b>
Classes – Constructors – Object-Oriented Techniques in JavaScript – Object constructor and Prototyping - Sub classes and Super classes – Introduction to JSON – JSON Structure – Introduction to jQuery –Introduction to AJAX-Bootstrap - Bootstrap components.		

<b>UNIT-V</b>	<b>ANGULAR JS FRAMEWORK</b>	<b>9</b>
MVC and Angular in HTML – communicating with server - expressions – filters –directives – controller –forms		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Thomas A. Powell, “HTML & CSS: The Complete Reference”, Fifth Edition, 2010
<b>2</b>	Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, Tata McGraw Hill, 2013

## REFERENCES

1. David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011
2. Brad green, shyam sesbadri, "AngularJS: Up and Running", O'Reilly Media,
3. Rodrigo Branas, "AngularJS Essentials", Packt Publishing, 2014.

## COURSE OUTCOMES

CO1: Explore HTML tag features for designing website.

CO2: Use CSS properties with HTML tags to develop interactive web designs

CO3: Design web application forms with validation constraints

CO4: Apply object oriented concepts in java scripts to make action

CO5: Gain knowledge on MVC architecture and its components

<b>19CAT602</b>	<b>DATA STRUCTURES &amp; ALGORITHMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>ELEMENTARY DATA STRUCTURES</b>	<b>9</b>
Introduction – Arrays – Structures – Stack: Definition and examples, Representing Stacks - Queues and lists: Queue and its Representation, lists – Applications of Stack, Queue and Linked Lists.		

<b>UNIT-II</b>	<b>TREES</b>	<b>9</b>
Binary Trees – Operations on binary trees - Binary Tree Representations – node representation, internal and external nodes, implicit array representation – Binary tree Traversals - Huffman Algorithm – Representing Lists as Binary Trees.		

<b>UNIT-III</b>	<b>SORTING AND SEARCHING</b>	<b>9</b>
General Background – Exchange sorts – Selection and Tree Sorting – Insertion Sorts – Merge and Radix Sorts – Basic Search Techniques – Tree Searching – General Search Trees – Hashing.		

<b>UNIT-IV</b>	<b>GREEDY AND BACKTRACKING</b>	<b>9</b>
Fundamentals of the analysis of algorithm efficiency - Asymptotic notations - Greedy method – Prim’s algorithm – Kruskal’s algorithm – Dijkstra’s algorithm – Backtracking: N-Queens problem		

<b>UNIT-V</b>	<b>NP-HARD AND NP-COMPLETE PROBLEMS</b>	<b>9</b>
P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem – Knapsack problem		

<b>L:45</b>	<b>T:0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Tanaenbaum A.S., Langram Y. Augestein M.J “Data Structures using C”, Pearson Education , 2008. (Unit I, II, III)
<b>2</b>	Anany Levitin “Introduction to the Design and Analysis of Algorithms” Pearson Education 2012. (Unit I, II, III, IV & V)

**REFERENCES**

1. Robert Kruse & Clovis L. Tondo “Data Structures and Program Design in C”, Prentice Hall , 2nd edition., 2007. (Unit I, II, III)
2. Weiss, “Data Structures and Algorithm Analysis in C”, Addison Wesley, Third Edition, 2007. (Unit I, II, III )
3. A.V.Aho, J.E Hopcroft and J.D.Ullman, “The Design and Analysis of Computer algorithms” Pearson education Asia, 2003. Unit I, II, III, IV & V)

**COURSE OUTCOMES**

CO1: Understand the different perspective about the Data structures.

CO2: Recognize the role and importance of abstract data types and specification.

CO3: Distinguish different data representation for searching and sorting.

CO4: Experiment the knowledge of greedy and back tracking algorithms into problems

CO5: Able to understand the classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete



<b>19CAT603</b>	<b>DATA COMMUNICATION AND NETWORK</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>DATA COMMUNICATION</b>	<b>9</b>
<p>Introduction: Networks – Protocols and standards – Standards organizations – Line configurations – Topology – Transmission mode – Categories of networks – Inter networks.OSI model: Functions of the layers. Encoding and modulating: Digital-to-digital conversion – Analog-to-digital conversion – Digital-to-analog conversion –Analog-to-analog conversion. Transmission media: Guided media – Unguided media – Transmission impairment – Performance.</p>		

<b>UNIT-II</b>	<b>ERROR CONTROL AND DATA LINK PROTOCOLS</b>	<b>9</b>
<p>Error detection and correction: Types of errors – Detection – Vertical Redundancy Check (VRC) – Longitudinal Redundancy Check (LRC) – Cyclic Redundancy Check (CRC) –Check sum – Error correction. Data link control: Line discipline – Flow control – Error control. HDLC, Project 802 – Ethernet – Token ring – FDDI- SONET – Bridges.</p>		

<b>UNIT-III</b>	<b>NETWORKS AND SWITCHING, NETWORKING DEVICES</b>	<b>9</b>
<p>Switching: Circuit switching – Packet switching – Message switching. Internetworks- IP addressing methods – Subnetting –Networking and internetworking devices: Repeaters – Bridges – Gateways – Other devices – Routing algorithms – Distance vector routing – Link state routing.</p>		

<b>UNIT-IV</b>	<b>TRANSPORT LAYER</b>	<b>9</b>
<p>Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.</p>		

<b>UNIT-V</b>	<b>APPLICATION LAYER</b>	<b>9</b>
<p>Domain Name Space (DNS) – SMTP – FTP – HTTP – WWW-SNMP– Network Security.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Behrouz A.Forouzan, “Data Communication and Networking”, 5 <sup>th</sup> Edition, Tata McGraw Hill, 2012. (Unit I, IV & V)
<b>2</b>	Andrew Tannenbaum.S, “Computer Networks”, 5 <sup>th</sup> Edition, Pearson Education, 2011. (Unit II & III)

**REFERENCES**

1. William Stallings, "Data and Computer Communication", 10<sup>th</sup> Edition, Pearson Education, 2013. (Unit II & III)

**COURSE OUTCOMES**

- CO1: Understand and explain Data Communications System and its components.
- CO2: Identify the different types of network topologies and protocols.
- CO3: Enumerate the layers of the OSI model and TCP/IP and identify the different types of Network devices and their functions within a network.
- CO4: Able to understand the use of various networking devices.
- CO5: Understand the role of application layer protocols in different scenarios

19CAT604	PROFESSIONAL DEVELOPMENT	L	T	P	C
		2	0	0	2
<b>UNIT-I</b>	<b>PROFESSIONAL COMMUNICATION</b>				<b>6</b>
Importance of communication- Types of communication- Verbal and Non-verbal Communication -Barriers to communication					
<b>UNIT-II</b>	<b>PERSONALITY DEVELOPMENT</b>				<b>6</b>
Significance of Personality development- Attitude - Motivation-Self Esteem-Body language - Problem-solving- Decision-making skills- Leadership qualities-Character building -Team-work -Work ethics - Good manners and etiquette					
<b>UNIT-III</b>	<b>PUBLIC SPEAKING</b>				<b>6</b>
Introduction to public speaking- Barriers- Speech organization-Understanding audience-Information & Communicative Technologies (ICT)-Effective power point presentation-feedback					
<b>UNIT-IV</b>	<b>NETWORKING</b>				<b>6</b>
Introduction to networking-Types of networking- <u>Business Card</u> - strategies for networking-networking database-Role of social media& internet					
<b>UNIT-V</b>	<b>SOCIALIZATION</b>				<b>6</b>
Importance of socialization-Theories of self-development-Agents of socialization-socialization across the life					

**TOTAL-30 Hours**

**TEXT BOOK:**

1. Personality development- 1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behaviour 16th Edition: Prentice Hall
3. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015

<b>COURSE OUTCOMES</b>
<p>CO1: Understand and explain Data Communications System and its components.</p> <p>CO2: Identify the different types of network topologies and protocols.</p> <p>CO3: Enumerate the layers of the OSI model and TCP/IP and identify the different types of Network devices and their functions within a network.</p> <p>CO4: Able to understand the use of various networking devices.</p> <p>CO5: Understand the role of application layer protocols in different scenarios</p>

<b>19ME615</b>	<b>DESIGN THINKING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>J</b>	<b>C</b>
		<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>

<b>UNIT I</b>	<b>INTRODUCTION TO DESIGN THINKING</b>	<b>3</b>
A brief insight to Design Thinking and Innovation- People Centered Design & Evoking the 'right problem' - Purpose of Design Thinking- Design Thinking Framework		

<b>UNIT II</b>	<b>PROCESS IN DESIGN THINKING (EMPATHY, DEFINE)</b>	<b>3</b>
Design Thinking Process – Empathy – Uncovering and Investigating Community Concerns - Define : Examine and Reflect on the problem		

<b>UNIT III</b>	<b>CONCEPTING AND BUILDING (IDEA, CREATE)</b>	<b>3</b>
Generating Ideas-Identifying top three ideas-Bundling the Ideas and create concepts-Rapid Prototyping		

<b>UNIT IV</b>	<b>TESTING, REFINING AND PITCHING THE IDEAS</b>	<b>3</b>
Importance & Testing the Design with People-Retest and Redefine Results-Creating a Pitch for the design		

<b>UNIT V</b>	<b>VALUE PROPOSITION DESIGN</b>	<b>3</b>
Business Vs Startup-Briefing the Problem-Problem Validation and User Discovery- Challenge Brief		

<b>L: 15 T:0 J: 30 TOTAL : 45 PERIODS</b>
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<b>TEXT BOOKS</b>	
1.	Robert A Curedale, Design Thinking Process & Methods 4th Edition, December 2017, Design Community College Inc.
2.	Andrew Pressman, Design Thinking: A Guide to Creative Problem Solving for Everyone, First Edition, Nov 2018, Routledge.
<b>REFERENCES</b>	
1.	Idris Mootee, Design Thinking for Strategic Innovation - What They Can't Teach You at Business or Design School, First Edition, 2017, Wiley
2.	Yves Pigneur, Greg Bernarda, Alan Smith, Trish Papadakos Alex Osterwalder, Value Proposition Design: How to Create Products and Services Customers Want, 2015, Wiley
3.	Brown, Tim, and Barry Katz. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, 2009, Harper Business

## **COURSE OUTCOMES**

At the end of the course students should be able to

CO1:Learn new approach-design thinking—that enhances innovation activities in terms of market impact, value creation, and speed.

CO2:Feel the Empathy and can define their problems based on the Community Concerns

CO3:Strengthen their individual and collaborative capabilities to identify customer needs, create sound concept hypotheses, collect appropriate data, and develop a prototype that allows for meaningful feedback in a real-world environment

CO4:Translate broadly defined opportunities into actionable innovation possibilities and recommendations for client organization

CO5:Become an Entrepreneurs

19CAP601	WEB PROGRAMMING ESSENTIALS LAB	L	T	P	C
		0	0	4	2

### List of Programs

1. Develop online book store site (static) which should contain the following pages:

- Home page
- User Registration
- Books catalog
- Shopping cart
- Order confirmation
- Payment mode selection

The pages should resemble any professional online store.

2. Demonstrate Digital clock using canvas in HTML 5
3. Design a user registration page for student in online course management. Apply validation procedure using java script suitably. Show appropriate error messages using dialog box. Display the user profile in the report form once it is submitted.
4. Develop a java script program to design a calculator to perform mathematical functions
5. Design home page for healthcare portal using div tag. Create a CSS style sheet for the page. Use internal, external mode of CSS style sheets
6. Create a user registration form to enroll the events through event management system using JQuery.
7. Define JSON structure for Bus ticket booking system and parse the JSON file to list the passengers those who reserved for Coimbatore to Bangalore
8. Demonstrate input selection and sorting using filters in AngularJS. Assume cricket player data like player name, country, type of player, no of matches played, number of runs scored, number of wickets taken, number of catches made etc...
9. Implement AngularJS forms and validation in user profile page
10. Create Todo list application using AngularJS with inserting

### Hardware Requirements

Intel Pentium IV Processor,  
 Intel Mother Board,  
 512 MB RAM,  
 80 GB Hard Disk or above

### Software Requirements

Windows XP Operating System / Linux Operating System  
Browser (IE /Mozilla) with Internet connection

**COURSE OUTCOMES**

CO1: Develop simple web applications using HTML 5

CO2: Embed CSS properties into web pages to make interactive components

CO3: Create simple one page web application with interactive functionalities using scripts

CO4: Demonstrate on how data can be shared between client and server in JSON form

CO5: Apply scripting logics in web applications using framework

<b>19CAP602</b>	<b>DATA STRUCTURE LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

### List of Programs

1. Strassen's matrix multiplication
2. Stack and Queue
3. Merge Sort
4. Quick Sort
5. Binary tree Traversals
6. DFS and BFS
7. Prim's Algorithm
8. Knapsack Problem – Dynamic Programming
9. Subset Sum Problem – Backtracking
10. Travelling salesperson problem – Branch and Bound

### Hardware Requirements

Intel Pentium IV Processor,  
 Intel Mother Board,  
 512 MB RAM,  
 80 GB Hard Disk or above

### Software Requirements

Windows XP Operating System  
 C/C++ Compiler

### COURSE OUTCOMES

- CO1: Ability to design and analyze the time and space efficiency of the data structure.  
 CO2: Gain practical knowledge on the applications of data structure.  
 CO3: Ability to analyze and implement the various algorithms.  
 CO4: Able to understand dynamic programming concepts and write programs.  
 CO5: Able to write programs implementing backtracking and branch & bound approaches



<b>19MAT609</b>	<b>OPTIMIZATION TECHNIQUES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

<b>UNIT-I</b>	<b>LINEAR PROGRAMMING MODELS</b>	<b>9+3</b>
<p>Mathematical Formulation - Graphical Solution of linear programming models – Simplex method – Artificial variable Techniques- Two Phase Simplex. Integer Programming: Gomory’s IPP method – Gomory’s mixed integer method.</p>		

<b>UNIT-II</b>	<b>TRANSPORTATION AND ASSIGNMENT MODELS</b>	<b>9+3</b>
<p>Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem</p>		

<b>UNIT-III</b>	<b>INVENTORY MODELS</b>	<b>9+3</b>
<p>Costs involved in inventory-Deterministic inventory models: single item inventory, EOQ with and without shortage having production rate finite and infinite.</p>		

<b>UNIT-IV</b>	<b>SCHEDULING BY PERT AND CPM</b>	<b>9+3</b>
<p>Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling</p>		

<b>UNIT-V</b>	<b>QUEUEING MODELS</b>	<b>9+3</b>
<p>Characteristics of Queuing Models – Poisson Queues - (M / M / 1) : (FIFO / ∞ / ∞), (M / M / 1) : (FIFO / N / ∞), (M / M / C) : (FIFO / ∞ / ∞), (M / M / C) : (FIFO / N / ∞) models</p>		

<b>L:45</b>	<b>T: 15</b>	<b>T: 60 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Taha H.A., “Operations Research : An Introduction “ 4 <sup>th</sup> Edition, Pearson Education, 2011. (Unit I – V)
<b>2</b>	A.M.Natarajan, P.Balasubramani, A.Tamilarasi, “Operations Research”, Pearson Education, Asia, 2005. (unit I – V)

**REFERENCES**

1. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Company Ltd, New Delhi, 4rd Edition , 2015. (Unit I – V)
2. S.R. Yadav & A.K. Malik, "Operations Research", First Edtion, Oxford University Press, 2014 (Unit I – V)
3. K Sharma., "Operations Research Theory & Applications , 3e", Macmillan India Ltd, 2007 (Unit I – V)

**COURSE OUTCOMES**

- CO1: Represent problems as linear programming problems and solve it.
- CO2: Apply optimization techniques in transportation and assignment problems
- CO3: Gain knowledge to classify the inventory models and derive solution.
- CO4: Apply PERT and CPM methods in projects and analyze resource requirements
- CO5: Examine and distinguish various queuing models

<b>16CAT607</b>	<b>PRINCIPLES OF MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>INTRODUCTION TO MANAGEMENT</b>	<b>9</b>
<p>Management: Definition - Evolution of Management Studies –Nature, Functions, Levels and role of management - Basic Principles and Process of Management - Management vs. Administration – Taylor &amp; Fayol’s contribution to Management - Management styles -Qualities of good manager.</p>		

<b>UNIT-II</b>	<b>PLANNING</b>	<b>9</b>
<p>Planning: Basic types of planning – Characteristics of a good plan- Features - Planning process- Obstacles in planning - MBO, MBE, Policy - Policy formulation - Types of policies - Forecasting, Process, Importance – Decision making process.</p>		

<b>UNIT-III</b>	<b>ORGANISING</b>	<b>9</b>
<p>Organization: Need - forms of organization - features of a good organization. Departmentation – organizational charts - manuals - span of management, factors affecting span of management - authority relationship – delegation of authority and responsibility - centralization and decentralization.</p>		

<b>UNIT-IV</b>	<b>STAFFING &amp; DIRCTING</b>	<b>9</b>
<p>Staffing: Meaning, Nature, Need, and Process. Directing - Characteristics, Importance and Techniques of directing. Event &amp; Time Management - Scope, Importance - Coordination - Need for coordination, Techniques for securing effective coordination.</p>		

<b>UNIT-V</b>	<b>CONTROLLING</b>	<b>9</b>
<p>Concept of Control – Importance of control- Essentials of control system - Process of control – Communication - Process of Communication - Types - Barriers - Management Information Systems.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Harold Koontz, and Weihrich, “Essentials of Management”, 8 <sup>th</sup> Edition, 2010 (Units- I,II,III,IV&V)

**REFERENCES**

1. Tripathy.P.C and Reddy.P.N., “Principles of Management” , 4th Edition, Tata McGraw Hill, 2011. (Units-I,II,III,IV&V)
2. Stephen.P.Robbins, Mary coulter, Neharika vohra, Pearson, Management, 10th Edition, 2010. (Units-I &II)
3. VSP Rao,V.Hari Krishna, Management , Excel books,2010. (Unit-I,II,V& Case study)
4. Dr.Kumkum Mukherjee, Principles of Management, 2nd Edition, Tata McGraw Hill, 2009. (Units-I,II&III)

**COURSE OUTCOMES**

- CO1: Understand various functions of management.
- CO2: Work as an effective team member and leader.
- CO3: Effectiveness of organizing and controlling aspects of management.
- CO4: Use problem-solving strategies and critical thinking in real life situations.
- CO5: Able to understand the significance of communication in business.

<b>19CAT608</b>	<b>JAVA PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>JAVA FUNDAMENTALS</b>	<b>9</b>
Java features – Java Platform – Java Fundamentals – Classes, Packages and Interfaces – Exception Handling – utilities and collections.		

<b>UNIT-II</b>	<b>PACKAGES</b>	<b>9</b>
Applets- AWT package – Layouts – Containers – Event Package – Event Model – Painting – Garbage Collection.		

<b>UNIT-III</b>	<b>NETWORKING AND I/O PACKAGES</b>	<b>9</b>
Multithreading – Network programming - InetAddress - URL - TCP/IP and datagram - Input Output Packages - inner classes.		

<b>UNIT-IV</b>	<b>ADVANCED JAVA PROGRAMMING</b>	<b>9</b>
Java Database Connectivity: drivers - connection- query execution – Servlets: Generic servlet-HttpServlet		

<b>UNIT-V</b>	<b>ADVANCED JAVA PROGRAMMING(Cont..)</b>	<b>9</b>
RMI – Java Beans – Introduction- Difference between AWT and SWING - Components hierarchy- Panes - Individual Swings components J Label - JButton, JTextField, JTextAres		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Margaret Levine Young, “The Complete Reference Internet”, 2 <sup>nd</sup> Edition, Tata McGraw Hill, 2002.(Unit I)
<b>2</b>	Herbert Schildt, The Complete Reference – Java 2 , 8 <sup>th</sup> Edition, Tata McGraw Hill, 2011. (Unit II, III, IV & V)

**REFERENCES**

1. Ralph Bravaco, Shai Simonson, “Java Programming : From the Ground Up”, Tata McGraw Hill Edition, 2012. (Unit II, III, IV & V)
2. Keyur shah, “Gateway to Java Programmer Sun Certification”, Tata Mc Graw Hill 2002. (Unit I – IV)

**COURSE OUTCOMES**

CO1: Able to understand the internet protocols and web fundamentals.

CO2: Able to develop and execute Java programs using object oriented programming concepts.

CO3: Able to apply the server side programming with database technologies.

CO4: Understand the use of networking and i/o packages.

CO5: Able to develop and deploy Java bean and swing programs.

<b>16CAT609</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>INTRODUCTION</b>	<b>9</b>
Historical perspective - Files versus database systems - Architecture - E-R model - Security and Integrity - Data models.		

<b>UNIT-II</b>	<b>RELATIONAL MODEL</b>	<b>9</b>
The relation - Keys - Constraints - Relational algebra and Calculus - Queries - Programming and triggers.		

<b>UNIT-III</b>	<b>DATA STORAGE</b>	<b>9</b>
Disks and Files - file organizations - Indexing - Tree structured indexing - Hash Based indexing.		

<b>UNIT-IV</b>	<b>QUERY EVALUATION AND DATABASE DESIGN</b>	<b>9</b>
External sorting - Query evaluation - Query optimization - Schema refinement and normalization - Physical database design and tuning – Concurrency control.		

<b>UNIT-V</b>	<b>COLUMN ORIENTED DATABASE</b>	<b>9</b>
Definition of NOSQL- NOSQL Storage Architecture, CRUD operations with MongoDB, Querying, Modifying and Managing NOSQL Data stores, Indexing and ordering datasets		

<b>L:45</b>	<b>T:0</b>	<b>T: 45 PERIODS</b>
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<b>REFERENCES</b>
<ol style="list-style-type: none"> <li>1. Raghu RamaKrishnan and Johannes Gehrke, “Database Management Systems”, McGraw Hill International Editions, 2000. (Unit I, II, III, IV &amp; V)</li> <li>2. C. J. Date, “An Introduction to Database Systems”, Seventh Edition, Addison Wesley, 1997. (Unit I &amp; II)</li> <li>3. Abraham Silberschatz, Henry. F. Korth and S. Sudharshan, “Database system Concepts”, Third Edition, Tata McGraw Hill, 1997. (Unit III, IV &amp; V)</li> <li>4. Ramez Elmasri, Shamkant B Navathe, “Fundamentals of database systems”, Pearson Education, 5<sup>th</sup> edition, 2009. (Unit I)</li> <li>5. Ganesh Chandra Deka, “NoSQL: Database for Storage and Retrieval of Data in Cloud”, CRC Process, 2017 (Unit V)</li> </ol>

<b>COURSE OUTCOMES</b>
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CO1: Master the basic concepts and appreciate the applications of database systems.

CO2: Be familiar with a commercial relational database system (Oracle) by writing SQL.

CO3: Gain the knowledge on indexing techniques, transaction processing and concurrency control.

CO4: Able to apply normalization on database design during software development.

CO5: Enable the ways of storing, accessing, and querying data in NoSQL databases



16CA604	DATABASE MANAGEMENT SYSTEM LABORATORY	L	T	P	C
		0	0	4	2

### List of Programs

1. Creation of base tables and views.
2. Data Manipulation  
INSERT, DELETE and UPDATE in tables  
SELECT, Sub Queries and JOIN
3. Data Control Commands.
4. High level language extensions – PL/SQL Or Transact SQL.
5. Use of Cursors, Procedures and Functions.
6. Embedded SQL or Database Connectivity.
7. Oracle or SQL Server Triggers.
8. Create the schema in a document database, add a key and insert data
9. Create cricket database with necessary information.
  - (i) list all the records
  - (ii) search for particular player using ID
  - (iii) list the player having batting average 40 and above
  - (iv) list the player who have scored 1000 and above runs in the world cup

### Case 1

A database is to be designed for a college to monitor students' progress throughout their Course of study. The students are reading for a degree (such as MCA, MBA, MSc, etc.) within the framework of the modular system. The college provides a number of module, each being characterized by its Code, title, Credit value, module leader, teaching staff and the department they come from. A module is co-ordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed some modules require pre-requisites modules and some degree programmes have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degrees they read for and their past performance (i.e., modules taken and examination results).

1. To retrieve the list of tables present in a database
2. To list which students attended which class frequently
3. To identify the most wanted modules by the students
4. To identify how many lectures teach more than one module
5. List out the students in ascending order depends on their performance.

6. Use join query to identify the relationship between mentor and students.
7. Compare past result performance with present examination result.

### Case 2

A Rental car service company requires database management system which includes information about cars & subcontractors, garages, company expenditures & revenues and customers. Cars could be described by make, model, year of production, engine size, fuel type, number of passengers, registration number, cost & purchase date, rent price/km, insurance amount and insurance date details. The company policy is not to keep any car for a period exceeding five year. All major repairs and maintenance are done by subcontractors. Therefore the data about garages to be kept in the database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others C2C has made arrangements for credit facilities. Company expenditures are to be registered for all outgoing connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources - car hire, car sales, insurance claims - must be kept of file. C2C maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car.

1. Design database and tables for the requirements. Prepare query
2. To find the cars which are to be out of service
3. To identify the cars which are going to be out of service for the next one month
4. To rank the cars based on the maintenance cost consumes
5. To list the cars which consumes maximum insurance claim within 5 year.
6. Displays the total number of customers by counting each customer ID. In addition, it groups the results according to the privilege of each customer.

### Case3

Start Oracle NoSQL Database instance and load the user profile data

<b>Hardware Requirements</b>	
Intel Pentium IV Processor, Intel Mother Board, 512 MB RAM, 80 GB Hard Disk or above	

<b>Software Requirements</b>	
Windows XP Operating System	
C Compiler	
Microsoft SQL Server/ Oracle	

<b>COURSE OUTCOMES</b>
CO1: Creation of tables, queries, forms, reports, data access pages, & macros.
CO2: To provide comprehensive instruction in the Structured Query Language (SQL) and transact-SQL for Microsoft's SQL Server users.
CO3: Will learn how to create multiple forms and reports using PL/SQL triggers, the Object Navigator, and Oracle's Form & Report Builders.
CO4: Able to write triggers and procedures for effectively utilizing the backend for application Development.
CO5: Apply visual basic technology for application development.

<b>19CAP605</b>	<b>JAVA PROGRAMMING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

### List of Programs

1. Write a java program to implement
  - Function overloading
  - Inheritance
  - Exception handling
2. Java program to implement package and interface
3. Writing a GUI program using AWT components
4. Writing a GUI program with event classes
5. Java program to implement network sockets
6. Application of threads and I/O files
7. Implementing database connectivity using JDBC
8. Creating RMI program
9. Create and use Java bean
10. Writing java GUI program with swing components

### Hardware Requirements

Intel Pentium IV Processor,  
 Intel Mother Board,  
 512 MB RAM,  
 80 GB Hard Disk or above

### Software Requirements

Windows XP Operating System / Linux Operating System  
 Java SDK (1.8) / Tomcat Server / IIS Server  
 Browser (IE /Netscape/Mozilla)

### COURSE OUTCOMES

- CO1: Able to develop small applications with Object oriented programming.  
 CO2: Able to develop and execute Java programs using object oriented programming concepts.  
 CO3: Able to develop remote applications with database technology.  
 CO4: Able to write client server programs using RMI.  
 CO5: Able to develop and deploy Java bean programs.

<b>19CAT701</b>	<b>MOBILE APPLICATION DEVELOPMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>GETTING STARTED WITH MOBILITY</b>	<b>9</b>
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.		

<b>UNIT-II</b>	<b>BUILDING BLOCKS OF MOBILE APPS - I</b>	<b>9</b>
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.		

<b>UNIT-III</b>	<b>BUILDING BLOCKS OF MOBILE APPS - II</b>	<b>9</b>
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).		

<b>UNIT-IV</b>	<b>SPRUCING UP MOBILE APPS</b>	<b>9</b>
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).		

<b>UNIT-V</b>	<b>IONIC Hybrid framework</b>	<b>9</b>
Mobile Hybrid Architecture – how angular JS powers IONIC - CSS components and Navigation – SCSS - Directives and services		

L:45	T: 0	T: 45 PERIODS
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<b><u>Textbooks:</u></b>	
<b>1</b>	Anubhav Pradhan, Anil V Deshpande, “Composing Mobile Apps: Learn  Explore  Apply using Android”, First Edition, 2014. (Unit I – V)
<b>2</b>	Barry Burd, “Android Application Development All in one for Dummies”, First Edition ,2011. (Unit I – V)

**REFERENCES**

1. Lauren Darcey , Shane Conder, “Teach Yourself Android Application Development In 24 Hours”, Second Edition, 2012. (Unit I – V)
2. Arvind Ravularvaru , “Learning IONIC”, PACKT Publications, First Edition, 2015

**COURSE OUTCOMES**

CO1: Able to get familiarize with Mobile apps development aspects.

CO2: 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.

CO3: Understand the use of graphics, animation in Android apps.

CO4: Able to develop mobile apps implementing location awareness and sensors.

CO5: Perform testing, signing, packaging and distribution of mobile apps.

16CAT702	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

<b>UNIT-I</b>	<b>INTRODUCTION TO BIG DATA</b>	<b>8</b>
<p>Introduction to BigData – Challenges of Conventional Systems - Intelligent data analysis – Data - Analytic Processes and Tools - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error</p>		

<b>UNIT-II</b>	<b>HADOOP</b>	<b>10</b>
<p>History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features</p>		

<b>UNIT-III</b>	<b>HADOOP ENVIRONMENT</b>	<b>9</b>
<p>Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud</p>		

<b>UNIT-IV</b>	<b>FRAMEWORKS</b>	<b>9</b>
<p>Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications</p>		

<b>UNIT-V</b>	<b>R PROGRAMMING</b>	<b>9</b>
<p>Introduction to R: Overview of R; functions and packages in R; working with dataset in R; use R for doing statistical analysis and graphics; R commands . Adoption of R in Industry : Oracle R, Revolution Analytics</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008. (UNIT I-II)
<b>2</b>	Tom White, “ Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012 (UNIT II-V)

**REFERENCES**

1. A.Ohri, “R for Business Analytics”, Second edition, Springer, 2012
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012 (UNIT III-IV)
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012. (UNIT III-IV)
4. Prabhanjan NarayanacharTattar, “R Statistical Application Development byExample Beginner's Guide”, PACKT, 2013 (UNIT V)

**COURSE OUTCOMES:**

The students will be able to:

1. Understand the significance of data and its analytics
2. Examine the components of Hadoop Framework and their functionalities
3. Analyze the HADOOP and Map Reduce technologies associated with big data analytics
4. Explore on Big Data applications Using Pig and Hive
5. Apply R programming language on analytical applications



19CAT703	<b>MACHINE LEARNING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>FOUNDATIONS OF LEARNING</b>	<b>9</b>
<p>Components of learning –learning models –geometric models –probabilistic models –logic models –grouping and grading –learning versus design –types of learning –supervised –unsupervised –reinforcement –theory of learning –feasibility of learning–error and noise –training versus testing –theory of generalization –generalization bound –approximation-generalization tradeoff –bias and variance –learning curve</p>		

<b>UNIT-II</b>	<b>LINEAR MODELS</b>	<b>9</b>
<p>Linear classification –univariate linear regression –multivariate linear regression –regularized regression –Logistic regression –perceptrons –multilayer neural networks –learning neural networks structures –support vector machines –soft margin SVM –going beyond linearity –generalization and overfitting –regularization –validation</p>		

<b>UNIT-III</b>	<b>DISTANCE-BASED MODELS</b>	<b>9</b>
<p>Nearest neighbor models –K-means –clustering around medoids –silhouettes –hierarchical clustering –k-d trees –locality sensitive hashing–non-parametric regression –ensemble learning –bagging and random forests –boosting –meta learning</p>		

<b>UNIT-IV</b>	<b>TREE AND RULE MODELS</b>	<b>9</b>
<p>Decision trees –learning decision trees –ranking and probability estimation trees –regression trees –clustering trees –learning ordered rule lists –learning unordered rule lists –descriptive rule learning –association rule mining –first-order rule learning</p>		

<b>UNIT-V</b>	<b>Machine Learning with Python’s scikit-learn</b>	<b>9</b>
<p>Introduction to scikit-learn library – supervised learning – k nearest neighbors – linear regressions – support vector machines – support vector regression</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, —Learning from Data, AML Book Publishers, 2012.
<b>2</b>	P. Flach, —Machine Learning: The art and science of algorithms that make sense of data, Cambridge University Press, 2012.

**REFERENCES**

- .K. P. Murphy, —Machine Learning: A probabilistic perspective, MIT Press, 2012.  
M. Mohri, A. Rostamizadeh, and A. Talwalkar, —Foundations of Machine Learning, MIT Press, 2012.  
C. M. Bishop, —Pattern Recognition and Machine Learning, Springer, 2007.  
D. Barber, —Bayesian Reasoning and Machine Learning, Cambridge University Press, 2012

**COURSE OUTCOMES**

- CO1: Able to understand various learning models of Machine Learning.  
CO2: Develop algorithms to learn linear and non-linear models.  
CO3: Apply data clustering algorithms on Analytical Problems.  
CO4: Gain the knowledge on tree and rule-based models.  
CO5: Apply reinforcement learning techniques for real life problems.

19CAP701	DATA ANALYTICS LABORATORY (PYTHON)	L	T	P	C
		0	0	4	2

### List of Programs

1. Implement linear regression machine learning algorithm using appropriate dataset
2. Demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
3. Implement k-Nearest Neighbour algorithm to classify the iris data set using Python ML library classes
4. Use diabetes dataset in scikit-learn library and make baseline prediction of disease progression for future patients
5. Logistic Regression using Scikit-Learn
6. Implementation of classifier using Random forest model
7. Perform outlier detection using appropriate dataset
8. Implement multiclass classification using SVM

### Hardware Requirements

Intel Pentium IV Processor,  
 Intel Mother Board,  
 512 MB RAM,  
 80 GB Hard Disk or above

### Software Requirements

Windows OS  
 Python Environment

### COURSE OUTCOMES

CO1: Ability to understand and implement the concepts of Python programming.  
 CO2: Understand and apply/use array in programming  
 CO3: To gain knowledge on functions and data types.  
 CO4: To gain knowledge on use of appropriate data structures  
 CO5: Ability to understand GUI concept

<b>19CAP702</b>	<b>MOBILE APPS. DEVELOPMENT LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

### List of Programs

1. Understand the app idea and design user interface/wireframes of mobile app.
2. Set up the mobile app development environment.
3. Form design for mobile applications.
4. Applications using controls.
5. Graphical and Multimedia applications.
6. Data retrieval applications.
7. Gaming applications.
8. Web Portal Development.
9. Using emulator to deploy and run mobile apps
10. Testing mobile app - unit testing, black box testing and test automation

### Hardware Requirements

Pentium P4, 2.8 GHz or higher  
 2 GB (or higher) RAM, 40 GB (or higher) HD  
 Windows XP with SP2 (or higher)

### Software Requirements

Android ADT bundle, MonkeyTalk, Robotium, Tomcat (or any other J2EE web container)

### COURSE OUTCOMES

- CO1: Setup the mobile app development environment with necessary tools.  
 CO2: Able to design user interface/ wireframes of mobile apps.  
 CO3: Develop mobile applications using controls.  
 CO4: Create graphical, multimedia, gaming and data retrieval applications.  
 CO5: Test and deploy mobile apps.

<b>19CAE809</b>	<b>SOFTWARE TESTING AND QUALITY ASSURANCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>TESTING ENVIRONMENT AND TEST PROCESSES</b>	<b>9</b>
<p>World-Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing – Developing the Test Plan – Verification Testing –Analyzing and Reporting Test Results – Acceptance Testing – Operational Testing – Post Implementation Analysis.</p>		

<b>UNIT-II</b>	<b>TESTING TECHNIQUES AND LEVELS OF TESTING</b>	<b>9</b>
<p>Using White Box Approach to Test design - Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs –Using Black Box Approaches to Test Case Design – Random Testing – Requirements based testing –Decision tables –State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – Levels of Testing - Unit Testing – Integration Testing - Defect Bash Elimination. System Testing - Usability and Accessibility Testing – Configuration Testing - Compatibility Testing - Case study for White box testing and Black box testing techniques.</p>		

<b>UNIT-III</b>	<b>INCORPORATING SPECIALIZED TESTING RESPONSIBILITIES</b>	<b>9</b>
<p>Testing Client/Server Systems – Rapid Application Development Testing – Testing in a Multiplatform Environment – Testing Software System Security - Testing Object-Oriented Software – Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution – Traditional Software and Web based Software – Challenges in Testing for Web-based Software – Testing a Data Warehouse - Case Study for Web Application Testing.</p>		

<b>UNIT-IV</b>	<b>TOOLS TO AUTOMATE TESTING</b>	<b>9</b>
<p>Selecting tools - requirements - tool market - tool selection project – tool selection team - Identifying requirements - Identifying constraints – Identifying tools availability in market - Evaluating the candidate tools - decision making, Testing Tools - WinRunner, SilkTest, LoadRunner, JMeter.</p>		

<b>UNIT-V</b>	<b>SOFTWARE TESTING AND QUALITY METRICS</b>	<b>9</b>
<p>Testing Software System Security - Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics - Defect Removal Effectiveness - FMEA - Quality Function Deployment – Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object Oriented Metrics.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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**Textbooks:**

1	Naresh Chauhan , “Software Testing Principles and Practices ”, Oxford University Press , New Delhi , 2010.(Unit I, II & III)
2	Stephen Kan, “Metrics and Models in Software Quality”, Addison – Wesley, 2 <sup>nd</sup> Edition, 2004.(Unit V)

**REFERENCES**

1. William Perry, “Effective Methods of Software Testing”, 3<sup>rd</sup> Edition, Wiley Publishing 2007 (Unit I)
2. Srinivasan Desikan and Gopaldaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2007.(Unit II & III)
3. Llene Burnstein, “Practical Software Testing”, Springer International Edition, Chennai, 2003(Unit IV & V)
4. Dale H. Besterfiled et al., “Total Quality Management”, Pearson Education Asia, 3<sup>rd</sup> Edition, Indian Reprint (2006). (Unit V)

**COURSE OUTCOMES**

- CO1: Test the software by applying testing techniques to deliver a product free from bugs.
- CO2: Investigate the scenario and be able to select the proper testing technique.
- CO3: Able to explore the test automation concepts and tools.
- CO4: Able to deliver quality product to the clients by way of applying standards.
- CO5: Understand the software quality management metrics and quality function deployment.

19CAE810	SOFT COMPUTING	L	T	P	C
		3	0	0	3

<b>UNIT-I</b>	<b>INTRODUCTION TO SOFT COMPUTING</b>	<b>9</b>
Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics		

<b>UNIT-II</b>	<b>GENETIC ALGORITHMS</b>	<b>9</b>
Introduction - Building block hypothesis - working principle - Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction - Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator - GA optimization problems - JSPP (Job Shop Scheduling Problem) - TSP (Travelling Salesman Problem) - Differences & similarities between GA & other traditional methods - Applications of GA		

<b>UNIT-III</b>	<b>NEURAL NETWORKS</b>	<b>9</b>
Machine Learning using Neural Network - Adaptive Networks – Feed Forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks – Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural Networks.		

<b>UNIT-IV</b>	<b>FUZZY LOGIC</b>	<b>9</b>
Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.		

<b>UNIT-V</b>	<b>NEURO-FUZZY MODELING</b>	<b>9</b>
Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case Studies		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003. (Unit I - V)

## REFERENCES

1. Kwang H.Lee, “First course on Fuzzy Theory and Applications”, Springer–Verlag Berlin. (Unit I – V)
2. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995. (Unit I – III)
3. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn., 2003. (Unit III)
4. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley, 2007. (Unit II)
5. Mitsuo Gen and Runwei Cheng, “Genetic Algorithms and Engineering Optimization”, Wiley Publishers 2000. (Unit II)

## COURSE OUTCOMES

- CO1: Implement machine learning through neural networks and gain knowledge on Genetic algorithm.
- CO2: Understand machine learning techniques and neural networks.
- CO3: Write Genetic Algorithm to solve the optimization problem and understand fuzzy concepts and develop a Fuzzy expert system to derive decisions.
- CO4: Understand fuzzy logics and develop a fuzzy expert system .
- CO5: Model Neuro Fuzzy system for data clustering and classification.



<b>19CAE811</b>	<b>ENTERPRISE RESOURCE PLANNING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>INTRODUCTION TO ERP</b>	<b>9</b>
<p>Overview – Benefits of ERP – ERP and Related Technologies – Business Process Reengineering – Data Warehousing – Data Mining – On-line Analytical Processing – Supply Chain Management - Customer Relationship Management (CRM), MIS - Management Information System, EIS - Executive Information System.</p>		

<b>UNIT-II</b>	<b>ERP IMPLEMENTATION</b>	<b>9</b>
<p>Implementation Life Cycle – Implementation Methodology – Hidden Costs – Organizing Implementation – Vendors, Consultants and Users – Contracts – Training and Education – Data Migration - Project Management and Monitoring.</p>		

<b>UNIT-III</b>	<b>BUSINESS MODULES</b>	<b>9</b>
<p>Business Modules in an ERP Package – Finance – Manufacturing – Human Resource – Plant Maintenance – Materials Management – Quality Management - Marketing – Sales and Distribution.</p>		

<b>UNIT-IV</b>	<b>ERP MARKET</b>	<b>9</b>
<p>ERP Market Place – SAP AG – PeopleSoft – Baan Company – JD Edwards World Solutions Company – Oracle Corporation – QAD – System Software Associates.</p>		

<b>UNIT-V</b>	<b>ERP – PRESENT AND FUTURE</b>	<b>9</b>
<p>Turbo Charge the ERP System – EAI – ERP and E-Business – ERP Case studies - ERP and Internet – ERP and TQM - Future Directions in ERP.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Alexis Leon, “ERP Demystified”, Tata McGraw Hill, 2008. (Unit I – V)

**REFERENCES**

1. Joseph A. Brady, Ellen F. Monk, Bret J. Wangner, “Concepts in Enterprise Resource Planning” , Thomson Learning, 2001. (Unit I & II)
2. Vinod Kumar Garg and N.K .Venkata Krishnan, “Enterprise Resource Planning - concepts and Planning”, Prentice Hall, 1998. (Unit III, IV & V)

**COURSE OUTCOMES**

- CO1: Able to understand ERP benefits and related technologies.
- CO2: Able to understand architecture of ERP and working of different modules in ERP.
- CO3: Understand the concepts of planning and utilizing resources.
- CO4: Able to evaluate and analyze the various ERP packages available in the market.
- CO5: Able to plan and implement ERP system in an organization.

<b>19CAE812</b>	<b>CLOUD COMPUTING AND VIRTUALIZATION TECHNIQUES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>CLOUD ARCHITECTURE AND MODEL</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-II</b>	<b>VIRTUALIZATION</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-III</b>	<b>CLOUD INFRASTRUCTURE</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-IV</b>	<b>PROGRAMMING MODEL</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-V</b>	<b>SECURITY IN THE CLOUD</b>	<b>9</b>
<p>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.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012. (Unit I -V)

## REFERENCES

1. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.(Unit II)
2. Kumar Saurabh, “Cloud Computing – insights into New-Era Infrastructure”, Wiley India,2011. (Unit I & III)
3. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009. (Unit IV)
4. John W.Rittinghouse and James F.Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2010. (Unit V)

## COURSE OUTCOMES

- CO1: Compare the strengths and limitations of cloud computing.
- CO2: Identify the architecture, infrastructure and delivery models of cloud computing.
- CO3: Apply suitable virtualization concept in clouds.
- CO4: Able to understand the various cloud software environments.
- CO5: Recognize the importance of security in the cloud.

<b>19CAE813</b>	<b>ACCOUNTING AND FINANCIAL MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>FINANCIAL ACCOUNTING</b>	<b>9</b>
<p>Meaning and Scope of Accounting - Principles – Concepts – Conventions - Accounting Standards - Final Accounts – Journal - Ledger -Trail Balance -Trading Account - Profit and Loss Account - Balance Sheet.</p>		

<b>UNIT-II</b>	<b>ACCOUNTING</b>	<b>9</b>
<p>Accounting Ratio Analysis-definition - objectives - classification of ratios - Funds Flow Analysis - Cash Flow Analysis Meaning – Objectives – Elements of Cost - Cost Sheet - Marginal Costing and Cost Volume Profit Analysis - Break Even Analysis – Applications – Limitations - Standard Costing.</p>		

<b>UNIT-III</b>	<b>BUDGETS AND BUDGETING CONTROL</b>	<b>9</b>
<p>Budgets and Budgetary Control-Meaning – Types - Sales Budget - Production Budget - Cost of Production Budget - Flexible Budgeting - Cash Budget - Master Budget - Zero Base Budgeting - Computerized Accounting.</p>		

<b>UNIT-IV</b>	<b>INVESTMENT DECISION AND COST OF CAPITAL</b>	<b>9</b>
<p>Objectives and Functions of Financial Management – Risk - Return Relationship - Time Value of Money Concepts - Capital Budgeting - Methods of Appraisal - Cost of Capital- Factors Affecting Cost of Capital - Computation for Each Source of Finance and Weighted Average Cost of Capital.</p>		

<b>UNIT-V</b>	<b>FINANCING DECISION AND WORKING CAPITAL MANAGEMENT</b>	<b>9</b>
<p>Capital Structure - Factors Affecting Capital Structure - Dividend Policy - Types of Dividend Policy - Concepts of Working Capital - Working Capital Policies - Factors affecting Working Capital - Estimation of Working Capital Requirements.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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**Textbooks:**

1	I.M.Pandey, "Financial Management", Vikas Publications, 4 <sup>th</sup> Reprint, 2002. (Unit III, IV & V)
2	S.N.Maheswari, "Financial and Management Accounting", Sultan Chand & Sons, 2003. (Unit I, II & V)

**REFERENCES**

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

**COURSE OUTCOMES**

- CO1: Able to gain knowledge on principles of accounting and financial standards.
- CO2: Gain a working knowledge of budget, cost of capital and working capital.
- CO3: Use fund flow and cash flow statement as an analytical tool.
- CO4: Understand the objectives and functions of financial management.
- CO5: Able to understand capital structure and dividend policies.

19CAE814	ADVANCED DATABASES	L	T	P	C
		3	0	0	3

<b>UNIT-I</b>	<b>PARALLEL AND DISTRIBUTED DATABASES</b>	<b>9</b>
<p>Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems - Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies.</p>		

<b>UNIT-II</b>	<b>OBJECT AND OBJECT RELATIONAL DATABASES</b>	<b>9</b>
<p>Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle – Case Studies.</p>		

<b>UNIT-III</b>	<b>XML DATABASES</b>	<b>9</b>
<p>XML: Motivation – Structure of XML Data – XML Document Schema – Querying and Transformation – Application Program Interfaces to XML – Storage of XML Data – XML Applications.</p>		

<b>UNIT-IV</b>	<b>MOBILE DATABASES</b>	<b>9</b>
<p>Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols – Mobile Database Recovery Schemes.</p>		

<b>UNIT-V</b>	<b>MULTIMEDIA DATABASES</b>	<b>9</b>
<p>Multidimensional Data Structures:k-d Trees – Point Quadtrees – MX – Quadtree – R-Tree – Image Databases : Representing Image DBs with Relations – Representing Image DBs with R-Trees – Text/Document Databases: TV Trees – Video Databases – Audio Databases.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education/Addison Wesley, 2007. (Unit I – V)

## REFERENCES

1. Thomas Cannolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2007. (Unit I – V)
2. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fifth Edition, McGraw Hill, 2006. (Unit I – V)
3. C.J.Date, A.Kannan and S.Swamynathan, ”An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006. (Unit I –III)
4. Raghuram Ramakrishnan, Johannes Gehrke, “Database Management Systems”, McGraw Hill, Third Edition 2004. (Unit I – III)
5. V.S. Subramanian, “Principles of Multimedia Database Systems”, Elsevier Publishers, 2001. (Unit V)
6. Vijay Kumar, “ Mobile Database Systems”, John Wiley & Sons, 2006. (Unit IV)

## COURSE OUTCOMES

- CO1: Select the appropriate high performance database like parallel and distributed databases.
- CO2: Embed the rule set in the database to implement intelligent databases and represent the data using XML database for better interoperability.
- CO3: Understand the concepts and applications of mobile databases.
- CO4: Able to understand the structure and applications of multimedia databases.
- CO5: Able to analyze the use of various databases in real time applications.



19CAE815	ASPECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

<b>UNIT-I</b>	<b>ASPECT-ORIENTED PROGRAMMING CONCEPTS</b>	<b>9</b>
<p>Introduction to Aspect-Oriented programming – From OO to Aspects – A First Look at AspectJ – Strategies for a Real Application: Application Description – Implementation Details – Crosscutting by Design.</p>		

<b>UNIT-II</b>	<b>FUNDAMENTALS OF ASPECTS</b>	<b>9</b>
<p>Extension – Reflection – Instantiation – Domination – Picking Join Points: Point cuts – Types of Point cuts.</p>		

<b>UNIT-III</b>	<b>ADVICES AND STATIC CROSSCUTTING</b>	<b>9</b>
<p>Fundamentals – The before Advice – The after Advice – Around Advice – Precedence Rules – Text Case – Field Introduction – Method Introduction – Constructor Introduction – Access Rules and Privileged Aspects.</p>		

<b>UNIT-IV</b>	<b>USES OF ASPECTJ AND ASPECTJ TOOLS</b>	<b>9</b>
<p>Adopting AspectsJ – Development Uses – Product AspectsJ – AspectJ Compiler Options – The Structure Browser for Aspects – Using AspectJ IDE Extensions – Debugging with AspectJ.</p>		

<b>UNIT-V</b>	<b>ERROR HANDLING AND COMMON PROBLEMS</b>	<b>9</b>
<p>Compilation Errors – Extended Runtime Error Handling – Exception Throwing and Catching – Using TraceJoinPoints.java – Differentiating between Call and Execution Designators – Aspect – Oriented Examples: Patterns and Reuse</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Ivan Kiselev, “Aspect-Oriented Programming with AspectJ”, Sams , 2002 (Unit I - III)
<b>2</b>	D.Joseph Gradecki, Nicholas Lesiecki, “Mastering AspectJ: Aspect -Oriented Programming in Java “, Wiley, First Edition, 2003. (Unit I - V)

## REFERENCES

- 1 O .Vladimir Safonov, “Using Aspect-Oriented Programming for Trustworthy Software Development”, John Wiley & Sons, 2008 (Unit I - III)

## COURSE OUTCOMES

- CO1: Able to understand the basics of aspect oriented programming.
- CO2: Understand fundamental components of aspect programming.
- CO3: Apply crosscutting before and after case.
- CO4: Handle exception using aspect oriented concepts.
- CO5: Able to know the various concepts and tools of AspectJ.

19CAE816	<b>DATA SCIENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>Introduction to Data Science</b>	<b>8</b>
<p>Definition – Big Data and Data Science - Facets of data – big data ecosystem and data science- Data Science Ethics – Doing good data science – Owners of the data - Valuing different aspects of privacy</p>		

<b>UNIT-II</b>	<b>Data science process</b>	<b>10</b>
<p>Overview- research goals – retrieving data – cleaning, integrating and transforming data- exploratory data analysis – build models – present finds</p>		

<b>UNIT-III</b>	<b>Machine learning</b>	<b>9</b>
<p>Machine learning – Modeling Process – Training model – Validating model – Predicting new observations –Supervised learning algorithms – Unsupervised learning algorithms</p>		

<b>UNIT-IV</b>	<b>Deep Learning</b>	<b>9</b>
<p>Introduction – Deep Feedforward Networks – Regularization – Optimization of Deep Learning – Convolutional Networks – Recurrent and Recursive Nets – Applications of Deep Learning</p>		

<b>UNIT-V</b>	<b>Data Visualization</b>	<b>9</b>
<p>Introduction to data visualization – Data visualization options – Filters – MapReduce – Dashboard development tools – Creating an interactive dashboard with dc.js-dashboard development tools</p>		

<b><u>Textbooks:</u></b>	
<b>1</b>	Davy Cielen, Arno D. B. Meysman, Mohamed Ali , “Introducing Data Science”, Manning Publications Co., 1st edition, 2016

<b>REFERENCES</b>	
<ol style="list-style-type: none"> <li>1. Ian Goodfellow, Yoshua Bengio, Aaron Courville , “Deep Learning”, MIT Press, 1st edition, 2016</li> <li>2. Joel Grus, “Data Science from Scratch: First Principles with Python”, O’Reilly, 1st edition, 2015</li> <li>3. Cathy O’Neil, Rachel Schutt , “Doing Data Science, Straight Talk from the Frontline”, O’ Reilly, 1st edition, 2013</li> <li>4. D J Patil, Hilary Mason, Mike Loukides , “Ethics and Data Science”, O’ Reilly, 1st edition, 2018</li> </ol>	

**COURSE OUTCOMES:**

CO1: Gain knowledge on fundamental concepts of data science

CO2: Apply data processing techniques on different application domains

CO3: Demonstrate machine learning algorithms in data science process

CO4: infer the concept of deep learning for data analysis

CO5: Recognize Visualization and present the them using various tool

<b>19CAE817</b>	<b>HUMAN RESOURCE MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>FUNDAMENTALS OF HRM</b>	<b>9</b>
<p>Introduction- importance of HRM – functions- qualities of HR manager – evolution and growth of HRM– trends and opportunities - HRM in global environment – legal and ethical context – laws for discriminatory practices – equal opportunity employment.</p>		

<b>UNIT-II</b>	<b>STAFFING, RECRUITMENT AND SELECTION</b>	<b>9</b>
<p>HR polices - need, type and scope – human resource planning – job analysis – recruiting goals – recruiting sources – global perspective – selection process – pre-employment testing – interviews –job offers – hiring mistakes - key element for successful predictors.</p>		

<b>UNIT-III</b>	<b>TRAINING AND DEVELOPMENT</b>	<b>9</b>
<p>Socialization – new employee orientation, training, development – organizational development – methods – evaluating training –international training and development issues – Talented Professionals – Characterization – Identification – Assessment and Recognizing Talent-Developing Technical Talent –Developing Managerial Talents-Career Counseling.</p>		

<b>UNIT-IV</b>	<b>PERFORMANCE EVALUATION, REWARDS AND BENEFITS</b>	<b>9</b>
<p>Appraisal process – methods – factors distort appraisal – team appraisal – international appraisal - rewards – Theories of motivation - compensation administration – job evaluation and pay structure –special cases of compensation – executive compensation programs – employee benefits.</p>		

<b>UNIT-V</b>	<b>SAFE AND HEALTHY WORK ENVIRONMENT</b>	<b>9</b>
<p>Occupational safety and health act - issues – stress – assistance program – labor management - employee unions – labor legislation. Promotion, demotion, transfer and separation – employee grievances - redressal methods.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Decenzo and Robbins, “Human Resource Management”,Wilsey, 10th edition, 2012. (Unit I - V)

## REFERENCES

1. Mamoria C.B. and Mamoria. S., “Personnel Management”, Himalaya Publishing Company, 1997. (Unit IV)
2. Mirza S. Saiyadain, “Human Resource Management” , Tata McGraw Hill, 4th edition 2009. (Unit I – III)
3. Eugence Mckenna and Nic Beach, “Human Resource Management”, Pearson Education Limited, 2002. (Unit V)
4. Dessler, “Human Resource Management”, Pearson Education Limited, 2002. (Unit I -III)
5. Decenzo and Robbins, Human Resource Management, Wilsey, 6th edition, 2001. (Unit I – III)
6. Wayne Cascio, Managing Human Resource, McGraw Hill, 1998. (Unit-V)

## COURSE OUTCOMES

- CO1: Identify the primary external influences affecting HRM and outline the components and the goals of staffing, training and development.
- CO2: Understand the selection procedure in various organizations.
- CO3: Understand the practices used to retain the employees and able to evaluate their performance.
- CO4: Recognize the importance of occupational safety and healthy work environment.
- CO5: Able to effectively manage human resource in an organization.

<b>19CAE817</b>	<b>AD HOC AND SENSOR NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>ADHOC NETWORKS FUNDAMENTALS AND MAC PROTOCOLS</b>	<b>9</b>
<p>Fundamentals of WLans – IEEE 802.11 Architecture - self configuration and auto configuration-  Issues in Ad-Hoc wireless networks – MAC protocols for Ad-Hoc wireless networks –  contention based protocols - TCP over Ad-Hoc Networks-TCP protocol overview - TCP and  MANETs – solutions for TCP over Ad-Hoc networks.</p>		

<b>UNIT-II</b>	<b>ADHOC NETWORK ROUTING AND MANAGEMENT</b>	<b>9</b>
<p>Routing in Ad-Hoc Networks- Introduction -Topology based versus position based approaches -  proactive, reactive, hybrid routing approach - Principles and issues – Location services -  DREAM – Quorums based location service – grid – forwarding strategies – greedy packet  forwarding – Restricted directional flooding- Hierarchical routing- Other routing protocols.</p>		

<b>UNIT-III</b>	<b>SENSOR NETWORK COMMUNICATION PROTOCOLS</b>	<b>9</b>
<p>Introduction – Architecture - Single node architecture – sensor network design considerations –  Energy efficient design principles for WSN's – Protocols for WSN – physical layer – transceiver  design considerations – MAC layer protocols – IEEE 802.15.4 Zigbee – Link layer and Error  control issues - routing protocols – mobile nodes and mobile robots - data centric &amp; contention  based networking – transport protocols &amp; QoS – congestion control issues – Application layer  support.</p>		

<b>UNIT-IV</b>	<b>TRANSPORT &amp; QOS IN WIRELESS SENSOR NETWORKS</b>	<b>9</b>
<p>Data-centric and contention-based networking – Transport layer and QoS in Wireless Sensor  Networks – congestion control – In-network processing – operating systems for wireless  sensor networks – examples.</p>		

<b>UNIT-V</b>	<b>ADHOC AND SENSOR NETWORK SECURITY</b>	<b>9</b>
<p>Security in Ad-Hoc and Sensor Networks – Key distribution and management – software  based antitamper techniques – water marking techniques – defense against routing attacks -  Secure adhoc routing protocols – broadcast authentication WSN protocols – TESLA – biba –  Sensor network security protocols – SPINS.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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**Textbooks:**

<b>1</b>	Carlos De Morais Cordeiro, Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks: Theory and Applications", 2 <sup>nd</sup> Edition, World Scientific Publishing, 2011. (Unit I- V)
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**REFERENCES**

1. C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004. (Unit I – V)
2. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002. (Unit III)
3. Holger Karl, Andreas willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Inc .2005. (Unit III)
4. Erdal Çayirci , Chunming Rong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009 (Unit IV)
5. Walteneus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory and Practice", John Wiley and Sons, 2010. (Unit IV & V)
6. Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006. (Unit I – V)

**COURSE OUTCOMES**

- CO1: Able to understand Ad-hoc network fundamentals and MAC protocols.  
CO2: Able to work with existing Ad-hoc and sensor network protocols and standards.  
CO3: Design ad-hoc and sensor network architectures using QoS and Congestion control  
CO4: Able to understand and manage Ad-hoc network routing.  
CO5: Deploy security mechanisms in the wireless ad-hoc and sensor networks.



<b>19CAE819</b>	<b>INFORMATION SECURITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>INTRODUCTION</b>	<b>9</b>
<p>An Overview of Computer Security-Security Services-Security Mechanisms-Security Attacks-Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.</p>		

<b>UNIT-II</b>	<b>CRYPTOSYSTEMS &amp; AUTHENTICATION</b>	<b>9</b>
<p>Classical Cryptography-Substitution Ciphers-permutation Ciphers-Block Ciphers-DES- Modes of Operation- AES-Linear Cryptanalysis, Differential Cryptanalysis- Hash Function - SHA 512-Message Authentication Codes-HMAC - Authentication Protocols.</p>		

<b>UNIT-III</b>	<b>PUBLIC KEY CRYPTOSYSTEMS</b>	<b>9</b>
<p>Introduction to Public key Cryptography- Number theory- The RSA Cryptosystem and Factoring Integer- Attacks on RSA-The ELGamal Cryptosystem- Digital Signature Algorithm-Finite Fields- Elliptic Curves Cryptography- Key management – Session and Interchange keys, Key exchange and generation-PKI.</p>		

<b>UNIT-IV</b>	<b>SYSTEM IMPLEMENTATION</b>	<b>9</b>
<p>Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem. Secure Software Development: Secured Coding - OWASP/SANS Top Vulnerabilities – Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries - Canonical Data Format - Command Injection - Redirection - Inference – Application Controls.</p>		

<b>UNIT-V</b>	<b>NETWORK SECURITY</b>	<b>9</b>
<p>Secret Sharing Schemes-Kerberos- Pretty Good Privacy (PGP)-Secure Socket Layer (SSL) - Intruders – HIDS - NIDS - Firewalls – Viruses.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	W. Stallings, Cryptography and Network Security: Principles and Practice, 6th Edition, Prentice Hall, 2013. (Unit I – V)

## REFERENCES

1. Matt Bishop, "Computer Security art and science", Second Edition, Pearson Education, 2002. (Unit I – V)
2. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007. (Unit I – III)
3. Jonathan Katz, and Yehuda Lindell, "Introduction to Modern Cryptography", CRC Press, 2007. (Unit I – III)
4. Douglas R. Stinson, "Cryptography Theory and Practice", Third Edition, Chapman & Hall/CRC, 2006. (Unit I – III)
5. Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, First Edition, 2006. (Unit I – III)
6. Menezes Bernard, Network Security and Cryptography, Cengage Learning, New Delhi, 2011. (Unit V)

## COURSE OUTCOMES

- CO1: Implement basic security algorithms required by any computing system and analyze the vulnerabilities in any computing system.
- CO2: Analyze the possible security attacks in complex real time systems and their effective counter measures.
- CO3: Able to understand various cryptosystems and authentication mechanisms.
- CO4: Identify the security issues in the network and resolve it.
- CO5: Able to design and develop highly secured software.

19CAE820	BUSINESS INTELLIGENCE	L	T	P	C
		3	0	0	3

<b>UNIT-I</b>	<b>BUSINESS INTELLIGENCE</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-II</b>	<b>KNOWLEDGE DELIVERY</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-III</b>	<b>EFFICIENCY</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-IV</b>	<b>BUSINESS INTELLIGENCE APPLICATIONS</b>	<b>9</b>
<p>Marketing models – Logistic and Production models – Case studies.</p>		

<b>UNIT-V</b>	<b>FUTURE OF BUSINESS INTELLIGENCE</b>	<b>9</b>
<p>Future of business intelligence – Emerging Technologies - Machine Learning - Predicting the Future - BI Search &amp; Text Analytics – Advanced Visualization – Rich Report - Future beyond Technology.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, 9th Edition, Pearson 2013. (Unit I – V)

## REFERENCES

1. Larissa T. Moss, S. Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making”, Addison Wesley, 2003. (Unit I & III)
2. Carlo Verzellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, Wiley Publications, 2009. (Unit II)
3. David Loshin Morgan, Kaufman, “Business Intelligence: The Savvy Manager’s Guide”, Second Edition, 2012. (Unit III & V)
4. Cindi Howson, “Successful Business Intelligence: Secrets to Making BI a Killer App”, McGraw-Hill, 2007. (Unit IV)
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, “The Data Warehouse Lifecycle Toolkit”, Wiley Publication Inc.,2007. (Unit III)
6. G.K.Gupta, “Introduction to Data Mining with case studies”, Prentice Hall of India, 2011. (Unit IV)

## COURSE OUTCOMES

- CO1: Explain the fundamentals of business intelligence and link data mining with business Intelligence.
- CO2: Apply various modeling techniques and business intelligence methods to various situations.
- CO3: Explain the data analysis and knowledge delivery stages.
- CO4: To understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence.
- CO5: Able to understand the emerging technologies and predict the future of business intelligence.

19CAE822	ELECTRONIC COMMERCE	L	T	P	C
		3	0	0	3

<b>UNIT-I</b>	<b>INTRODUCTION</b>	<b>9</b>
<p>Networks and Commercial Transactions - Internet and Other Novelties - Electronic Transactions Today - Commercial Transactions - Establishing Trust - Internet Environment - Internet Advantage - World Wide Web</p>		

<b>UNIT-II</b>	<b>SECURITY TECHNOLOGIES</b>	<b>9</b>
<p>Why Internet Is Unsecure - Internet Security Holes - Cryptography : Objective - Codes and Ciphers - Breaking Encryption Schemes - Data Encryption Standard - Trusted Key Distribution and Verification - Cryptographic Applications - Encryption - Digital Signature – Non repudiation and Message Integrity</p>		

<b>UNIT-III</b>	<b>ELECTRONIC PAYMENT METHODS</b>	<b>9</b>
<p>Traditional Transactions : Updating - Offline and Online Transactions - Secure Web Servers - Required Facilities - Digital Currencies and Payment Systems - Protocols for the Public Transport - Security Protocols - SET - Credit Card Business Basics</p>		

<b>UNIT-IV</b>	<b>MOBILE COMMERCE</b>	<b>9</b>
<p>Introduction – Infrastructure of M–Commerce – Types of Mobile Commerce Services – Technologies of Wireless Business – Benefits and Limitations, Support, Mobile Marketing &amp; Advertisement, Non– Internet Applications in M–Commerce –Wireless/Wired Commerce Comparisons</p>		

<b>UNIT-V</b>	<b>MOBILE COMMERCE: TECHNOLOGY</b>	<b>9</b>
<p>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.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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**Textbooks:**

1	Pete Loshin, “Electronic Commerce”, 4 <sup>th</sup> Edition, Firewall media, An imprint of laxmi publications Pvt. Ltd., New Delhi, 2004. ( UNIT I, II & III)
2	Paul May, “Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business” Cambridge University Press, March 2001. (UNIT IV & V)

**REFERENCES**

1. Dave Chaffey, “E-Business and E-Commerce Management”, 3<sup>rd</sup> Edition, Pearson Education, 2009. ( UNIT IV)
2. Brian E. Mennecke, Troy J. Strader, “Mobile Commerce: Technology, Theory and Applications”, Idea Group Inc., IIR press, 2003. (UNIT V)
3. Dr.Pandey , Saurabh Shukla, “ E-commerce and Mobile commerce Technologies” , Sultan chand, 2011. (UNIT IV & V)

**COURSE OUTCOMES**

- CO1: Able to apply E-commerce principles in market place.
- CO2: Able to understand E-Commerce security and e-payments.
- CO3: Able to apply M-commerce principles to various business domains.
- CO4: Able to understand the theory and applications of M-commerce in business domain.
- CO5: Able to understand the framework of mobile commerce

19CAE723	ENERGY AWARE COMPUTING	L	T	P	C
		3	0	0	3

<b>UNIT-I</b>	<b>INTRODUCTION</b>	<b>9</b>
<p>Energy efficient network on chip architecture for multi core system-Energy efficient MIPS CPU core with fine grained run time power gating – Low power design of Emerging memory technologies.</p>		

<b>UNIT-II</b>	<b>ENERGY EFFICIENT STORAGE</b>	<b>9</b>
<p>Disk Energy Management-Power efficient strategies for storage system-Dynamic thermal management for high performance storage systems-Energy saving technique for Disk storage systems.</p>		

<b>UNIT-III</b>	<b>ENERGY EFFICIENT ALGORITHMS</b>	<b>9</b>
<p>Scheduling of Parallel Tasks – Task level Dynamic voltage scaling – Speed Scaling – Processor optimization- Memetic Algorithms – Online job scheduling Algorithms</p>		

<b>UNIT-IV</b>	<b>REAL TIME SYSTEMS</b>	<b>9</b>
<p>Multi processor system – Real Time tasks- Energy Minimization – Energy aware scheduling-Dynamic Reconfiguration- Adaptive power management-Energy Harvesting Embedded system.</p>		

<b>UNIT-V</b>	<b>ENERGY AWARE APPLICATIONS</b>	<b>9</b>
<p>On chip network – Video codec Design – Surveillance camera- Low power mobile storage</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Ishfaq Ah mad, Sanjay Ranka, “Handbook of Energy Aware and Green computing” , Chapman and Hall /CRC , 2012. (UNIT I – V)

<b>REFERENCES</b>	
<p>1. Chong-Min Kyung, Sungioo yoo, “Energy Aware system design Algorithms and Architecture”, Springer, 2011. (UNIT I – II)</p> <p>2. Bob steiger wald ,Chris:Luero, “Energy Aware computing” , Intel Press, 2012. (UNIT I – V)</p>	

**COURSE OUTCOMES**

CO1: Design Energy efficient architecture Hardware and Software components.

CO2: Analyze power and performance trade off between various energy aware storage devices.

CO3: To implement various energy aware algorithms.

CO4: To understand significance of energy aware techniques used in real time system.

CO5: Restructure the software and Hardware for Energy aware applications.



<b>19CAE724</b>	<b>REMOTE SENSING GEOGRAPHICAL INFORMATION SYSTEM</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>UNIT-I</b>	<b>BASICS</b>	<b>9</b>
<p>Maps: Types – Characteristics – Coordinate systems – Map projections – Definition of GIS – Evolution – Components of GIS – Data : Spatial and Non-spatial – Spatial Data: Point, Line, Polygon/Area and Surface – Non-Spatial Data: Levels of measurement – Database Structures.</p>		

<b>UNIT-II</b>	<b>DATA MODEL AND INPUT</b>	<b>9</b>
<p>Raster Data Model – Grid – Tessellations – Geometry of Tessellations — Data Compression – Vector Data Model – Topology –Topological consistency – Vector data input– Raster Vs. Vector comparison – File Formats for Raster and Vector – Vector to Raster conversion- raster formats.</p>		

<b>UNIT-III</b>	<b>DATA ANALYSIS AND OUTPUT</b>	<b>9</b>
<p>Modeling in GIS – types – Digital Elevation Models: Generation, Representation, Applications – ALTM.</p>		

<b>UNIT-IV</b>	<b>DATA QUALITY AND MISCELLANEOUS TOPICS</b>	<b>9</b>
<p>Data quality analysis – Sources of Error – Components of Data Quality – Meta Data – Open GIS consortium – Customization in GIS – Object Oriented GIS – WebGIS - GIS system evaluation and bench marking.</p>		

<b>UNIT-V</b>	<b>FUTURE OF BUSINESS INTELLIGENCE</b>	<b>9</b>
<p>Future of business intelligence – Emerging Technologies - Machine Learning - Predicting the Future - BI Search &amp; Text Analytics – Advanced Visualization – Rich Report - Future beyond Technology.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Lo. C P and Yeung, Albert K W, “Concepts and Techniques of Geographic Information Systems”, Prentice Hall of India, 2006 (UNIT I – III)
<b>2</b>	Robert Laurini and Derek Thompson, “Fundamentals of Spatial Information Systems”, Academic Press, 1996. (UNIT IV, V)

## **REFERENCES**

1. Peter A Burrough, Rachael A Mc.Donnell, “Principles of GIS”, Oxford University Press, 2000. (UNIT I – III)
2. Allan Brimicombe, GIS Environmental Modeling and Engineering, Taylor & Francis, 2003 (UNIT IV)

## **COURSE OUTCOMES**

- CO1: Apply the fundamental concepts and techniques related to the use of Geographic Information System.
- CO2: Apply this knowledge to a wide range of spatial/environmental problems.
- CO3: Describe GIS data models and spatial data collection.
- CO4: Apply quality metrics on design of data model on GIS .
- CO5: Understand business intelligence and analytics.

19CAE725	SENSOR NETWORKS AND INTERNET OF THINGS	L	T	P	C
		3	0	0	3

<b>UNIT-I</b>	<b>FUNDAMENTALS of IoT</b>	<b>9</b>
Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.		

<b>UNIT-II</b>	<b>IoT DESIGN METHODOLOGY</b>	<b>9</b>
IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.		

<b>UNIT-III</b>	<b>BUILDING IoT WITH RASPBERRY PI</b>	<b>9</b>
Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services.		

<b>UNIT-IV</b>	<b>BUILDING IoT WITH GALILEO/ARDUINO</b>	<b>9</b>
Intel Galileo Gen2 with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks .		

<b>UNIT-V</b>	<b>CASE STUDIES and ADVANCED TOPICS</b>	<b>9</b>
Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT – Data Analytics for IoT – Software & Management Tools for IoT.		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Arshdeep Bahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015. (Unit I – III)
<b>2</b>	Manoel Carlos Ramon, “Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers”, Apress, 2014. (UNIT IV, V)

<b>REFERENCES</b>
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| 1. Marco Schwartz, “Internet of Things with the Arduino Yun”, Packt Publishing, 2014. |
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<b>COURSE OUTCOMES</b>
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CO1: Able to design a IoT using Arduino/ equivalent boards and relevant protocols.
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CO2: Develop web services to access IoT devices using Raspberry Pi Interfaces.
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CO3: Understand the design methodology and specification of IoT.
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CO4: Develop an IoT application using Arduino.
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CO5: Understand the data analytics and management of IoT in cloud.
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19CAE726	LINUX ADMINISTRATION (SYSTEM & NETWORKS)	L	T	P	C
		3	0	0	3
<b>UNIT-I</b>	<b>INTRODUCTION TO LINUX</b>				<b>9</b>
<p>Linux Distributions -Operating Systems and Linux - History of Linux and Unix- Unix -Linux - Linux Overview - Open Source Software - Linux Software -Software Repositories - Third-Party Linux Software Repositories - Linux Office and Database Software - Internet Servers - Development Resources - The Linux Shell and File Structure - The Shell - The Command Line - Command Line Editing -Command and Filename Completion - History - Filename Expansion - Standard Input/Output and Redirection - Pipes - Linux Files, Directories, and Archives - Linux Files - The File Structure - Home Directories - Pathnames - System Directories – Displaying and Printing Files- Managing Directories - File and Directory Operations -File Compression.</p>					
<b>UNIT-II</b>	<b>SYSTEM AND USER ADMINISTRATION</b>				<b>9</b>
<p>Basic System Administration - Superuser Control - System Time and Date - Scheduling Tasks - System Runlevels - System Directories -Confir guration Directories and Files -System Logs -The Linux Auditing System - Performance Analysis Tools and Processes - Grand Unified Bootloader (GRUB) - Managing Users - GUI User Management Tools - User Configuration Files - The Password Files - Managing User Environments- Adding and Removing Users with useradd, usermod, and userdel - Managing Groups - Controlling Access to Directories and Files - Disk Quotas - Lightweight Directory Access Protocol - Pluggable Authentication Modules.</p>					
<b>UNIT-III</b>	<b>LINUX FILE SYSTEMS</b>				<b>9</b>
<p>File Systems-File System Hierarchy Standard (FHS)- Journaling-Mounting File Systems Automatically -Mounting File Systems Manually -Creating File Systems -CD-ROM and DVD-ROM Recording-Mono and .NET Support- Devices and Modules-Device Files-Hardware Abstraction Layer -Manual Devices-Installing and Managing Terminals and Modems-Input Devices-Installing Sound, Network, and Other Cards-PCMCIA Devices-Modules.</p>					
<b>UNIT-IV</b>	<b>INTERNET AND NETWORK SERVICES</b>				<b>9</b>
<p>Managing Services-System Startup Files-SysV Init-Starting Services-Service Management-Service Scripts-Extended Internet Services Daemon (xinetd)- FTP Servers-Anonymous FTP-The FTP User Account-Using FTP with rsync-The Very Secure FTP Server-Professional FTP Daemon-Web Servers-Tux-Alternate Web Servers-Apache Web Server-Apache Confi guration Files-Apache Configuration and Directives-Virtual Hosting on Apache-PHP-Apache Configuration Tool-Web Server Security: SSL.</p>					
<b>UNIT-V</b>	<b>NETWORK ADMINISTRATION SERVICES</b>				<b>9</b>
<p>Administering TCP/IP Networks-TCP/IP Protocol Suite-Configuring Networks on GNOME and KDE-IPv4 and IPv6-TCP/IP Network Addresses-IPv6 Addressing-IPv6 and IPv4 Coexistence Methods-TCP/IP Confi guration Files-Domain Name Service (DNS)- Network Interfaces and Routes: ifconfi g and route-Wireless Networking-Command Line PPP Access-Monitoring Your Network-IP Aliasing-Network File Systems: NFS-Network Information Service: NIS.</p>					

<b>L:45</b>	<b>T:0</b>	<b>T: 45 PERIODS</b>
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**Textbooks:**

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|----------|---|
| <b>1</b> | Richard Petersen, “Linux: The Complete Reference”, Tata McGraw Hill, Sixth Edition, 2007. (UNIT - I, II, III, IV, V). |
|----------|---|

**REFERENCES**

1. Evi Nemeth, Garth Snyder, Trent R Hein, Ben Whaley, “Unix and Linux System Administration Handbook”, Prentice Hall, Fourth Edition, 2010. (UNIT- I, II, III, IV, V).
2. Richard Blum, “Linux Command Line and Shell Scripting Bible”, Wiley, Second Edition, 2011. (UNIT – I, II, III).

**COURSE OUTCOMES**

- CO1: Understand Linux file system and manage files and directories.  
CO2: Perform the user and group administration.  
CO3: Integrate a workstation with an existing network.  
CO4: Manage FTP server and apache web servers.  
CO5: Configure a workstation as a client to internet and network services.

<b>19CAE727</b>	<b>APPLICATION DEVELOPMENT FRAMEWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>MVC ARCHITECTURE</b>	<b>9</b>
MVC Architecture – Why MVC? – Benefits of MVC Architecture – Struts and MVC – Implementing MVC Architecture – How MVC Application work – How MVC maps into Struts.		

<b>UNIT-II</b>	<b>DESIGNING WITH STRUTS</b>	<b>9</b>
Validator – Tiles – Tiles overview – Internationalizing Tiles – Using the tiles tag library – The tiles tag library tags – Declarative Exception Handling.		

<b>UNIT-III</b>	<b>APPLYING STRUTS</b>	<b>9</b>
Internationalizing Struts Applications – Securing Struts Applications – Testing Struts Applications.		

<b>UNIT-IV</b>	<b>INTRODUCING THE SPRING FRAMEWORK</b>	<b>9</b>
Why Spring – Lightweight Frameworks – Enter Spring – Architecting Applications with Spring – Persistence and Integration – Business Service Objects.		

<b>UNIT-V</b>	<b>Model-View-View Model</b>	<b>9</b>
MVVM-Basics – Structure- Model-View-ViewModel-Advantages-looser data binding- MVC vs MVVM		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	James Holmes, “Struts: The Completer Reference”, McGraw Hill, 2 <sup>nd</sup> Edition, 2007. (Unit I – III)
<b>2</b>	Rod Johnson, Jwergen Hoeller, Atof Arendsen, Thomas Risberg, Colin Sampaleanu, “Professional Java development with the Spring framework”, Wiley, 2008 Reprint (Unit IV & V)

## REFERENCES

1. Addy Osmani, “Learning JavaScript Design Patterns”, O’Reilly, 2012
2. Kogent Solutions Inc., “Struts 2 Black Book”, Dreamtech Press, 2<sup>nd</sup> Edition, 2008. (Unit I – III)
3. Ted N Husted, Cedric Dumoulin, George Franciscus and David Winterfeldt, “Struts in Action”, Manning Publications, 2002. (Unit II & III)
4. Chuck Cavaness, “Programming Jakarta Struts”, O’ Reilly Media, 2<sup>nd</sup> Edition. (Unit II & III)

## COURSE OUTCOMES

- CO1: Develop applications using Model-View-Controller (MVC) design pattern.
- CO2: Understand Struts architecture and develop applications using Struts framework.
- CO3: Understand Spring architecture and develop applications using Spring framework.
- CO4: Design a web application using Model-view-View model.
- CO5: Able to evaluate the various application development frameworks.



<b>19CAE728</b>	<b>HUMAN COMPUTER INTERACTIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>INTRODUCTION TO HUMAN COMPUTER INTERFACE</b>	<b>9</b>
<p>Importance of User Interface - Human Computer Interface- Importance of Good Design- Benefits of Good Design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics- Principles of User Interface Design</p>		

<b>UNIT-II</b>	<b>USER INTERFACE DESIGN PROCESS</b>	<b>9</b>
<p>Understanding How User Interact With Computers- User Interface Models- Design Methodologies- Designing an Interface- Process of Interaction Design - Human Interaction Speeds, Human Characteristics in Design, Human Consideration in Design.</p>		

<b>UNIT-III</b>	<b>SCREEN DESIGN</b>	<b>9</b>
<p>Design Goals, Test for a Good Design- Screen and Web Page Meaning and Purpose- Organizing Screen Elements Clearly -Ordering of Screen Data and Content- Screen Navigation and Flow - Visually pleasing composition - Technological consideration in interface design</p>		

<b>UNIT-IV</b>	<b>SOFTWARE TOOLS</b>	<b>9</b>
<p>Specification Methods- Interface Building Tools-Interface Mock Up Tools, Software Engineering Tools- Windowing System Layer- GUI Tool Kit Layer</p>		

<b>UNIT-V</b>	<b>INFORMATION SEARCH AND VISUALIZATION</b>	<b>9</b>
<p>Database Query- Phase Search in Documents- Multimedia Document Searches- Information Visualization- Advanced Filtering- Hypertext- Web Technology- Static Web Content and Dynamic Web Content</p>		

<b>L:45</b>	<b>T:0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Wilbert O Galitz , “The essential guide to user interface design”, 3 <sup>rd</sup> edition, Wiley DreamaTech, 2007

**REFERENCES**

1. Ben Shneidermann , “Designing the user interface”, 3rd Edition , Pearson Education Asia
2. Alan Dix, Janet Finck, Greg Goryd, Abowd, Russell Bealg , “Human – Computer Interaction”, Pearson Education, 3<sup>rd</sup> edition, 2004
3. Prece, Rogers, Sharps, “Interaction Design”, Wiley Dreamtech, 3rd Edition, 2011
4. Soren Lauesen , “User Interface Design”, Pearson Education, 2005

**COURSE OUTCOMES:**

CO1: Discover the process involved in designing user interface

CO2: Associate components consideration with user interface design of application development

CO3: Relate different elements of user interface for good user interface design

CO4: Experiment the design consideration on various levels of software development using tools

CO5: Analyze the various methods of information retrieval and visualization

<b>19CAOOE1</b>	<b>DIGITAL MARKETING AND SEO</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>INTRODUCTION TO DIGITAL MARKETING</b>	<b>9</b>
<p>Role of digital marketing (scope &amp; context), Emerging trends, Technology shifts, the online ecosystem. Role of digital marketing in B2B, B2C marketing. The digital consumer - Online consumer definition &amp; types, Audience segmentation and profiling, Consumer online usage and behavior, Emerging trends and patterns in digital consumption, Consumer engagement – meaning and implication.</p>		

<b>UNIT-II</b>	<b>SEO BASICS</b>	<b>9</b>
<p>Search Engine Optimization, Process and methodology, Long tail in SEO, Link building, Key word analysis, process and optimization. Search Engine Marketing - Paid versus natural Search, SEM landscape, Landing pages and their importance in conversion analysis, Google vs. Bing vs. Yahoo. Search Methodology.</p>		

<b>UNIT-III</b>	<b>SOCIAL MEDIA OPTIMIZATION (SMO)</b>	<b>9</b>
<p>Social Media &amp; e-PR - Online reputation management, Social Media measuring, monitoring &amp; reporting, Tracking &amp; Monitoring platforms. Content seeding, How to use blogs, forums and discussion boards, Blogs, forums and communities, Viral campaigns and the social graph.</p>		

<b>UNIT-IV</b>	<b>EMAIL AND MOBILE MARKETING</b>	<b>9</b>
<p>Email Marketing - Principles and best practice, In-house, rental, vendors and 3rd party, Email platforms, Dynamic campaign management tools, Testing &amp; Optimization, Trigger marketing, Contact strategy. Mobile Marketing - The 3rd screen, Landscape &amp; trends, Mobile advertising – WAP &amp; mobile search, Mobile applications and consumer usage behavior, Role of the service provider, publisher &amp; consumer, The Next level of mobile interaction.</p>		

<b>UNIT-V</b>	<b>WEB ANALYTICS</b>	<b>9</b>
<p>Introduction - Google Analytics- Navigate Google Analytics – GA reports- Case Study.</p>		

<b>L:45</b>	<b>T:0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Smith P R Chaffey Dave, “E-Marketing Excellence: The Heart of E-Business”, Butterworth Heinemann, USA. (UNIT –I, IV, V).
<b>2</b>	Deepak Bansal, “A Complete Guide To Search Engine Optimization”, B.R. Publishing Corporation, First edition 2009. (UNIT –II, III).

## REFERENCES

1. Strauss Judy, “E-Marketing” , Prentice Hall, India (UNIT –I, IV).
2. Grienstein and Feinman, “E-commerce –Security, Risk Management and Control”, TMH, Second Edition, 2011 (UNIT –I).

## COURSE OUTCOMES

- CO1: Able to understand role of digital media in marketing.
- CO2: Able to use SEO techniques and social media for business success.
- CO3: Optimize the social media as a effective marketing tool.
- CO4: Understand the principles of mobile management and its strategies.
- CO5: Able to apply the web analytics on digital marketing .

<b>19CAOOE2</b>	<b>CONTENT MANAGEMENT SYSTEM</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>INTRODUCTION TO CONTENT</b>	<b>8</b>
Introduction -Defining Data, Information, and Content - Content Format - Content Structure - Content Functionality		

<b>UNIT-II</b>	<b>CONTENT MANAGEMENT</b>	<b>10</b>
Understanding Content Management - Major Parts of a CMS - The Branches of Content Management - Knowing When You Need a CMS - Component Management versus Composition Management - The Roots of Content Management - The Branches of Content Management		

<b>UNIT-III</b>	<b>DESIGNING CONTENT MANAGEMENT SYSTEM</b>	<b>9</b>
Requirement gathering-Doing Logical Design - Selecting Hardware and Software - Implementing the System -The Wheel of Content Management - Working with Metadata - Cataloguing - Designing Publications - Designing Content Types - Content Access - Designing Personalization - Designing Workflow and Staffing Model		

<b>UNIT-IV</b>	<b>WORD PRESS</b>	<b>9</b>
Introduction – configuring wordpress- Directory structure- creating and managing content-security		

<b>UNIT-V</b>	<b>JOOMLA</b>	<b>9</b>
Introduction – installation and configuration – content type- templates –plugins – security		

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<b><u>Textbooks:</u></b>	
<b>1</b>	Bob Boiko – Content Management Bible, 2nd Edition - Wiley Publishing, Inc., 2005
<b>2</b>	Tris Hussey, “Using wordpress”, Pearson education, 2011

<b>REFERENCES</b>	
<ol style="list-style-type: none"> <li>1. Dan Rahmel, “Professional Joomla”,wrox publications, 2011</li> <li>2. Eric Tiggeler,” Joomla! 3 Beginner's Guide”, PACKT Publishing, 2013.</li> <li>3. Sofia Hauschildt,”CMS Made Simple 1.6 Beginners Guide”,– PACKT Publishing, 2010.</li> <li>5. Ishai Sagi, “SharePoint 2010 How To”, Pearson Education, SAMS Publication, 2011</li> </ol>	

**COURSE OUTCOMES:**

The students will be able to:

- Know how to organize content of website
- Design efficient algorithms for mining the data from large volumes.
- Design own content management system with necessary functions
- Develop dynamic website with wordpress
- Develop and manage websites with Joomla

<b>19CAOOE3</b>	<b>BUSINESS INTELLIGENCE FOR MANAGERS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>UNIT-I</b>	<b>BUSINESS INTELLIGENCE</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-II</b>	<b>KNOWLEDGE DELIVERY</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-III</b>	<b>EFFICIENCY</b>	<b>9</b>
<p>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.</p>		

<b>UNIT-IV</b>	<b>BUSINESS INTELLIGENCE APPLICATIONS</b>	<b>9</b>
<p>Marketing models – Logistic and Production models – Case studies.</p>		

<b>UNIT-V</b>	<b>FUTURE OF BUSINESS INTELLIGENCE</b>	<b>9</b>
<p>Future of business intelligence – Emerging Technologies - Machine Learning - Predicting the Future - BI Search &amp; Text Analytics – Advanced Visualization – Rich Report - Future beyond Technology.</p>		

<b>L:45</b>	<b>T: 0</b>	<b>T: 45 PERIODS</b>
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<b><u>Textbooks:</u></b>	
<b>1</b>	Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, 9th Edition, Pearson, 2013. (Unit I – V)

## REFERENCES

1. Larissa T. Moss, S. Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making”, Addison Wesley, 2003. (Unit I & III)
2. Carlo Vercellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, Wiley Publications, 2009. (Unit II)
3. David Loshin Morgan, Kaufman, “Business Intelligence: The Savvy Managers Guide”, Second Edition, 2012. (Unit III & V)
4. Cindi Howson, “Successful Business Intelligence: Secrets to Making BI a Killer App”, McGraw-Hill, 2007. (Unit IV)
5. Ralph Kimball, Margy Ross, Warren Thornthwaite, Joy Mundy, Bob Becker, “The Data Warehouse Lifecycle Toolkit”, Wiley Publication Inc., 2007. (Unit III)
6. G.K.Gupta, “Introduction to Data Mining with case studies”, Prentice Hall of India, 2011. (Unit IV)

## COURSE OUTCOMES

- CO1: Define the fundamentals of business intelligence and link data mining with business intelligence.
- CO2: Apply various modeling techniques and business intelligence methods to various situations.
- CO3: Relate the data analysis and knowledge delivery stages.
- CO4: To understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence.
- CO5: Able to understand and apply business intelligence tools in management.