

MAHENDRA ARTS & SCIENCE COLLEGE

(Autonomous)

Accredited with A Grade by NAAC & Affiliated to Periyar University

Recognized under 2(f) & 12(B) of UGC Act, 1956

Kalippatti (Po.), Tiruchengode (Tk.), Namakkal (Dt.) – 637501



DEGREE OF BACHELOR OF COMPUTER APPLICATIONS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR B.C.A

FOR THE STUDENTS ADMITTED

FROM THE ACADEMIC YEAR 2016 - 2017 ONWARDS

MAHENDRA ARTS & SCIENCE COLLEGE
(Autonomous)
KALIPPATTI, NAMAKKAL (DT) - 637501

REGULATIONS FOR BCA (COMPUTER APPLICATIONS) DEGREE COURSE
with Semester System
(Effective from the academic year 2016-2017)

1. OBJECTIVE OF THE COURSE

The three year degree program was instituted in response to the demand for staff with a high level of technical and professional training required by business, industry, government and the academic community to perform specific functions ranging from the lowest level professional to the highest level researcher and educator. The program aims to prepare the students for instruction, research activities related to the discipline, for advanced studies in Computer Applications, and to train them to develop software systems.

2. ELIGIBILITY FOR ADMISSION

A candidate who has passed Higher Secondary Examination with Mathematics or Business Mathematics or Computer Science or Statistics (Academic stream or vocational stream) as one of the subjects under Higher Secondary Board of Examination, Tamil Nadu or as per norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the College Academic Council subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Computer Applications** degree examination after a course of study of three academic years.

3. DURATION OF THE COURSE

The course for the degree of **Bachelor of Computer Applications** consists of three academic years divided into six semesters with two semesters in one academic year comprising 90 working days for each semester. Examinations are conducted at the end of each semester for the respective subjects.

4. COURSE OF STUDY

The course of study shall comprise instructions in the following subjects according to the syllabus and books prescribed from time to time. This syllabus for various subjects is clearly demarcated into five viable UNITS in each paper / subject. Part-I, Part-II, Part-III, Part-IV and Part V as prescribed in the scheme of examination.

5. EXAMINATION

The Theory / Practical examination is conducted for 3 hours duration for each paper at the end of every semester. The candidate failing in examinations are permitted to appear for each failed subject(s) in the subsequent examination.

6. a) SUBMISSION OF RECORD NOTE BOOKS FOR PRACTICAL EXAMINATIONS

Candidates appearing for practical examinations should submit record note books prescribed for practical examinations, otherwise the candidates will not be permitted to appear for the practical examinations. However, in genuine cases where the students, who could not submit the record note books, they may be permitted to appear for the practical examinations, provided the concerned Head of the department of the candidate certifies that the candidate has performed the experiments prescribed for the course. For such candidates zero (0) marks will be awarded for record note books and they have to score the minimum pass marks from the external practical exam.

7. REVISION OF REGULATIONS AND CURRICULUM

The college may revise / amend / change the Regulations and scheme of examinations, if needed.

8. PASSING MINIMUM

a) THEORY

The candidate is declared to have passed the end semester examination if the candidate secure 40 marks out of 100(CIA – 10 marks out of 25 and EA – 30 marks out of 75) in each theory paper.

Internal Marks Distribution [CIA] (Total Marks: 25)

- Attendance : 5 Marks
- Assignment : 5 Marks
- Internal Examinations : 15 Marks

b) PRACTICAL

The candidate is declared to have passed the end semester practical examination if the candidate secure 40 marks out of 100(CIA – 16 marks out of 40 and EA – 24 marks out of 60) in in each practical paper.

Practical Marks Distribution

Max. Marks: 100

Internal [CIA]: 40 Marks & External [EA]:

60 Marks

Internal Marks Distribution (Total Marks: 40)

- Preparation of Record & Submission : 15 Marks
- Internal Practical Examinations : 25 Marks

The components for continuous internal assessment are:

- Attendance : 5 Marks
- Model Practical Examinations : 20 Marks

External Marks Distribution (Total Marks: 60)

For each Practical question the marks should be awarded as follows (External):

- | | | |
|--|---|-----|
| (i) Algorithm / Flowchart | - | 20% |
| (ii) Writing the program in the main answer book | - | 30% |
| (iii) Test and debug the programs | - | 30% |
| (iv) Printing the correct output | - | 20% |

(Marks may be proportionately reduced for the errors committed in each of the above mentioned distribution)

Failed candidates in the Internal Assessment are permitted to improve their Internal Assessment marks in the subsequent semesters (2 chances will be given) by written test and by submitting assignment.

9. QUESTION PAPER PATTERN

a) THEORY -Total Marks: 75

Time: 3 Hrs.

PART – A (10 x 2 = 20 Marks)

(Answer ALL questions) (Two questions from each UNIT)

PART – B (5 x 5 = 25 Marks)

(Answer ALL questions) & (One question from each UNIT with Internal Choice)

PART – C (3 x 10 = 30 Marks)

(Answer ANY 3 questions) & (Open Choice – 3 out of 5 questions)

b) PRACTICAL - Total Marks: 60

Time: 3 Hrs.

2 Major Questions each carry 30 Marks. (Either or pattern)

1. a. From the list of practical's 1, 2 and 3 (**or**) b. From the list of practical's 4 and 5

AND

2. a. From the list of practical's 6, 7 and 8 (**or**) b. From the list of practical's 9 and 10

9. CLASSIFICATION OF SUCCESSFUL CANDIDATES

- FIRST CLASS WITH DISTINCTION – 75% and above
- FIRST CLASS - 60% and above
- SECOND CLASS - 50% to 59%

10. COMMENCEMENT OF REGULATION

These regulations shall take effect from the academic year 2016 – 2017, i.e., for students who are to be admitted to the first year of the course during the academic year 2016 – 2017.

Credit Distribution

Semester	Number of Credits						Total Credits	Max. Marks
	I	II	III	IV	V	VI		
Part I: Tamil	3	3	-	-	-	-	06	200
Part II: English	3	3	-	-	-	-	06	200
Part III: Major	7	7	14	14	16	12	70	1900
Part III: Elective	-	-	-	-	3	3	06	200
Part III: Practical	2	2	2	2	2	2	12	600
Part III: Project	-	1	-	1	-	2	04	300
Part III: Allied	4	4	4	4	-	-	16	400
Part III: Allied Practical	-	-	2	2	-	-	04	200
Part IV: NMEC	-	-	2	2	-	-	04	200
Part IV: SBEC	-	-	-	-	4	4	08	400
Part IV: Value Education	2	-	-	-	-	-	02	100
Part IV: Environmental Studies	-	2	-	-	-	-	02	100
Part V: Value Added	1	1	1	1	-	-	04	400
Part V: Extension Activities	-	-	-	-	-	1	01	-
Cumulative Total	22	23	25	26	25	24	145	5200

S.No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
Semester I									
1	Part I	Tamil-I / Hindi-I / French-I / Malayalam – I / Telugu -I	M16UFTA01/ HI01 / FR01 / MA01 / TE01	5	3	25	75	100	3
2	Part II	English – I	M16UFEN01	5	3	25	75	100	3
3	Part III	Core I: Principles of Problem Solving	M16UCA01	4	3	25	75	100	3
4		Core II: Programming in C	M16UCA02	5	3	25	75	100	4
5		Allied - I : Mathematics	M16UMAA03	5	3	25	75	100	4
6		Core Practical I: Programming in C Lab	M16UCAP01	3	3	40	60	100	2
7	Part IV	Value Education : Yoga	M16UVE01	1	3	25	75	100	2
8	Part V	Value Added : Communicative English - I	M16UVA03	2	3	100	-	100	1
Total				30		290	510	800	22

S.No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
Semester II									
1	Part I	Tamil-II / Hindi-II / French-II / Malayalam – II / Telugu -II	M16UFTA02/ HI02 / FR02 / MA02 / TE02	5	3	25	75	100	3
2	Part II	English - II	M16UFEN02	5	3	25	75	100	3
3	Part III	Core III: Data Structures	M16UCA03	4	3	25	75	100	3
4		Core IV: Object Oriented Programming with C++	M16UCA04	5	3	25	75	100	4
5		Allied II : Numerical & Statistical Methods	M16USTA01	5	3	25	75	100	4
6		Core Practical II : Data Structures Lab using C++	M16UCAP02	3	3	40	60	100	2
7	Part IV	Environmental Studies	M16UES01	1	3	25	75	100	2
8	Part V	Value Added : Communicative English II	M16UVA04	2	3	100	-	100	1
9	Part III	Project - I	M16UCAPR1	-	-	100	-	100	1
Total				30	-	390	510	900	23

S.No	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
Semester III									
1	Part III	Core V: Design and Analysis of Algorithms	M16UCA05	4	3	25	75	100	4
2		Core VI: Java Programming	M16UCA06	4	3	25	75	100	4
3		Core VII: Software Engineering	M16UCA07	4	3	25	75	100	3
4		Core VIII: Multimedia and its Applications	M16UCA08	4	3	25	75	100	3
5		Allied III : Applied Electronics / Principles of Accountancy	M16UPHA03 / M16UCCA01	4	3	25	75	100	4
6		Core: Practical – III: Java	M16UCAP03	3	3	40	60	100	2
7		Allied : Practical I– Digital Electronics / Accountancy (Tally)	M16UPHAP01 / M16UCCAP01	3	3	40	60	100	2
8	Part IV	NMEC – I: Applied Statistics	M16USTN01	2	3	25	75	100	2
9	Part V	Value Added : Quantitative Aptitude	M16UVA05	2	3	100	-	100	1
Total				30		330	570	900	25

.No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
Semester IV									
1	Part III	Core IX: Operating System	M16UCA09	5	3	25	75	100	4
2		Core X: Computer Networks	M16UCA10	4	3	25	75	100	4
3		Core XI: Relational Data Base Management System	M16UCA11	4	3	25	75	100	3
4		Core XII: Programming in Python	M16UCA12	4	3	25	75	100	3
5		Allied IV : Advanced Electronics / Modern Banking	M16UPHAP02 / M16UCCA02	3	3	25	75	100	4
6		Core: Practical – IV: Oracle	M16UCAP04	3	3	40	60	100	2
7		Allied : Practical II– Applied Electronics / Commerce Practical	M16UPHAP02 / M16UCCAP02	3	3	40	60	100	2
8	Part IV	NMEC – II: Business Communication	M16UCMN04	2	3	25	75	100	2
9	Part V	Value Added: Verbal and Logical Reasoning	M16UVA06	2	3	100	-	100	1
10	Part III	Industrial Literacy	M16UCAPR2	-	3	100	-	100	1
Total				30	-	430	570	1000	26

S.No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
Semester V									
1	Part III	Core XIII: Mobile Computing	M16UCA13	5	3	25	75	100	4
2		Core XIV: Internet Programming	M16UCA14	5	3	25	75	100	4
3		Core XV: Principles of Cloud Computing	M16UCA15	5	3	25	75	100	4
4		Core XVI: Cyber Security	M16UCA16	4	3	25	75	100	4
5		Elective I:		4	3	25	75	100	3
6		Core Practical V: Internet programming Lab	M16UCAP05	3	3	40	60	100	2
7	Part IV	SBEC-I: Office Automation	M16UCAS01	2	3	25	75	100	2
8		SBEC-II: Mobile Application Development	M16UCAS02	2	3	25	75	100	2
Total				30		215	585	800	25

S.No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
Semester VI									
1	Part III	Core XVII: Data Mining and Warehousing	M16UCA17	6	3	25	75	100	4
2		Core XVIII: CASE Tools concept & Applications	M16UCA18	6	3	25	75	100	4
3		Core XIX: Big data Analytics	M16UCA19	6	3	25	75	100	4
4		Elective II		5	3	25	75	100	3
5		Core Practical VI: Data Mining Lab using Rapid Miner	M16UCAP06	3	3	40	60	100	2
6	Part IV	SBEC III: Business Process Outsourcing	M16UCAS03	2	3	25	75	100	2
7		SBEC IV: Desktop Publishing	M16UCAS04	2	3	25	75	100	2
8	Part III	Project II	M16UCAPR3	-	3	25	75	100	2
9	Part V	Extension Activities	M16UEX01	-	-	-	-	-	1
Total				30		215	585	800	24

Semester I	BCA	2016-2017
Core: 1	PRINCIPLES OF PROBLEM SOLVING	
M16UCA01		
Credit: 3		

UNIT I

Introduction to Problem Solving: Problem solving strategies, Problem identification, Problem understanding, Algorithm development, Solution planning (flowcharts, pseudocode, etc.), Modular programming design.

UNIT II

Hardware: Architecture (Mainframe, Mini, PC, Workstations), Real time system, Transaction Processing system, Laptop, Palmtop, Client server, N-Tier. **Introduction to Networks:** LAN, WAN, MAN, etc. **Peripherals:** Information about Input devices (Keyboard, Mouse, Joystick, Track ball, etc.) - Details about Storage devices (Floppy disk, Hard disk, Tapes (Cartridge, DAT), Compact Disk), Information about Monitors, Printers (impact, non-impact) - Various types of plotters.

UNIT III

Software: Software Classification (System, Application, and Utilities). **Operating System:** Introduction, Basic functions of OS, Classification of OS. **Programming Languages:** Generation of Languages and their uses. **Packages:** Spread sheets, DTP Tools, Presentation tools. Application areas of Software - Commercial, Scientific, Real time application etc.

UNIT IV

Multimedia and Internet: Introduction to multimedia - Hardware, Software and applications - Introduction to Internet, Service providers, Internet naming and addressing - Information about electronic mail, Remote login, File Transfer, Usenet-BBS, HTML. **Intranet, Extranet:** Introduction to Intranet and Extranet.

UNIT V

Object Oriented System: Concepts, Benefits of OOS over conventional system. **Enterprise Computing:** About ERP, Activities under ERP. **Mobile Computing** – An Introduction to Mobile Computing.

TEXT BOOKS

1. Dromey, How To Solve It By Computer , Dorling Kindersley (India) Pvt Ltd, 2008.
2. Brain, K. Williams, et. al., *Using Information Technology*, Third edition, TMH, 2000.

REFERENCE BOOKS

1. Turban, Rainer, Potter, *Introduction to Information Technology*, second edition, Wiley Publications.
2. Dennis P. Curtin, et.al., *Information Technology - The Breaking View*, TMH, 2000.

Semester I	BCA	2016-2017
Core: 2	PROGRAMMING IN C	
M16UCA02		
Credit: 4		

UNIT I

Overview of C: History of C – Basic structure of C programs. **Constants, Variables and Data types:** Character Set-C Tokens – Keywords and identifiers – Constants – Variables-Declaring of Variables-Assigning Values to Variables – Data types. **Operators and Expression:** Operators – Types of Operators-Arithmetic Expressions-Evaluation of expressions – Precedence of arithmetic operators – Type conversions in expressions – Operator precedence and associativity.

UNIT II

Managing Input and Output Operations: Reading and writing a character – Formatted input and output. **Decision Making and Branching:** Simple IF, IF-ELSE, Nesting of IF-ELSE, ELSE-IF ladder, Switch statements-The ?: Operator – GOTO statements. **Decision Making and Looping:** WHILE statement – DO statement – FOR statement – Jumps in loops.

UNIT III

Arrays: Definition, Declaration and Initialization of – One dimensional – Two dimensional – Multi dimensional arrays – Dynamic arrays. **Character arrays and strings:** Declaring and initializing string variables – Reading strings from terminal – Writing strings to screen-Comparison of Two Strings – String handling functions – Table of strings.

UNIT IV

User-Defined functions: Introduction – Return values and their types – Function calls – Function declaration – All category of functions – Nesting of functions – Recursion. **Structures and Unions:** Defining a structure – Declaring structure variables – Accessing structure members – Structure initialization – Copying and comparing structure variables – Operations in Individual Functions – Unions.

UNIT V

Pointers: Declaring and Initializing of pointer variables – Chain of pointers. **File Management:** Introduction – Defining and opening a file –Closing a file – Input/output operation on files – Error handling during I/O operations – Random access files – Command line arguments. **The Preprocessor:** Introduction – Macro substitution – File inclusion – Compiler control directives.

TEXT BOOK

1. Programming in ANSI C, by E. Balagurusamy, Tata McGraw Hill, 6th Edition.

REFERENCE BOOKS

1. Let Us C, by Yashavant Kanetkar BPB Publications 13th Edition.
2. Programming in ANSI C, by D. Ravichandran, New Age International (P) Ltd.

Semester I	BCA	2016-2017
Core Practical I	PROGRAMMING IN C	
M16UCAP01		
Credit: 2		

List of Practical's

1. Write a C program to read & calculate any two numbers using all types of operators.
2. Write a C program to find the Greatest in three numbers using IF Statement.
3. Write a C Program to generate the Fibonacci series using FOR Statement.
4. Write a C program to Sort numbers in ascending order using Arrays.
5. Write a C Program to find String Handling Functions.
6. Write a C program to Sort names in Alphabetical order using Strings.
7. Write a C Program to find the factorial using functions.
8. Write a C Program to display Swapping numbers using pointers.
9. Write a C program to find the simple interest using Structures.
10. Write a C Program to display odd & even numbers using files.

Semester II	BCA	2016-2017
Core: 3	DATA STRUCTURES	
M16UCA03		
Credit: 3		

Unit - I

Algorithms: Algorithms (Analysis and Design) – Problem Solving – Top-down and Bottom-up approaches to algorithm design – Use of algorithms in Problem Solving - Design of Algorithms – Efficiency analysis of Algorithms. **Basic Concepts:** Abstract Data Type (ADT) – Fundamentals and Derived Data Types- Primitive Data Structures – Symbol Table - Recursion.

Unit - II

Arrays: Introduction of an Array – Representation of Arrays - Multidimensional Arrays – Sequential Allocation and Address Calculation – Operations on Arrays – Application of Arrays – Strings as an Array of Characters – String Manipulation - Calling functions Using Arrays – Arrays and Pointers – Dynamic Representation of a Two-dimensional Array.

Unit - III

Linked lists: Introduction – Representation of Linked List - Types of linked list – Implementation of Linked List - Operations performed on linked list. **Stacks:** Introduction – Representation Stacks - Implementation of Stack – Polish Notation – **Queues:** Introduction – Representation of Queues - Implementation of Queues – Circular Queue – Priority Queue – D-Queue.

Unit - IV

Trees: Introduction - Binary tree – Tree Traversal –Representation of Algebraic representation of expression using tree – Recursive Algorithms – Non Recursive Traversal of a Binary tree – Binary tree representation – Application of Binary Trees - Binary search trees – B-tree – Heap- tree.

Unit - V

Searching and Sorting: Sequential and binary search – Indexed search – Hashing Schemes - Hashing functions –Hash collision. **Sorting:** Selection sort – Bubble Sort – Insertion sort – Quick sort – Merge sort – Heap sort. **Graphs:** Introduction – Graph representation – Traversal schemes – Shortest Path Algorithms – Spanning tree – Applications of graphs.

TEXT BOOKS

1. Seymour Lipschitz "Data Structures, Tata McGraw Hill
2. Ellis Horowitz & S. Sahni, Fundamentals of Data Structures, Galgotia Pub.

REFERENCE BOOKS

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, First Edition Reprint 2003.
2. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India Edition, 2005

Semester II	BCA	2016-2017
Core: 4	OBJECT ORIENTED PROGRAMMING WITH C++	
M16UCA04		
Credit: 4		

UNIT – I

Principles of Object Oriented Programming: OOPs Paradigm – Basic Concepts of OOP – Benefits of OOP – Applications of OOP – Beginning with C++: What is C++ - Structure of C++ Program – A Simple C++ Program – Creating the Source File – Compiling and Linking – Applications of C++

UNIT – II

Elements of C++: Tokens – Keyword – Identifier and Constants – Symbolic Constants - Basic Data Type: User – Defined Data Types – Derived Data Types – Variables: Declaration – Initialization and Reference – Operators in C++ - Scope Resolution Operator – Member Dereferencing Operators – Memory Management Operators – Manipulators – Type Cast Operator -Expressions and their Types – Special Assignment Expressions – Control Structures

UNIT – III

Functions in C++: The Main Function – Prototyping – Call by Reference – Return by Reference – Inline Functions – Default Arguments – const Arguments – Recursion - Function Overloading – Friend and Virtual Functions – Classes and Objects – Constructors and Destructors: Constructors – Parameterized and Multiple Constructors – Constructors with Default Arguments – Dynamic Initialization – Copy and Dynamic Constructors - Destructors

UNIT – IV

Operator Overloading: Defining operator overloading – Unary and Binary Operator Overloading – Manipulation of Strings – Rules for Overloading – Type Conversion – Inheritance Extending Classes: – Defining Derived Classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Base Classes – Pointers – this Pointer.

UNIT – V

Templates: Class Templates – Class Templates with Multiple Parameters – Function Templates – Function Templates with Multiple Parameters – **Exception Handling:** Basics of Exception Handling – Exception Handling Mechanism – Throwing and Catching Mechanism – Specifying Exceptions.

TEXT BOOK

1. “Object Oriented Programming with C++”, E Balagurusamy , Tata McGraw-Hill Publish, 6th Edition, 2013.

REFERENCE BOOKS

1. “C++, The Complete Reference”, Herbert Schildt, 4th Edition, TMH.
2. “Programming with C++”, D. Ravichandran. TMH, 4th Edition, 2011

Semester II	BCA	2016-2017
Core: Practical II	DATA STRUCTURES USING C++	
M16UCAP02		
Credit: 2		

List of Practical's

1. Write a program to sort numbers in ascending order using arrays.
2. Write a program to perform STACK operations using arrays.
3. Write a program to perform QUEUE operations using arrays.
4. Write a program to implement Single Linked List operations using pointers.
5. Write a program for In-order, Pre-order and Post-order traversal of Binary Tree.
6. Write a Program to Describe the Representation of Graph using Adjacency Matrix
7. Write a program to perform Bubble Sort.
8. Write a program to perform Merge Sort.
9. Write a program to perform Linear Search.
10. Write a program to perform Binary Search.

Semester III	BCA	2016-2017
Core: 5	DESIGN AND ANALYSIS OF ALGORITHMS	
M16UCA05		
Credit: 4		

UNIT – I

Algorithm Analysis: Algorithm – Algorithm Design – Performance Analysis - Time Space Tradeoff - Asymptotic notations - Properties of big-Oh - Conditional Asymptotic Notations - Recurrence equations – Solving recurrence equations - Analysis of linear search – Mathematical Analysis of Non Recursive Algorithm - Mathematical Analysis of Recursive Algorithm.

UNIT – II

Divide and Conquer: General method - Binary search - Finding maximum and minimum- Merge sort - **Greedy Algorithms:** General method - Container Loading - Knapsack problem.

UNIT – III

Dynamic Programming: Introduction - General method – Multistage graphs – All Pairs Shortest paths – Single Source Shortest Paths - Optimal binary search tree (OBST) – 0/1 Knapsack Problem - Travelling Salesperson Problem.

UNIT – IV

Back Tracking: General method - 8 Queen’s Problem - Sum of subsets - Graph Coloring – Hamiltonian Problem – Knapsack Problem.

UNIT – V

Graph Algorithms: Graphs - Graph Traversals - Connected Components - Bi-Connected Components - Spanning Trees – **Branch and Bound:** General Method – Least Cost (LC) Search – Bounding – 0/1 Knapsack problem - LC Branch and Bound Solution – FIFO Branch and Bound Solution.

TEXT BOOK

“Design and Analysis of Algorithms”, Anuradha A. Puntambekar, Technical Publications Pune, 2010

REFERENCE BOOK

“Introduction to the Design and Analysis of Algorithms”, Pearson Education, 2nd Edition, 2008

Semester III	BCA	2016-2017
Core: 6	JAVA PROGRAMMING	
M16UCA06		
Credit: 4		

UNIT I

Java Evolution: Introduction-Java features –How to Java differs from C and C++-Java and Internet-Java and WWW Browser-Hardware & Software Requirements-Java Support Systems-Java Environment-Java Program Structure-Java Tokens-Java Statements-JVM-Command Line Arguments. **Constants, Variables & Data Types:** Constants-Variables-Data Types-Declaration of Variables-Giving Values to Variables-Scope of Variables-Symbolic Constants-Type Casting - Operators and Expressions.

UNIT II

Decision Making and Branching Statements: IF, Nested IF, Switch and Ternary Operator- **Decision Making and Looping:** The While Statement-The Do statement-The For Statement -Jump in Loops and Labeled Loops.

UNIT III

Classes, Objects and Methods: Introduction-Defining a Class – Method Declarations-Creating Objects- Accessing Class Members-Constructors-Methods Overloading-Static Members-Nesting of Methods-Inheritance-Overriding Methods-Final Classes-Abstract Methods and Classes-Visibility Control-Arrays and Strings.

UNIT IV

Interfaces: Introduction-Defining, Extending and Implementing Interfaces-Accessing Interfaces- **Packages:** Introduction-Creating, Accessing and Using a Package-Adding a Class to a Package. **Multithreaded Programming:** Creating Threads-Life Cycle of a Thread-Using Thread Methods-Thread Exceptions-Thread Priority-Synchronization.

UNIT V

Managing Errors and Exceptions: Introduction-Types of Errors-Exceptions-Multiple Catch Statements-Using Finally Statement-Throwing Our Own Exceptions. **Applet Programming:** Introduction-Building Applet Code-Applet Life Cycle-Creating an Executable Applet- Designing a Web Page–Applet Tag-Adding Applet to Html File-Running the Applet.

TEXT BOOK

Programming with Java, 5th Edition, E. Balagurusamy, Tata McGraw Hill Pub. Ltd., New Delhi.

REFERENCE BOOK

The Complete Reference Java2, 7th Edition, Patrick Naughton, Herbert Schildt, Tata McGraw Hill Pub. Ltd., New Delhi.

Semester III	BCA	2016-2017
Core: VII	SOFTWARE ENGINEERING	
M16UCA07		
Credit: 4		

UNIT –I

Introduction to Software Engineering: Definitions - Size Factors - Quality and Productivity Factors - Managerial Issues - Planning a software project: Defining the problem - Developing a Solution Strategy - Planning the Development Process - Planning an Organization structure - Other Planning Activities.

UNIT – II

Software Cost Estimation: Software cost factors - Software Cost Estimation Techniques - Staffing-level Estimation - Estimating Software Maintenance Costs - The Software Requirements Specification - Formal Specification Techniques - Languages and Processors for Requirements Specification.

UNIT – III

Software Design: Fundamental Design Concepts - Modules and Modularization Criteria - Design Notations - Design Techniques - Detailed Design Considerations - Real-Time and Distributed System Design - Test Plans.

UNIT – IV

Implementation Issues: Structured Coding Techniques - Coding Style - Standards and Guidelines - Documentation guidelines –Modern Programming Language Features - Type Checking – Data Abstraction - Concurrency Mechanisms.

UNIT –V

Verification and Validation Techniques: Quality Assurance - Walkthroughs and Inspections - Static Analysis - Symbolic Execution - Unit Testing and Debugging - System Testing - Formal Verification: Enhancing Maintainability during Development - Software Maintenance - Source Code Metrics.

TEXT BOOKS

1. "Software Engineering Concepts", R.Fairley, Tata Mc-Graw Hill Education, 4th Edition, 2001.
2. "Software Engineering", R.S. Pressman, Tata Mc-Graw Hill Education, 4th Edition, 2001.

Semester III	BCA	2016-2017
Core: 8	MULTIMEDIA AND ITS APPLICATIONS	
M16UCA08		
Credit: 4		

UNIT –I

Introduction to Multimedia and Hardware Devices: What is Multimedia? - Definitions - Where to use Multimedia. **Introduction to Making Multimedia:** The Stages of a Project - What you need. **Hardware Devices:** Macintosh Verses Windows - Networking Macintosh and Windows - Connections - Memory and Storage Devices - Input Devices - Output Hardware - Communication Devices.

UNIT – II

Multimedia Basic Software Tools and Authoring Tools : **Basic software Tools:** Text Editing and Word Processing Tools - OCR Software - Painting and drawing Tools - 3-D Modeling and Animation Tools - Image-Editing Tools - Sound Editing Tools - Animation, Video and Digital Movie Tools - Helpful Accessories. **Multimedia Authoring Tools:** Making Instant Multimedia - Types of Authoring Tools - Card and Page-Based Authoring Tools - Icon and Object-Based Authoring Tools - Cross-Platform Authoring Notes.

UNIT – III

Multimedia Text and Sound: **Text:** The Power of Meaning - About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext. **Sound:** The Power of Sound - Multimedia System Sounds - Digital Audio - Making MIDI Audio - Audio File Formats - MIDI Versus Digital Audio - Adding Sound to Your Multimedia Project - Music CDs - Production Tips.

UNIT – IV

Multimedia Images, Animation and Video: **Images:** Making Still Images - Color -Image File Formats. **Animation:** The Power of Motion - Principles of Animation - Animation by Computer - Making Animations That Work. **Video:** Using Video - How Video Works - Analog Display Standards - Digital Display Standards - Digital video - Video Recording and Tape Formats - Shooting and Editing Video - Optimizing Video Files for CD-ROM.

UNIT –V

Multimedia and the Internet: The Internet and How it Works: Internet History - Internetworking - Connections - Internet Services - The World Wide Web and HTML - Dynamic Web Pages and XML - Multimedia on the Web. **Tools for the World Wide Web:** Web Servers - Web Browsers - Search Engines - Web Page Makers and Site Builders - Plug-ins and Delivery Vehicles - Beyond HTML. **Designing for the World Wide Web:** Working on the Web - Text for the Web - Images for the Web - Sound for the Web - Animation for the Web.

TEXT BOOK

1. Multimedia Making It Work – Seventh Edition by Tay Vaughan – Tata McGraw-Hill Edition 2008.

REFERENCE BOOKS

1. Multimedia Technology and Applications - David Hillman - Galgotia Publications Pvt. Ltd, 1998.
2. Multimedia in Action – James E.Shuman – Vikas Publishing House.
3. Multimedia an Introduction – John Villamil – Casanova, Louis Moliva, PHI.

Semester III	BCA	2016-2017
Core: Practical III	Practical III : JAVA	
M16UCAP03		
Credit: 2		

List of Practical's

1. Write a java program to read any two numbers and perform all types of operators.
2. Write a java program to display student marks and grade using ternary operator.
3. Write a java program for matrix addition using arrays and for loop.
4. Write a java program to display income tax calculation using classes and objects.
5. Write a java program to implement the string handling functions.
6. Write a java program using interface.
7. Write a java program using packages.
8. Write a java program to create three threads and adjusts the priority using multithreading.
9. Write a java program to display any three types of exceptions.
10. Write a java program to display clock using applets.

Semester III	BCA	2016-2017
Allied Practical I	Allied Practical I - Accountancy (Tally)	
M16UCCAP01		
Credit: 2		

1. Company Information

- a. Company creation
- b. Select Company
- c. Shut Company
- d. Alter Company
- e. Split Company Data
- f. Backup and Restore

2. Gateway of Tally

a. Accounts info

- i) Groups
- ii) Ledgers
- iii) Voucher Types

b. Inventory info

- i) Stock Group
- ii) Stock Category
- iii) Stock item
- iv) Unit of Measures
- v) Godown

c. Accounting Vouchers

d. Inventory Vouchers

3. Statutory and Taxation

- a. Value Added Tax (VAT)
- b. Tax Deducted at Source (TDS)
- c. Tax Collected at Source (TCS)
- d. Service Tax

4. Display

- a. Trial Balance
- b. Day Book
- c. Accounts Book
- d. Statement of Accounts
- e. Inventory Books
- f. Statement of Inventory
- g. Statutory Info
- h. Statutory Reports
- i. Cash flow and Fund flow Statements

Semester IV	BCA	2016-2017
Core: 9	OPERATING SYSTEM	
M16UCA09		
Credit: 4		

UNIT - I

Introduction - What is an Operating System - History of Operating systems - Computer Hardware Review - Operating system Zoo - OS concepts - System calls- Operating system structure -Processes.

UNIT - II

Threads: Thread usage - Thread Model - Threads Implementation. Inter process Communication – Scheduling. **Deadlock:** Introduction - Principles of Deadlock - Deadlock Detection & Recovery - Deadlock Avoidance - Deadlock Prevention.

UNIT - III

Memory Management: Memory Abstraction - Virtual Memory - Page Replacement Algorithm - Segmentation. **Input/output:** Principles of I/O Hardware-Principles of I/O Software.

UNIT - IV

File Systems: Files – Directories - File System Implementation. **Multiprocessor Systems:** Multiprocessor – Multicomputer - Distributed systems.

UNIT - V

Unix: Introduction - History of Unix - Unix Process Management - Memory Management-Input/output Management-Unix File Management.

TEXT BOOKS

1. “Modern Operating Systems”, Andrew S. Tannenbaum, 3rd Edition, PHI Private Limited, New Delhi, 2011.
2. “Modern Operating Systems”, Andrew S. Tannenbaum, 2nd Edition, PHI Private Limited, New Delhi, 2008.

REFERENCE BOOKS

1. “Operating System Principles”, Abraham Silverschatz, Peter Baer Galvin and Greg Gagne, 7th Edition, Wiley India Pvt.Ltd, New Delhi. 2011.
2. “Operating Systems-Internal & Design Principles”, William Stallings, 5th Edition, PHI Private Limited, New Delhi, 2008.

Semester IV	BCA	2016-2017
Core: 10	COMPUTER NETWORKS	
M16UCA10		
Credit: 4		

UNIT - I

Introduction: Uses of computer network – **Network hardware:** LAN, MAN & WAN – **Network Software:** Protocols – Design issues for the layers – Connection oriented Vs Connection less service – **Reference models.**

UNIT - II

Physical Layer: The Theoretical Basis for Data Communication – Guided Transmission media – Wireless Transmission – Communication Satellite – Public Switch Telephone Network – The Mobile Telephone system – Cable Television.

UNIT - III

Data Link Layer: Data Link Layer Design Issues – Error Detection and Correction – Elementary data link protocols – Sliding window Protocols.

Network Layer: Network Layer Design Issues – Routing Algorithms – Congestion Control Algorithms – Quality of service – Internetworking.

UNIT - IV

Transport Layer: Transport services – Elements of Transport Protocols – Internet Transport Protocols. **Application Layer:** Domain name system – Electronic Mail – The World Wide Web – content delivery.

UNIT - V

Security: Introduction – cryptography – Public key algorithms – Digital signatures – Communication security – Authentication protocols – Email security – Web security.

TEXT BOOKS

1. “Computer Networks”, Andrew S. Tanenbaum, David J. Wetherall, Pearson Education, 5th Edition, 2011.
2. “Computer Networks”, Andrew S. Tanenbaum, PHI Pvt. Ltd. 4th Edition, New Delhi, 2003.

REFERENCE BOOK

1. “Data Communication and Networks”, Achyut S. Godbole, Tata McGraw Hill, 3rd Edition, New Delhi.

Semester - IV	BCA	2016-2017
Core: 11	RELATIONAL DATABASE MANAGEMENT SYSTEMS	
M16UCA11		
Credit: 4		

UNIT-I

Introduction: Database system Application – Purpose of Database Systems- View of Data – Database Languages - Relational Databases - Database Design - Data Storage and Querying- Transaction Management- Database Architecture - Data Mining and Information.

Retrieval - Specialty Databases - Database Users and Administrators **Relational Databases:** introduction to the Relational Model ER- Model: Structure of Relational Databases-Database Schema –Keys.

UNIT-II

Introduction to SQL: Overview of the SQL Query Language– SQL Data Definition- Basic Structure of SQL Queries – Additional Basic Operation -Set Operations- – Null Values – Aggregate Functions -Nested Sub queries– Modification of the Database **Intermediate SQL** – joined Relations- Views - Transactions - Authorization

UNIT-III

Data Normalization: Pitfalls in Relational Database Design- Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce Code Normal Form – Fourth Normal Form – Fifth Normal Form – Denormalization – **Database Security:** Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges and roles – Data Encryption – Network Security – Authenticating users to the database.

UNIT-IV

PL/SQL: A Programming Language: History of PL/SQL – Fundamentals of PL/SQL – PL/SQL Block Structure – Comments- Data Types – Other Data Types – Variable Declaration – Anchored Declaration – Assignment Operation – Bind Variables- Substitution Variables in PL/SQL– Printing in PL/SQL – Arithmetic Operators – **Control Structures and Embedded SQL:** Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation in PL/SQL – Transaction Control Statements.

UNIT-V

PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors - Explicit Cursors – Explicit Cursor Attributes – Implicit Cursor Attributes - Cursor for Loops – SELECT... FOR UPDATE Cursor – WHERE CURRENT OF CLAUSE – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.**PL/SQL Composite Data Types: Records, Tables and V arrays:** Composite Data Type – PL/SQL Records – PL/SQL Tables - PL/SQL V arrays – **PL/SQL Named Blocks: Procedures, Functions, Packages & Triggers:** Procedures – Functions – Packages - Triggers – Data Dictionary Views.

TEXT BOOKS

1. “Database system Concepts”, Abraham Silberschatz, Henry F.Korth, S.Sudarshan, TMH 6th Edition at 2010 (Unit – I & II),.
2. “Fundamentals of Database Management Systems”, Alexis Leon, Mathews Leon, Vijay Nicole Imprints Private Limited, 2nd Edition at 2010(Unit – III).
3. “Database Systems Using Oracle-A simplified Guide To SQL and PL/SQL”, Nilesh shah, 2nd Edition at 2005, PHI. (Unit- IV: Chapters 10,11. Unit-V Chapters 12, 13, 14).

REFERENCE BOOKS

1. “Database Management Systems”, Ramakrishnan, Gehrke, 3rd Edition, McGraw Hill.
2. “Database system Concepts”, Abraham Silberschatz, Henry F.Korth, S.Sudarshan, TMH 5th Edition

Semester - IV	BCA	2016-2017
Core: 12	PROGRAMMING IN PYTHON	
M16UCA12		
Credit: 4		

UNIT I

The Content of Software Development: Learning Programming with Python-Writing a Python Program-A Longer Python Program. **Values and Variables:** Integer Values-Variables and Assignments-Identifiers-Floating Point Types-Control Codes with Strings-User Input-The *eval* Function-Controlling the *print* Function. **Expression and Arithmetic:** Expression-Operator Precedence and associativity- Comments- Errors-Arithmetic Examples-More Arithmetic Operators-Algorithms.

UNIT II

Conditional Execution: Boolean Expressions- Simple if Statements-The if/else Statements-Compound Boolean Expressions-Nested Conditionals- Multi-way Decision Statements-Conditional Expressions-Errors in Conditional Statements. **Iteration:** The While Statement- Definite Loop vs Indefinite Loop- The for Statement-Nested Loops-Abnormal Loop Termination- Infinite Loop-Iteration Examples.

UNIT III

Using Functions: Introduction to Using Functions-Standard Mathematical Functions-Time Functions-Random Numbers-Importing Issues. **Writing Functions:** Function Basics- Using Functions- Main Functions- Parameter Passing-Function Examples- Custom Functions vs. Standard Functions. **More on Functions:** Global Variables- Default Parameters- Recursion- Making Functions Reusable- Documenting Functions and Modules- Functions as Data.

UNIT IV

Lists: Using List- List Assignment and Equivalence – List Bounds- Slicing - Lists and Functions- Prime Generation with a List.**List Processing:** Sorting-Flexible Sorting-Search- List Permutations- Randomly Permuting a List- Reversing a List.

UNIT V

Objects: Using Objects- String Objects- List Objects. **Custom Types:** Geometric Points- Methods- Custom Type Examples- Class Inheritance. **Handling Exceptions:** Motivation- Exception Examples- Using Exceptions - Custom Exceptions.

TEXT BOOK

Learn to Program with Python, 3th Edition, Richard L. Halterman, Southern Adventist University.

REFERENCE BOOK

Core Python Programming, 2th Edition, Wesley J. Chun, Prentice Hall.

Semester - IV	BCA	2016-2017
Core Practical: IV	Practical IV- Oracle	
M16UCAP04		
Credit: 2		

List of Practical's

1. Table Creation using various constraints.
2. Apply the constraints like Primary key, Foreign Key, Not Null to the tables.
3. Write the queries to implement the joins.
4. Write the queries for implementing the Aggregate functions.
5. Write a SQL statement for Nested sub queries.
6. Write a PL/SQL program of Employee's Pay Bill.
7. Write a PL/SQL program to calculate the area of circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table name areas.
8. Write a PL/SQL block to display electricity bill for the electricity consumers. The database should consist of consumer-no, name, add, units consumed. Insert the data of ten consumers and calculate the bills and using following rules.
 - a. No of units Rate/Unit For
 - b. First 100 units Rs. 6 per unit
 - c. Next 300 units Rs.4.25 per unit
 - d. Beyond 300 units Rs. 3.50 per unit.
9. Write a PL/SQL program of Student Details using Triggers.
10. Write a PL/SQL program of Voters Details using V-arrays.

Semester - V	BCA	2016-2017
Core: 13	MOBILE COMPUTING	
M16UCA13		
Credit: 4		

UNIT - I

Introduction: Applications - A Simplified Reference Model. Wireless Transmission: Frequencies for radio transmission - Signals - Antennas - Signal Propagation - Multiplexing - Modulation - Spread Spectrum - Cellular System.

UNIT - II

Medium Access Control: Motivation for a Specialized MAC- Hidden and exposed terminals - Near and far terminals - SDMA - FDMA - TDMA - Fixed TDM - Classical Aloha - Slotted Aloha - Carrier Sense Multiple Access - Demand assigned Multiple Access - PRMA Packet Reservation Multiple Access - Reservation TDMA - Multiple Access with Collision Avoidance - Polling - Inhibit Sense Multiple Access. CDMA - Spread Aloha multiple access.

UNIT - III

Telecommunication Systems: GSM - Mobile Services - System Architecture - Radio Interface - Protocols - Localization and Calling - Handover - Security. UMTS and IMT 2000: UMTS releases and standardization - UMTS System Architecture - UMTS Radio Interface -UTRAN - UMTS Handover.

UNIT - IV

Satellite System: History - Applications - Basics - Routing- Localization - Handover. Wireless LAN: IEEE 802.11- System Architecture - Protocol Architecture - Physical Layer - Medium Access Control Layer. Bluetooth: User scenarios - Architecture - Radio Layer - Baseband Layer - Link Manager Protocol.

UNIT - V

Mobile Network Layer: Mobile IP - Goals, Assumption, and Requirements - Entities and Terminology - IP Packet delivery - Agent discovery - Registration. Dynamic Host Configuration Protocol - Mobile Transport Layer: Traditional TCP - Congestion Control - Slow Start - Fast Retransmit.

TEXT BOOK

Jochen Schiller, "Mobile Communications", 2nd Edition, eighth impression, Pearson Education, 2011.

REFERENCE BOOKS

1. William Stallings, "Wireless Communication and Networks", 2nd Edition, Pearson Education, 2005.
2. Theodore Rappaport, "Wireless Communications: Principles and Practice", Prentice Hall Communications, 1996.

Semester - V	BCA	2016-2017
Core: 14	INTERNET PROGRAMMING	
M16UCA14		
Credit: 4		

UNIT I

Introduction to computers and the Internet 2: Introduction – Machine Languages, Assembly Languages and High-level Languages – History of the Internet and WWW – W3C. **Java Script:** Object-Based scripting for the web – Software Technologies. **Web Browser Basics:** Introduction – Connecting to the Internet - Features – Searching the Internet – Keeping Track of Your Favorite Sites – FTP – Other web browsers.

UNIT II

Introduction to XHTML: Introduction – Editing XHTML with example – W3C XHTML validation services – Headings – Linking – Images – Special Characters and Horizontal rules – Lists – Tables – Forms - Internal Linking. **Cascading Style Sheets:** Introduction – Inline styles – Embedded Styles sheets – Conflicting styles – Linking External Style sheets – Positioning Elements – Element Dimensions – Building a CSS Drop-Down Menu- User Style Sheets.

UNIT III

Document Object Model (DOM): Object and Collections – Introduction – Modeling a Document: DOM Nodes and Trees – Traversing and Modifying a DOM Tree – DOM Collections – Dynamic Styles. **Java Script:** Introduction – Simple Program & Modification – Obtaining User Input with Prompt dialogs – Dynamic Welcome Page – Adding Integers – Memory Concepts. **Events:** Introduction – Registering Event Handlers – Event on load – Event on mouse move – Event Bubbling.

UNIT IV

XML and RSS: Introduction – XML Basics – Structuring Data – XML Namespaces – DTDs – W3C XML Schema Documents – XML Vocabularies – Extensible Style sheet Language and XSL Transformations – DOM – RSS. **PHP:** Introduction – PHP Basics – String Processing and Regular Expressions – Comparing Strings – Regular Expressions - Form Processing and Business Logic – Connecting to a Database – Using Cookies – Dynamic Content – Operator Precedence Chart.

UNIT V

Java Server Faces Web Applications: Introduction – Java Web Technologies – Creating and Running Simple Applications in Net beans – JSF Components. **Web Services:** Introduction – Java Web Services Basics – Creating, Publishing, Testing and Describing a Web Service – Consuming a Web Service – SOAP – Session Tracking in Web Services – Consuming a Databases driven web service from a web applications.

TEXT BOOK

1. “Internet & World Wide Web How to Program”, P.J Deital & H.M Deital, Fourth Edition, 2008.

Semester - V	BCA	2016-2017
Core: 15	PRINCIPLES OF CLOUD COMPUTING	
M16UCA15		
Credit: 4		

UNIT – I Getting Started

Cloud Computing Basics: Cloud computing overview – Applications – Internets and the Cloud – First Movers in the Cloud. **Your Organization and Cloud Computing:** When you can use Cloud Computing – Benefits – Limitations – Security Concerns – Regularity Issues. **Cloud Computing With the Titans:** Google – EMC – NetApp – Microsoft – Amazon – Salesforce.com – IBM – Partnership.

UNIT – II

The Business Case for Going to the Cloud: Cloud Computing Services – How Those Applications Help Your Business – Deleting Your Datacenter – Salesforce.com – Thomson Reuters.

Cloud Computing Technology

Hardware and Infrastructure: Clients – Security – Network – Services.

UNIT – III

Accessing the Cloud: Platforms – Web Applications – Web APIs – Web Browsers. **Cloud Storage:** Overview – Cloud Storage Providers. **Standards:** Applications – Client – Infrastructure – Service.

UNIT – IV Cloud Computing at Work

Software as a Service: Overview – Driving Forces – Company Offerings – Industries. **Software plus Services:** Overview – Mobile Device Integration – Providers – Microsoft Online.

UNIT – V

Developing Applications: Google – Microsoft – Intuit Quick base – Cast Iron Cloud – Bungee Connect – Development – Troubleshooting – Application Management. Local Clouds and Thin Clients: Virtualization – Server Solutions – Thin Clients.

TEXT BOOK

1. Cloud Computing – A Practical Approach by Anthony T.Velte, Toby J. Velte and Robert Elsenpeter Indian Edition, McGraw Hill Education (India) Edition, 2013.

Semester - V	BCA	2016-2017
Core: 16	CYBER SECURITY	
M16UCA16		
Credit: 4		

UNIT I

Understanding the Cyber security Landscape: The State of Today's Intrusions- Targeted Intrusions-Dots, DDots & botnets –Advanced persistent threats- The Changing Face of Cybercriminals. **The Role of Malware in Cyber attacks:** Recognizing Key Characteristics of Advanced Malware- Understanding Modern Cyber-attack Strategy- Key Security Lessons and Opportunities. **Why Traditional Security Solutions Fail to Control Advanced Malware :** Rapidly Expanding Attack Vectors - A Lack of Comprehensive End-to-End Visibility- Hash-Based Signature Avoidance -Targeted Malware- Traditional Network Controls Are Ineffective –Firewalls-Intrusion prevention - Proxies -Endpoint protection- Virtual and cloud protection- Crossing Legacy Security Silos- Network versus host-based approaches-Integrating multidisciplinary solutions.

UNIT II

What Next-Generation Security Brings to the Fight: The Next-Generation Firewall- Preventing Infection with Next-Generation Firewalls-Reduce the attack surface- Control advanced malware-enabling applications-Actively test unknown files- Prevent use of circumventors-Investigate any unknown traffic and traffic patterns-Find command-and-control traffic- Automate tracking and correlation. **Creating Advanced Threat Protection Policies:** Safe Enablement through Smart Policies-Application controls-User controls-Network controls- Endpoint controls- Addressing Mobile and Remote Users. **Ten Things to Look for in a Cyber security Solution:** Enforce Allowed Interactions Between Your Data and Users- Identify Threats Everywhere and Always- Protect Data at Multiple Stages in the Attack Lifecycle-Outsmart Threats Designed to Outmaneuver Security Tools-Translate New Intel into Protections in Security Policies- Get Intel and Protection against the Latest Attacks- Enable Quick and Accurate Mitigation-Coordinate Actions across Individual Security Technologies.

UNIT III

Logging: Introduction - Logging in Linux-Spoofing Log Messages - Remote Logging - Logging in Windows - Rotating Windows Logs -Remote Windows Logs -Integrating Windows and Linux Logs . **Malware and Persistence:** Introduction- Document-Based Malware -Creating Malware - Persistence-Kerberos Golden Tickets - Sticky Keys Persistence on Linux Systems-Malware Analysis -Detecting Persistence - Mandiant Redline - Malware Defense.

UNIT IV

Web Attacks: Introduction - Pillaging the Browser -Man in the Middle - Password Attacks-Burp Suite Web Proxy - Burp Suite Brute Force Password Attacks -Custom Password Attacks- Defending Against Password Attacks-Server Reconnaissance – Slowloris- Heartbleed

UNIT V

Firewalls : Introduction- Network Firewalls -Virtual Networking -IPFire - Installing IPFire -IPFire Initial Configuration - Network Traffic Rules -Configuring the Network-Egress Filters and Proxies-IPFire Features-Attacks through a Network Firewall-Attacks from the DMZ Attacking the Internal Network -Bypassing the Firewall.

Textbooks

- 1) Cyber Security for Dummies by Lawrence C. Miller, CISSP, Palo Alto Networks 2nd Edition, 2016 (UNIT I & II)
- 2) Cyber Operations Building, Defending, and Attacking Modern Computer Networks by Mike O’Leary, Apress, 2015(UNIT III-V)

Reference Books

- 1) Denzyl. P. Dayal – Cyber Terrorism and Hoaxes and Law Enforcement, Dominant publishers and Distributors, First Edition, 2005

Semester - V	BCA	2016-2017
Core Practical : V	Practical V- INTERNET PROGRAMMING LAB	
M16UCAP05		
Credit: 2		

1. Write a XHTML code Inserting Special Characters into a webpage.
2. Create a XHTML code to display Nested Lists in your web page.
3. Create a XHTML code to display Tables in your web page.
4. Write a XHTML code to display Form using a Variety of Components in your web page.
5. Write a CSS code to display Positioning element into your web page.
6. Write a CSS code to display Dynamic Styles into your web page.
7. Create a Java Script code to display Memory Concepts into your web page.
8. Create a Java Event Script code to display to Events on Mouse Move into your web page.
9. Write a XML code to display Vocabularies in your web page.
10. Write a PHP code to display Cookies into your web page.

Semester - V	BCA	2016-2017
SBEC-I	SBEC I - OFFICE AUTOMATION	
M16CCAS01		
Credit: 2		

UNIT – I

MS-Word: Introduction to Word: Starting Word – Creating Documents – Saving the Document – Printing a Document – Closing a Document - **Editing a Document:** Opening a Document – Cursor Movement- Editing a Document – Selecting, Deleting, Selecting Text – Undoing and Redoing Changes – Cut, Copy and Paste Text - Help System - Moving Text – **Formatting Text and Paragraph:** Formatting Text- Using the Font Dialog Box- Paragraph Formatting- Using Bullets and Numbers in Paragraphs. **Finding and Replace Text and Spelling Checking:** Finding Text- Replace Command- Spelling Checking and Correction- Inserting Date and Time.

UNIT – II

Enhancing Document: Page Setup- Inserting Page Breaks- Adding Borders and Shading to Paragraph- Using Headers and Footers in the Document- Print Preview. **Columns, Tables and Other Features:** Creating Tables in Document- Formatting a Table - Using Multiple Columns- Sorting Text. **Using Graphics, Templates and Wizards:** Using Templates- Using the Wizard to Create a Document- Inserting Graphics. **Using Mail Merge:** Mail Merge- Examples of Mail Merge- Viewing and Printing Merged Letters- Creating Mailing labels.

UNIT – III

MS-Excel: Excel Basics: Introduction - Menus, Toolbars and their Icons: Menus: File, Edit, View, Insert, Format, Tools, Data and Window Menu – Toolbars and their Icons – Creating a Chart – Database: Data Forms – Data Sort – Data Filters - Formulas and Functions.

UNIT – IV

Charting and Printing Your Data: Charting your Data: Creating Charts-Modifying your Data: Changing Chart types- Enhancing Charts- Formatting Charts automatically. **Printing Worksheet and Charts:** Previewing your Worksheet- Setting up pages- Adding Headers and Footers.

UNIT – V

MS-PowerPoint: Basic PowerPoint File Management: Starting PowerPoint - Saving- Opening- Creating a Presentation. **Slides and PowerPoint Objects:** Working with Slides- Working with PowerPoint Text Objects. **Multimedia:** Inserting Sound files- Adding Video- Microsoft Online Clip Gallery.

Text Books

- 1) PC Software for Windows- R K Taxali, Tata McGraw-Hill Publishing.
- 2) Office The Basics & Beyond – Alan Neibauer, Tata McGraw-Hill Edition
- 3) Microsoft Excel for Windows 95- Catapult, Microsoft Press.
- 4) Microsoft PowerPoint 2000 – Alexandria Haddad, Tech media.

Semester - V	BCA	2016-2017
SBEC-II	SBEC II - MOBILE APPLICATION DEVELOPMENT	
M16CCAS02		
Credit: 2		

UNIT –I

Introduction: Brief History of Mobile –Evolution of Devices: Brick Era – Candy Bar Era – Feature Phone Era-Smart Phone Era-Touch Era. **The Mobile Ecosystem:** Operators- Networks-Devices-Platforms-Operating Systems-Application Frameworks-Applications-Services. **Why Mobiles?** : Mobile as a Medium.

UNIT – II

Types of Mobile Applications: Mobile Application Medium Types. **Mobile Information Architecture:** Mobile Information Architecture. **Mobile Design:** Elements of Mobile Design- Mobile Design Tools.

UNIT – III

Mobile Web Apps Vs Native Applications: Ubiquity Principle- When to Make a Native Application – When to Make a Mobile Web Application. **Mobile Web Development:** Web Standards- Designing for Multiple Mobile Browsers- Device Plans- Markup- CSS- JavaScript.

UNIT – IV

iPhone Web Apps: Why Web kit? – Markup – CSS - JavaScript- Creating a Mobile Web App- Web Apps as Native Apps- PhoneGap- Tools and Libraries.

UNIT –V

Supporting Devices: Having a Device Plan – Device Testing – Desktop Testing – Usability Testing.

TEXT BOOK

1. Mobile Design and Development – First Edition by Brian Fling – O’Reilly Media, Inc., Edition 2009.

<http://www.scribd.com/doc/63967028/Mobile-Design-and-Development-Practical-concepts-and-techniques-for-creating-mobile-sites-and-web-apps>

REFERENCE BOOKS

1. Reto Meier, Professional Android 2 Application Development, Wiley, Publications, 2011.
2. J. F. DiMarzio, Android –A programmer’s Guide, Mc Graw Hill, 2010.

Semester - V	BCA	2016-2017
ELECTIVE: I	PRINCIPLES OF HUMAN COMPUTER INTERACTION	
M16UCAE01		
Credit: 3		

UNIT I

The Human: Introduction-**Input-output channels:** Vision-Hearing-Touch-Movement-
Human Memory: Sensory memory-Short-term memory-Long-term memory –
Thinking: Reasoning and problem solving - Errors – Emotion – Individual differences – Psychology and the design of interactive systems.

UNIT II

The Computer: Introduction – **Text entry devices:** Alphanumeric keyboard-Chord keyboards-Phone pad and T9 entry-Hand writing recognition – Speech recognition-
Positioning, pointing and drawing: The mouse - Touch pad - Trackball and thumbwheel–Joystick and keyboard nipple - Touch-sensitive screens (touch screens) - Stylus and light pen - Digitizing tablet - Eyegaze-Cursor keys and discrete positioning -
Display devices: Bitmap displays-Technologies-Large displays and situated displays - Digital paper – **Physical Controls, Sensors and Special devices:** Special displays-Sound output-Touch, feel and smell-Physical controls-Environment and bio-sensing-**Paper: Printing and Scanning** - Printing - Fonts and page description languages – Screen and page - Scanners and optical character recognition – **Memory:** RAM and short-term memory (STM) - Disks and long-term memory (LTM) - Understanding speed and capacity – Compression - Storage format and standards.

UNIT III

The Interaction

Models of interaction: The terms of interaction-The execution–evaluation cycle-The interaction framework - **Frameworks and HCI – Ergonomic:** Arrangement of controls and displays-The physical environment of the interaction-Health issues-The use of color-
Ergonomics and HCI- **Interaction Styles:** Command line interface-Menus-Natural language-Question/answer and query dialog-Form-fills and spreadsheets-The WIMP interface - Point-and-click interfaces - Three-dimensional interfaces - **Elements of the WIMP interfaces - Interactivity – The Context of the interaction - Experience, Engagement and Fun:** Understanding experience - Designing experience - Physical design and engagement.

UNIT IV

Design Process

Interaction Design Basics: What is Design: The Golden rule of design-To Err is human-
Te central message-The user. The Process of Design – User Focus- Scenarios-**Navigation
Design:** Local Structure- Global Structure-hierarchical organization-Global Structure-
Dialog. **Screen Design and Layout:** Tools for Layout-User acting and control– Iteration
and Prototyping.

Design Rules: Principles to Support Usability: Learnability-Flexibility-Robustness.
Guidelines – Golden rules and Heuristics – HCI Patterns.

UNIT V

Evaluation Techniques: What is evaluation? -Goals of Evaluation – Evaluation through
expert analysis- evaluation through user Participation – Choosing an Evaluation Method.
User Support: Introduction – Requirements of user support – Approaches to user
Support – Adaptive help Systems –Designing user support Systems.

TEXT BOOK

Human – Computer Interaction, Alan Dix, Janet Finlay, Gregory D.Abowd, Russell
Beale Pearson Prentice Hall 3rd Edition, 2004.

REFERENCE BOOK

Principles of Human Computer Interaction Design by Dr. Raul Valerie Paperback.

Semester - V	BCA	2015-2016
ELECTIVE: I	COMPUTER GRAPHICS	
M16UCAE02		
Credit: 3		

UNIT – I

Overview of Graphics Systems: Video Display Devices-Refresh Cathode-Ray Tubes-Raster Scan Displays-Random Scan Displays -Color CRT Monitors-Direct-View Storage Tubes-Flat-Panel Displays-Three Dimensional Viewing Devices-Stereoscopic and Virtual Reality Systems-Raster Scan System-Video Controller-Raster -Graphics Software-Coordinate Representations-Graphics Functions-Software Standards-PHIGS Workstations. **Output Primitives:** Points and Lines-Line-Drawing Algorithms-Loading the Frame Buffer-Line Function-Circle-Generating Algorithms-Ellipse-Generating Algorithms-Parallel Curve Algorithms-Curve Functions-Pixel Addressing-Filled-Area Primitives-Fill-Area Functions-Cell Array-Character Generation.

UNIT – II

Attributes of Output Primitives: Line Attributes-Curve Attributes-Color and Grayscale Levels-Area-Fill Attributes-Character Attributes-Bundled Attributes-Inquiry Functions-Ant aliasing-Area Sampling Straight Line Segment-Filtering Techniques-Pixel Phasing-Compensating for Line intensity Difference-Ant aliasing Area Boundaries. Two-Dimensional Geometric Transformations: Basic Transformations-Matrix Representations and Homogeneous Coordinates-Composite Transformations. **Two-Dimensional Viewing:** The Viewing Pipeline-Viewing Coordinate Reference Frame-Window-to-viewport Coordinate Transformation-Two-Dimensional viewing Functions-Clipping Operations-Point Clipping-Line Clipping-Polygon Clipping-Curve Clipping-Text Clipping-Exterior Clipping.

UNIT – III

Structures and Hierarchical Modeling: Structure Concept-Editing Structures-Basic Modeling Concepts-Hierarchical Modeling with Structures-**Graphical User Interfaces and Interactive input Methods:** The User Dialogue-input of Graphical Data-input Functions-Initial Values for Input Device Parameters-interactive Picture-Construction Techniques-Virtual-Reality Environments. **Three-Dimensional Concepts:** Three-Dimensional Display Methods-Three-Dimensional Graphics Packages.

UNIT – IV

Three Dimensional Object Representations: Polygon Surfaces-Curved Lines and Surfaces-Quadric Surfaces-Super quadrics-Blobby Objects-Spline Representations-Cubic Spline Interpolation Methods-Bezier Curves and Surfaces-B-Spline Curves and Surfaces-Beta-Splines-Rational Splines-Conversion Between Spline Representations-Displaying Spline Curves and Surfaces-Sweep Representations -Particle Systems-Physically Based Modeling-Visualization of Data Sets-Visual Representations for Multivariate Data Fields.

Three Dimensional Geometric and Modeling Transformations: Translation-Rotation-Scaling - Composite Transformations-Three-Dimensional Transformation Functions - Modeling and Coordinate Transformations.

UNIT – V

Visible-Surface Detection Methods: Classification of Visible-Surface Detection algorithms-Back-Face Detection-Depth-Buffer Method-Buffer Method-Scan Line Method-Depth Sorting Method-BSP-Tree Method-Area Subdivision Method-Octree Methods-Ray-Casting Method-Curved Surfaces-Wireframe Methods-Visibility-Detection Functions. **Color Models and Color Applications:** Properties of Light-Standard Primaries and the Chromaticity Diagram-Intuitive Color Concepts-RGB Color Model-YIQ Color Model-CMY Color Model-HSV Color Model-Conversion between HSV and RGB Models-HLS Color Model-Color Selection and Applications. **Computer Animation:** Design of Animation Sequences-General Computer-Animation Functions-Raster Animations-Computer-Animation Languages-Key-Frame Systems-Motion Specifications

TEXT BOOK

Computer Graphics C Version by Donald Hearn & M Pauline Baker II Edition.

REFERENCE BOOK

Introduction to Computer Graphics David J. Eck.

Semester - V	BCA	2016-2017
ELECTIVE: I	OPEN SOURCE SOFTWARE DEVELOPMENT	
M16UCAE03		
Credit: 3		

UNIT – I

Open Source Software: Definitions and History:-Definition of Terms-A Brief History of Software-**Where Open Source Is Successful:** Analytical Framework-Open Source Is in Widespread Successful Use-**Open Source: The Good, the Bad and the Ugly:** What Is Good about Open Source-Open Source Is Not Enough by Itself-How Choosing Open Source Is More Difficult for You-What Others Say about Open Source.

UNIT – II

Five Immediate Open Source Opportunities: Create an Open Source Lab-Migrate Infrastructure to Samba and Open LDAP- Build Some LAMP Applications-Bring New Desktop Systems to the Underserved- Migrate Applications and Databases to Open Source- **Five More Open Source Opportunities:** Introduction- Directory Services- Email- Groupware and Collaboration- Complex Web Publishing- Manage User Desktops- Other Possibilities.

UNIT – III

Operating Systems: Contents of the Operating System- Linux Distribution Vendors- Enterprise Distribution Vendors- Community-Supported Distribution Vendors- International Alternatives. **Open Source Server Applications:** Infrastructure Services- Web Servers- Database Servers- Mail Servers. **Open Source Desktop Applications:** Introduction- Graphical Desktops- Web Browsers- The Office Suite- Mail and Calendar Clients- Personal Software.

UNIT – IV

How Open Source Software Is Developed: Methodology- Languages Used to Develop Open Source Products- Cross-Platform Code. **Managing System Implementation:** Implementation Roles- Open Source Impact on Team Issues- Implementation Process- Implementation Principles- Key Documents- Migration- Interacting with the Open Source Community.

UNIT – V

Application Architecture: Types of Systems- Tiered Design- Managing Performance and Scalability- Interoperability- Development Platform Choices. **The Cost of Open Source Systems:** Total Cost of Ownership- Types of Costs- Scenarios- **Licensing:** Types of Licenses- Licenses in Use- Mixing Open and Closed Code- Dual Licensing- Other Intellectual Property Issues.

TEXT BOOK

Open Source Software: Implementation and Management by Paul Kavanagh.

REFERENCE BOOK

Fundamentals Of Open Source Software Kindle Edition by M. N. RAO.

Semester - V	BCA	2016-2017
ELECTIVE: I	OBJECT ORIENTED SYSTEM DESIGN	
M16UCSE04		
Credit: 3		

UNIT I

An overview of Object oriented Systems Development: Object Orientation, Object Basics: An Object - Oriented Philosophy, Objects, grouping objects in classes, Attributes; Object Behavior and methods, Encapsulation and Information Hiding, Class Hierarchy, Polymorphism, Object Relationships, and Associations, Aggregations and Object Containment. Object-Oriented Systems Development Life Cycle: Introduction -The software Development Process, Building High Quality software.

UNIT II

Object Oriented Methodology: Introduction, Rumbaugh Object Modeling Technique, The Booch Methodology, The Jacobson methodologies, Patterns. Unified Modeling Language: Introduction, Static and Dynamic Models, UML Diagrams, UML class Diagram, Use Case Diagram, UML Dynamic Modeling, Model Management: Packages And Model Organization, UML Meta - Model

UNIT III

Identifying Use Cases: Introduction, Business Object Analysis: Understanding the Business Layer, Use -Case Driven Object - Oriented Analysis: the Unified Approach, Business Process Modeling, Use – Case Model, Developing Effective Documentation, Object Analysis: Classification introduction, Classification Theory, Approaches For Identifying Classes, Noun Phrase Approach, Classes, Responsibilities and Collaborators process, Naming Classes, Identifying Object Relationships, Attributes, and Methods : Associations, Super - Sub Class Relationships, A part of Relationships- Aggregations, Class responsibility: Defining Attributes by analyzing Use Case and other UML Diagrams, Object Responsibility: Methods and messages.

UNIT IV

The Object Oriented Design Process, Object Oriented Design Axioms, Corollaries, Design patterns, Designing Classes: The Process, Class Visibility; Designing Well - Defined Public, Private and Protected protocols, Designing Classes: Refining Attributes, Designing Methods and Protocols, Packages and managing Classes, Access Layer: Object Store and Persistence: Database Management systems, Object Oriented Database Management Systems, Object relational systems, View Layer designing Interface Objects: View Layer Classes, Macro - Level Process, Micro level Process.

UNIT V

Case Study

A payroll program: structures approach, object - oriented approach. Case Study:- ViaNet Bank ATM: Identifying actors and use cases for viaNet bank ATM systems - vianet bank ATM systems packages. Case study: relationship analysis for the vianet bank atm system, Case Study: Designing the Access Layer for the ViaNet Bank ATM. Software Quality assurance: Testing Strategies, Test Cases, Test Plan, Continuous Testing, Myers Debugging Principles.

TEXT BOOKS

1. Ali Bahrami, Object Oriented Systems Development, McGraw hill,1999.
2. Booch, Object Oriented Analysis and Design Pearson Education
3. Criag Larman, Applying UML and Patterns, an Introduction to Object –Oriented Analysis and Design. Pearson Education 1998
4. Rebecca Wirfs-Brock et al: Designing Object-Oriented software, Prentice-Hall India 1990
5. Grady Booch, Unified modeling Language User Guide, Pearson Education,
6. Gamma: Design patterns: Elements of Reusable Object Oriented Software, Pearson Education
7. Shalloway, Design Patterns Explained Pearson Education
8. Martin. J. and Odell, J, object oriented methods: a Foundation, Prentice Hall, 1995.

Semester - VI	BCA	2016-2017
Core: 17	DATA MINING AND WAREHOUSING	
M16UCA17		
Credit: 3		

UNIT I

DATA MINING

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT II

ASSOCIATION RULE MINING AND CLASSIFICATION

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT III

CLUSTERING AND TRENDS IN DATA MINING

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

UNIT IV

BUSINESS ANALYSIS

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multi relational OLAP – Categories of Tools – OLAP Tools and the Internet

UNIT V**DATA WAREHOUSING**

Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools – Metadata.

Text Books

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw –Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

Reference Books

1. Pang – Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Aja, “Insight into Data Mining Theory and practice”, Eastern Economy Edition, Prentice Hall of India, 2006.
3. G.K. Gupta, “Introduction to Data Mining with Case Studies”, Eastern Economy Edition, Prentice Hall of India, 2006.
4. Daniel T. Larose, “Data Mining Methods and Models”, Wiley – Inter science, 2006.

Semester - VI	BCA	2016-2017
Core: 18	CASE TOOLS CONCEPTS AND APPLICATIONS	
M16UCA18		
Credit: 4		

UNIT I

Data Modeling: Business Growth-Organizational Model-Case Study of student MIS-What is the purpose of such Models-Understanding the business-Types of models-model development approach-the case for structural development-advantages of using a case tool. System analysis and design-what is DFD-General Rules for Drawing DFD-Difference between Logical data flow diagram and Physical data flow diagram-Software versus Information Engineering-How case tools store information.

UNIT II

Approach used to solve the problem statement: How to deal with a problem statement-Data flow diagram for Payroll System-Presentation Diagram for Payroll System-schematics of the model-Forms-Screens-Menu Screens-Data entry Screens-Report Output Format-Utilities. Installation of Ubridge and Synthesis: How to use the tools in Ubridge Synthesis for case-Installation of Ubridge Synthesis-Computer Aided Software Engineering-Getting Ubridge to work-Setup-Assign-Housekeep-The Ubridge page.

UNIT III

Introduction to Ubridge: Introduction - Main flow of the system prototyping your Report-Introducing the Novice Model of the Operation. Introducing Synthesis - Synthesis basic – Synthesis - Menu Drawing the screen-Requirement Definition-Diagram-Data Dictionary-Document-Synthesis Main Administration - Synthesis reference - importing and exporting screen.

UNIT IV

Diagram definition tool: Introduction-Starting DDT-Drawing your own Icon - Defining the connection rules-Rebuilding your icon. Object oriented methodologies: Rambaugh et.al.'s object modeling techniques-The Booch methodology –The Jacobson et.al. Methodologies-Pattern-Frame works-The Unified Approach.

UNIT V

Introduction to UML-UML Diagram-Class Diagram-Use Case Diagram-Interaction Diagram-Sequence Diagram-Collaboration Diagram-State Chart Diagram-Activity Diagram-Component Diagram-Deployment Diagram.

TEXT BOOKS

1. Case Tools Concepts and Applications, Ivan N Bayross, BPB Publications
2. Object Oriented System Development using the Unified Modeling Language, McGraw Hill International edition.

REFERENCE BOOKS

Software Engineering: A Practitioner's Approach, Roger S Pressman, McGraw Hill International Edition.

Semester - VI	BCA	2016-2017
Core: 19	BIG DATA ANALYTICS	
M16UCA19		
Credit: 4		

UNIT I

Big Data: From the business Perspective – What is Big Data? – Why Is Big Data Important? – Why IBM for Big Data? - **Big Data:** From the Technology Perspective – All about Hadoop: The History of Hadoop – Components of Hadoop – Application Development in Hadoop – Getting Your Data into Hadoop – Other Hadoop Components – Wrapping It Up.

UNIT II

InfoSphere BigInsights: Analytics for Big - Data at Rest - Administrative Tooling – Security - Enterprise Integration - Improved Workload Scheduling: Intelligent Scheduler – Adaptive MapReduce - Data Discovery and Visualization: BigSheets - Advanced Text Analytics Toolkit - Machine Learning Analytics - Large-Scale Indexing -BigInsights Summed Up.

UNIT III

IBM InfoSphere Streams: Analytics for Big Data in Motion - InfoSphere Streams Basics - Industry Use Cases for InfoSphere Streams - How InfoSphere Streams Works - What's a Stream? - The Streams Processing Language - Source and Sink Adapters - Operators - Streams Toolkits - Enterprise Class - High Availability - Consumability: Making the Platform Easy to Use - Integration is the Apex of Enterprise Class Analysis.

UNIT IV

Microsoft's Plan for Big Data: Microsoft's Hadoop Distribution - Developers, Developers, Developers - Streaming Data and NoSQL - Toward an Integrated Environment - The Data Marketplace. **Big Data in the Cloud:** IaaS and Private Clouds - Platform solutions - Amazon Web Services – Google - Microsoft - Big data cloud platforms compared. **Data Marketplaces:** What Do Marketplaces Do? – Infochimps – Factual - Windows Azure Data Marketplace – Data Market - Data Markets Compared - Other Data Suppliers.

UNIT V

The NoSQL Movement: Size, Response, Availability - Changing Data and Cheap Lunches - The Sacred Cows - Other features - In the End. **Why Visualization Matters:** A Picture Is Worth 1000 Rows - Types of Visualization - Explaining and exploring - Your Customers Make Decisions, Too - Do Yourself a Favor and Hire a Designer. **The Future of Big Data:** More Powerful and Expressive Tools for Analysis - Streaming Data Processing - Rise of Data Marketplaces.

TEXT BOOKS

- 1) **“Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”** by **Paul C. Zikopoulos, Chris Eaton Dirk, deRoos Thomas, Deutsch George, Lapis – Mc Graw Hill Companies Publication,2012, (Unit I, Unit II, Unit III).**
- 2) **“Planning for Big Data”** by **O’Reilly Radar Team, Published by O’Reilly Media,2012 (Unit IV, Unit V)**

REFERENCE BOOKS

- 1) Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
- 2) Jy Liebowitz, “Big Data and Business analytics”,CRC press, 2013.

Semester – VI	BCA	2016-2017
Core Practical : 7	PRACTICAL – VII - DATA MINING USING RAPID MINOR	
M15UCAP07		
Credit: 2		

List of Practical's

- 1.** Data Cleaning
- 2.** Data Exploration
- 3.** Data Prep
- 4.** Data Blending
- 5.** Data Cleaning
- 6.** Data Modeling
- 7.** Data Validation
- 8.** Cloud Execution
- 9.** Scheduling
- 10.** Integration

Semester – VI	BCA	2016-2017
SBEC-III	SBEC III - BUSINESS PROCESS OUTSOURCING	
M16CCAS03		
Credit: 2		

UNIT – I

BPO – Meaning – Definition – Evaluation & Recent Development – In sourcing – Outsourcing – Needs – Technical requirement – Eligibility.

UNIT – II

Call Centers – Functions – Processes – classifications – Telemarketing – Tele selling – Preparing for a Job – Approach – Preparation – Training – Selection Process.

UNIT – III

Improving Efficiency – Handling Calls – Team Player – Pleasing the Customers – Converse efficiently – Reducing stress.

UNIT – IV

Numerical aptitude – Basic Computer Skills – Type Master – Written Test – Interviews – Telephonic Interviews.

UNIT – V

Good Communicator – Ability to lead – Pleasing personality – Physical fitness – Dress Consciousness – Other Personality development.

REFERENCE BOOKS

1. Fundamentals of Computer Science & Communication engineering by Alexis Leon, Mathew Leon.
2. Quantitative Aptitude by R.S. Agarwal
3. English Conversation Practice by Grand Tailor
4. English Course by Lingua Phone
5. Adult Faculty by Kev Nair

Semester – VI	BCA	2016-2017
SBEC-IV	SBEC IV - DESKTOP PUBLISHING	
M16CCAS04		
Credit: 2		

Unit I

Adobe PageMaker: Using the toolbox-Viewing pages- Working with text and graphics - Moving between pages - Correcting mistakes- Creating a publication from scratch - Setting up pages - Using Master pages – Using the zero point - Nonprinting guides - Setting up ruler guides – Numbering pages.

Unit II

Adobe PageMaker: Creating text blocks - Formatting text - Duplicating an object- Control palette basics - Grouping and ungrouping objects – Locking objects - Aligning and distributing objects - Rotating an object – Reflecting an object - Skewing an object - Cropping a graphic - Printing in PageMaker.

Unit III

CorelDraw: CorelDraw terminology and concepts - application window - workspace tools -working with template - zooming and panning – working with views - lines, outlines and Brush Strokes.

Unit IV

CorelDraw: Formatting lines and Outlines - Drawing rectangles and squares - Applying uniform fills - Applying pattern fills.

Unit V

CorelDraw: Working with color - working with custom color palettes - understanding color models - using Special Effects - Using Text in Drawing - Adding bitmapped images - Print a drawing.

TEXT BOOK

1. Vishnu Priya Singh and Meenakshi Singh, “DTP Course Book”, CompuTech Publication Ltd., New Delhi, 2nd Edition, 2011.

REFERENCE BOOK

Shirish Chavan, “Rapidex DTP Course”, Unicorn Books Pvt. Ltd., New Delhi-02, Revised and Enlarged Edition - 2005.

Semester - VI	BCA	2016-2017
Elective: II	INTERNET OF THINGS	
M16UCAE05		
Credit: 3		

Unit I

M2M to IoT: The Vision-Introduction - From M2M to IoT - M2M towards IoT-the global context - A use case example - Differing Characteristics.

Unit II

M2M to IoT – A Market Perspective: Introduction - Some Definitions -M2M Value Chains - IoT Value Chains - An emerging industrial structure for IoT - The international driven global value chain and global information monopolies. **M2M to IoT- An Architectural Overview:** Building architecture - Main design principles and needed capabilities - An IoT architecture outline - standards considerations.

Unit III

M2M and IoT Technology Fundamentals: Devices and gateways - Local and wide area networking - Data management - Business processes in IoT - Everything as a Service (XaaS) - M2M and IoT Analytics - Knowledge Management.

Unit IV

IoT Architecture-State of the Art: Introduction - State of the art - **Architecture Reference Model:** Introduction - Reference Model and architecture - IoT reference Model. **IoT Reference Architecture:** Introduction - Functional View - Information View - Deployment and Operational View - Other Relevant architectural views.

Unit V

Real-World Design Constraints: Introduction - Technical Design constraints-hardware is popular again - Data representation and visualization - Interaction and remote control. **Industrial Automation-:** Service-oriented architecture-based device integration. SOCRADES: realizing the enterprise integrated Web of Things - IMC-AESOP: from the Web of Things to the Cloud of Things - **Commercial Building Automation-** Introduction, Case study: phase one-commercial building automation today.

Textbook

Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **“From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”**, 1st Edition, Academic Press, 2014.

Reference Books

1. Vijay Madiseti and Arshdeep Bahga, **“Internet of Things (A Hands-on-Approach)”**, 1st Edition, VPT, 2014.
2. Francis daCosta, **“Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”**, 1st Edition, Apress Publications, 2013

Semester - VI	BCA	2016-2017
Elective: II	CLIENT / SERVER TECHNOLOGY	
M16UCAE06		
Credit: 3		

UNIT I

Client / Server Computing–Advantages of Client /Server Computing - Technology Revolution – Connectivity –Ways to improve Performance –How to reduce network Traffic.

UNIT II

Components of Client / Server Applications – The Client: Role of a Client – Client Services – Request for Service. Components of Client / Server Applications – The Server: The Role of a Server – Server Functionality in Detail – The Network Operating System – What are the Available Platforms – The Server Operating system.

UNIT III

Components of Client / Server Applications –Connectivity: Open System Interconnect – Communications Interface Technology –Inter-process communication –WAN Technologies.

UNIT IV

Components of Client / Server Applications –Software. Components of Client / Server Applications –Hardware

UNIT V

Components of Client / Server applications –Service and Support: System Administration. The Future of Client / Server Computing: Enabling Technologies –Transformational Systems.

TEXT BOOK

Client / Server Computing, Patrick Smith, Steve Guenferich, 2nd edition, PHI. (Chapters 1-8 &10)

REFERENCE BOOKS

1. Robert Orfali, Dan Harkey, Jeri Edwards: The Essential Client/Server Survival Guide, 2nd edition, Galgotia Publications.
2. Dewire and Dawana Travis, Client/ Server Computing, TMH

Semester - VI	BCA	2016-2017
Elective: II	MULTIMEDIA SYSTEMS	
M16UCAE07		
Credit: 3		

UNIT-I

Introduction to Multimedia and Hardware Devices: What is Multimedia? - Definitions - Where to use Multimedia. **Introduction to Making Multimedia:** The Stages of a Project - What you Need. **Hardware Devices:** Macintosh Verses Windows - Networking Macintosh and Windows - Connections - Memory and Storage Devices - Input Devices - Output Hardware - Communication Devices.

UNIT-II

Multimedia Text and Sound: Text: The Power of Meaning - About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext. **Sound:** The Power of Sound - Multimedia System Sounds - Digital Audio - Making MIDI Audio - Audio File Formats - MIDI Versus Digital Audio - Adding Sound to Your Multimedia Project - Music CDs - Production Tips.

UNIT-III

Multimedia Images, Animation and Video: Images: Making Still Images - Color - Image File Formats **Animation:** The Power of Motion - Principles of Animation – Animation Techniques - Animation by Computer - Making Animations That Work **Video:** Using Video - How Video Works - Analog Display Standards - Digital Display Standards - Digital video - Video Recording and Tape Formats - Shooting and Editing Video - Optimizing Video Files for CD-ROM.

UNIT-IV

Multimedia Basic Software Tools and Storage and Retrieval Technologies: Basic software Tools: Text Editing and Word Processing Tools - OCR Software - Painting and drawing Tools - 3-D Modeling and Animation Tools - Image-Editing Tools - Sound Editing Tools - Animation, Video and Digital Movie Tools - Helpful Accessories. **Storage and Retrieval Technologies:** Magnetic Media Technology – Optical Media – Worm Optical drives – Hierarchical Storage Management – cache Management for Storage Systems.

UNIT-V

Multimedia and the Internet: The Internet and How it Works: Internet History - Internetworking - Connections - Internet Services - The World Wide Web and HTML - Dynamic WebPages and XML - Multimedia on the Web. **Tools for the World Wide Web:** Web Servers - Web Browsers - Search Engines - Web Page Makers and Site Builders - Plug-ins and Delivery Vehicles - Beyond HTML. **Designing for the World Wide Web:** Working on the Web - Text for the Web - Images for the Web - Sound for the Web - Animation for the Web.

TEXT BOOKS

2. Multimedia Making It Work – Seventh Edition by Tay Vaughan – Tata McGraw-Hill Edition 2008.
3. Andliegh Pk and Thakrar K “Multimedia Systems”, Addison Wesley Longman.

REFERENCE BOOKS

1. Multimedia Technology and Applications - David Hillman - Galgotia Publications Pvt. Ltd, 1998.
2. Multimedia in Action – James E. Shuman – Vikas Publishing House.
3. Multimedia an Introduction – John Villamil – Casanova, Louis Moliva, PHI.

Semester - VI	BCA	2016-2017
Elective: II	E-LEARNING	
M16UCAE08		
Credit: 3		

UNIT I

Designing E-Learning – What is E-Learning?- What is E-Learning Design? – Design quickly and reliably – Absorb Type Activities – Presentations – Sharing Stories – Readings – Field Trips.

UNIT II

Do Type Activities – Practice Activities – Discovery Activities – Games and Simulations – Connect type activities – Ponder activities – Job aids – Research activities – Original work activities.

UNIT III

Tests – Select the right type of question – Write effective questions – Combine questions effectively – Give meaningful feedback –Perfect your testing – Explain the test – Consider alternative to formal tests.

UNIT IV

Topics – Design the Components of the topic – Design reusable topics – Lessons - Way of organizing lessons – Designing lessons as objects – Strategic Designs – Choose the kind of e-Learning - follow quality standards.

UNIT V

Design for the Virtual Classroom – Select and use collaboration tools – Conduct online meetings – Guide discussion activities – Manage virtual courses – Visual display – Window characteristics – Legibility – Layout.

Text Book

1. E-Learning by Design by William Horton – 2006 John Willey & Sons.