

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 SCIENCE
CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR B.Sc. COMPUTER SCIENCE

FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2016 - 2017 ONWARDS

MAHENDRA ARTS & SCIENCE COLLEGE
(Autonomous)
KALIPPATTI, NAMAKKAL (Dt.) – 637501.

REGULATIONS FOR B.Sc. (COMPUTER SCIENCE) DEGREE COURSE
with Semester System and CBCS Pattern
(Effective from the academic year 2016 - 2017)

1. OBJECTIVE OF THE COURSE

The three year degree program addresses the need for advanced training in information systems and computing theory among the professionals in the computer industry with minimal training in the field of computer science. It is designed to enable the students to acquire the necessary background in computer science in preparation for advanced studies; to gain knowledge and skills in computer science as applied in their field of work and to develop and improve their techniques in the practice of proper design and development of application software.

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 there to by the College Academic Council subjected to such conditions are permitted to appear and qualify for the **B.Sc. Computer Science** 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 Science** consists of three academic years divided into six semesters with two semesters in one academic year comprising 90 working days in 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. The syllabus for various subjects is clearly demarcated into five viable UNITS in each paper / subject. And the subject as 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 time duration for each paper at the end of every semester. The candidate failing in examinations are permitted to reappear 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, 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 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 assignment submission.

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.

Two 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

10. CLASSIFICATION OF SUCCESSFUL CANDIDATES

- **FIRST CLASS WITH DISTINCTION** – 75% and above at the first appearance
 - **FIRST CLASS** - 60% and above
 - **SECOND CLASS** - 50% to 59%

11. COMMENCEMENT OF REGULATIONS

These regulations shall take effect for the academic year 2015 – 2016, i.e., for students who are to be admitted in the first year of the course during the academic year 2015 – 2016.

Credit Distribution

Semester	No. of Credits						Total Credits	Max. Marks
	I	II	III	IV	V	VI		
Part I: Tamil	3	3	3	3			12	400
Part II: English	3	3	3	3			12	400
Part III: Major	7	7	8	8	16	12	58	1500
Part III: Elective					3	3	6	200
Part III: Core Practical	2	2	2	2	2	2	12	600
Part III: Project	-	1	-	1	-	2	4	300
Part III: Allied	4	4	4	4			16	400
Part III: Allied Practical			2	2			4	200
Part IV: Value Education	2	-					4	100
Part IV: NMEC			2	2			4	200
Part IV: SBEC					4	4	8	400
Part IV: Environmental Studies	-	2	-	-	-	-	-	100
Part V: Value Added Course	1	1	1	1	-	-	4	400
Part V: Extension Activities	-	-	-	-	-	1	1	--
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 : Computer Fundamentals & Microprocessor	M16UCS01	4	3	25	75	100	3
4		Core II: Programming in C	M16UCS02	5	3	25	75	100	4
5		Allied I: Mathematics	M16UMAA03	5	3	25	75	100	4
6		Core Practical I: Programming in C	M16UCSP01	3	3	40	60	100	2
7	Part IV	Value Education: Yoga	M16UVE01	1	3	25	75	100	2
8	Part V	Value Added I: 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	M16UCS03	4	3	25	75	100	3
4		Core IV: Object Oriented Programming with C++	M16UCS04	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 using C++	M16UCSP02	3	3	40	60	100	2
7	Part IV	Environmental Studies	M16UES01	1	3	25	75	100	2
8	Part V	Value Added - II: Communicative English-II	M16UVA04	2	3	100	-	100	1
9	Part III	Project – I	M16UCSPR1	-	3	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 I	Tamil-III / Hindi-III / French-III / Malayalam – III / Telugu -III	M16UF TA03/ HI03 / FR03 / MA03 / TE03	5	3	25	75	100	3
2	Part II	English – III	M16UFEN03	5	3	25	75	100	3
3	Part III	Core V: Design and Analysis of Algorithms	M16UCS05	4	3	25	75	100	4
4		Core VI: Java Programming	M16UCS06	4	3	25	75	100	4
5		Allied III : Applied Electronics / Principles of Accountancy	M16UPHA03 / M16UCCA01	4	3	25	75	100	4
6		Core: Practical – III: Java	M16UCSP03	2	3	40	60	100	2
7		Allied : Practical I– Digital Electronics / Accountancy (Tally)	M16UPHAP02 / M16UCCAP01	2	3	40	60	100	2
8	Part IV	NMEC – I: Applied Statistics	M16USTN01	2	3	25	75	100	2
9	Part V	Value Added III : Quantitative Aptitude	M16UVA05	2	3	100	-	100	1
Total				30		330	570	900	25

S. No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
Semester IV									
1	Part I	Tamil-IV / Hindi-IV / French-IV / Malayalam – IV / Telugu -IV	M16UFTA04/ HI04 / FR04 / MA04 / TE04	5	3	25	75	100	3
2	Part II	English – IV	M16UFEN04	5	3	25	75	100	3
3	Part III	Core VII: Operating System	M16UCS07	4	3	25	75	100	4
4		Core VIII: Relational Data Base Management System	M16UCS08	4	3	25	75	100	4
5		Allied IV : Advanced Electronics / Modern Banking	M16UPHA04 / M16UCCA01	4	3	25	75	100	4
6		Core: Practical – IV: Oracle	M16UCSP04	2	3	40	60	100	2
7		Allied : Practical II– Applied Electronics / Commerce Practical	M16UPHAP03 / M16UCCA01	2	3	40	60	100	2
8	Part IV	NMEC – II: Business Communication	M16UCMN04	2	3	25	75	100	2
9	Part V	Value Added IV: Verbal and Logical Reasoning	M16UVA06	2	3	100	-	100	1
10	Part III	Industrial Literacy	M16UCSPR2	-	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 IX: Software Engineering	M16UCS09	5	3	25	75	100	4
2		Core X: Programming in Python	M16UCS10	5	3	25	75	100	4
3		Core XI: Web Technology	M16UCS11	5	3	25	75	100	4
4		Core XII: Computer networks	M16UCS12	4	3	25	75	100	4
5		Elective I:		4	3	25	75	100	3
6		Core: Practical – V: Web Technology using PHP	M16UCSP05	3	3	40	60	100	2
7	Part IV	SBEC –I: Office Automation	M16UCSS01	2	3	25	75	100	2
8		SBEC –II: Mobile Application Development	M16UCSS02	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 XIII: Data Mining and Warehousing	M16UCS13	6	3	25	75	100	4
2		Core XVI: MAT Lab Programming	M16UCS14	6	3	25	75	100	4
3		Core XV: Principles of Cloud Computing	M16UCS15	6	3	25	75	100	4
4		Elective II		5	3	25	75	100	3
5		Core: Practical – VI: Data Mining using Rapid Miner	M16UCSP06	3	3	40	60	100	2
6	Part IV	SBEC –III: Business Process Outsourcing	M16UCSS03	2	3	25	75	100	2
7		SBEC –IV: Desktop Publishing	M16UCSS04	2	3	25	75	100	2
8	Part III	Project II	M16UCSPR3	-	3	25	75	100	2
9	Part V	Extension Activities	M16UEX01	-	-	-	-	-	1
Total				30		215	585	800	24

Semester I	B.Sc. Computer Science	2016-2017
Core: 1	COMPUTER FUNDAMENTALS & MICROPROCESSOR	
M16UCS01		
Credit: 3		

UNIT-I

Introduction to computers: Introduction - Types of Computers-Characteristics of Computer - Five Generations of Modern Computers - Classification of Digital Computer Systems - Number System.

UNIT-II

Anatomy of a Digital Computer - Memory Units - Input Devices - Output Devices - Auxiliary Storage Devices.

UNIT-III

Computer software: Programming Languages - Operating Systems - Computer networks.

UNIT-IV

Introduction to Telecommunications - Introduction to Word Processing - Internet - Electronic mail.

UNIT-V

Microprocessors, Microcomputers, and Assembly Language: Microprocessors - Microprocessor as a CPU (MPU) - Organization of a Microprocessor Based System.

Microprocessor instruction set and computer Languages: Machine Language - 8085 Machine Language - 8085 Assembly Language - High-Level Language.

Microprocessor Architecture and Micro Computer Systems: Microprocessor Architecture and its Operations.

Memory: Flip-Flop or Latch as a Storage Element - Memory Map and Addresses - Memory and Instructions Fetch.

8085 Microprocessor Architecture and Memory Interfacing: The 8085 MPU - A Detailed Look at the 8085 MPU Architecture - Decoding and Executing an Instruction.

TEXT BOOKS

1. "Computer Science and communication Engineering", Alexis Leon Mathews Leon co-published by Leon Press and Vikas publishing house Pvt Ltd. (UNIT I ,II ,III, IV).
2. "Microprocessor Architecture Programming and Application with the 8085", Ramesh Gaonkar, 5th Edition. (UNIT V).

REFERENCE BOOK

1. Thomas C Bartee, "Digital Computer Fundamentals", Tata Mcgraw hill 6th Edition.

Semester I	B.Sc. Computer Science	2016-2017
Core: 2	PROGRAMMING IN C	
M16UCS02		
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-Comparision 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

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	B.Sc. Computer Science	2016-2017
Core Practical I	PROGRAMMING IN C	
M16UCSP01		
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	B.Sc. Computer Science	2016-2017
Core: 3	DATA STRUCTURES	
M16UCS03		
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	B.Sc. Computer Science	2016-2017
Core: 4	OBJECT ORIENTED PROGRAMMING WITH C++	
M16UCS04		
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	B.Sc. Computer Science	2016-2017
Core Practical: II	Practical II - DATA STRUCTURES USING C++	
M16UCSP02		
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	B.Sc. Computer Science	2016-2017
Core: 5	DESIGN AND ANALYSIS OF ALGORITHMS	
M16UCS05		
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	B.Sc. Computer Science	2016-2017
Core: 6	JAVA PROGRAMMING	
M16UCS06		
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	B.Sc. Computer Science	2016-2017
Core: Practical III	Practical III: JAVA	
M16UCSP03		
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 - IV	B.Sc. Computer Science	2016-2017
Core: 7	OPERATING SYSTEM	
M16UCS07		
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	B.Sc. Computer Science	2016-2017
Core: 8	RELATIONAL DATABASE MANAGEMENT SYSTEMS	
M16UCS08		
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 – De normalization – **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	B.Sc. Computer Science	2016-2017
Core Practical: IV	Practical IV- Oracle	
M16UCSP04		
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	B.Sc. Computer Science	2016-2017
Core: 9	SOFTWARE ENGINEERING	
M16UCS09		
Credit: 4		

UNIT I

Introduction: Evolution-from an art form to an Engineering discipline – Software Development projects – Exploratory style of software development – Emergence of software engineering.

Software Life cycle models: A few basic concepts – Classical waterfall model – Iterative waterfall model- V-Model - Prototype model – Incremental development model - Evolutionary model – Spiral model.

UNIT II

Software project Management: Software project management complexities - Responsibilities of Software Project Manager – Project Planning – Matrices for project size estimation – Project estimation techniques –Staffing level estimation – Scheduling – organization and team structures – Staffing – Risk management – Software configuration management.

Requirement analysis and specification: Requirements gathering and analysis – software requirement specification (SRS) – Formal system specification.

UNIT III

Software design: How to characterize a good software design? – Cohesion and coupling – Layered arrangement of modules – Approaches to Software design.

Function oriented software design: Overview of SA/SD methodology – Structure analysis –Developing the DFD model of a system - Structure Design – Detailed Design – Design review.

UNIT IV

User Interface Design: Characteristics of User Interface – Basic concepts – Types of user interfaces – components – Fundamentals of computer based GUI development –A User interface design methodology

Coding and Testing: Coding - Code Review – Software documentation - Testing – Black box testing – White box testing – Debugging – Program analysis tools – Integration testing – System testing.

UNIT V

Software Reliability and Quality management: Software Reliability – Statistical testing – Software quality – Software Quality Management System.

Computer Aided Software engineering : Case environment – Case Support in software life cycle- Other Characteristics of case tools – Towards second generation case tool – Architecture of case environment.

Software Maintenance: Characteristics of software maintenance – Software Reverse Engineering – Software Maintenance process Models – Estimation of Maintaining cost – **Software reuse:** Basic Issue in any reuse program – A Reuse approach – Reuse at organization level - Emerging trends.

TEXT BOOK

Fundamentals of Software Engineering, RAJIB MALL, Prentice Hall of India Private Limited, Fourth Edition - 2014

Semester - V	B.Sc. Computer Science	2016-2017
Core: 10	PROGRAMMING IN PYTHON	
M16UCS10		
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 - V	B.Sc. Computer Science	2016-2017
Core: 11	WEB TECHNOLOGY	
M16UCS11		
Credit: 4		

UNIT – I

Internet: Introduction to Internet – History of the Internet – Web Concepts – Internet Standards..**Internet Protocols:** Introduction – Internet Protocols – Host Name –Internet Applications and Application Protocols - **HTML:** Introduction: SGML-HTML Document – Head Section - Body Section – HTML Forms.

UNIT – II

JavaScript: Introduction – Language Elements – Objects of JavaScript - **VBScript:** Introduction: Variables – Operators – Procedures – Conditional Statements –Looping Constructs- Objects and VBScript – **DHTML:** Introduction – Cascading Style Sheets (CSS) – DHTML Document Object Model and Collections – Event Handling – Filters and Transitions – Data Binding.

UNIT – III

Common Gateway Interface(CGI) : Introduction: Server-Browser Interaction - CGI Script Structure – The CGI.pm Module – CGI Environment Variables – Processing Forms – Sending Mail – Validating the Form Data – Handling Checkboxes – CGI Security Issues. **Servlets:** The Servlet Life Cycle – Servlet API – A Simple Servlet – Cookies – Session Tracking.

UNIT – IV

Java Server Pages (JSP): Introduction: Advantages of JSP – Developing First JSP – Components of JSP – JSP Sessions – Cookies. **Active Server Pages:** Introduction – Advantages of ASP – First ASP Script – Variables and Constructs – Subroutines – ASP Cookies – ASP Objects – Connecting to Data with ASP.

UNIT-V

Introducing PHP - Basic development Concepts - Creating first PHP Scripts - Using Variable and Operators - Storing Data in variable - **Controlling Program Flow:** Writing Simple Conditional Statements - Repeating Action with Loops - Working with String and Numeric Functions - **Using Functions and Classes:** Creating User-Defined Functions - Creating Classes - Working with Files and Directories: Reading Files - Writing Files - Processing Directories.

TEXT BOOKS

1. “Web Technology A Developer’s Perspective”, N.P.Gopalan & J.Akilandeswari, PHI Learning Private Limited, New Delhi- 2014.
2. PHP A Beginner's Guide, Vikram Vas Want, Tata McGraw-Hill

REFERENCE BOOKS

1. Web Technologies TCP/IP to Internet Applications Architectures – AchyutS Godbole & AtulKahate, 2007, TMH.
2. “The Complete Reference Java2”, Patrick Naughton, Herbert Schildt, Tata Mc-Graw Hill Publications, 3rd Edition, New Delhi.
3. The PHP Complete Reference , Steven Holzner, Tata McGraw-Hill Edition

Semester - V	B.Sc. Computer Science	2016-2017
Core: 12	COMPUTER NETWORKS	
M16UCS12		
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

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

Semester - V	B.Sc. Computer Science	2016-2017
Core Practical : V	Practical -V - WEB TECHNOLOGY USING PHP	
M16UCSP05		
Credit: 2		

List of Practical's

1. To write a HTML code for Loan Calculation
2. To write HTML program to validate Student Registration Form using JavaScript
3. To write a HTML code for image map.
4. To write a HTML program for creating simple Web Page using DHTML.
5. Write a Java Servlet program to create a session and display the various informations like(Last Accessed time, Modified time, Expiration)
6. To write a HTML program for Online Examination using JSP
7. Write a JSP program to implement the Telephone Directory
8. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.
9. To write a PHP program is using Array, Control Structures, Looping structures and form handling.
10. To write a PHP program using storing and retrieving book information.

Semester - V	B.Sc. Computer Science	2016-2017
SBEC-I	SBEC I - Office Automation	
M16UCSS01		
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	B.Sc. Computer Science	2016-2017
SBEC-II	SBEC II - Mobile Application Development	
M16UCSS02		
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	B.Sc. Computer Science	2016-2017
ELECTIVE: I	PRINCIPLES OF HUMAN COMPUTER INTERACTION	
M16UCSE01		
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	B.Sc. Computer Science	2016-2017
ELECTIVE: I	COMPUTER GRAPHICS	
M16UCSE02		
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-Chromaticity Detection Functions.

Color Models and Color Applications: Properties of Light-Standard Primaries and the 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	B.Sc. Computer Science	2016-2017
ELECTIVE: I	OPEN SOURCE SOFTWARE DEVELOPMENT	
M16UCSE03		
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	B.Sc. Computer Science	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	B.Sc. Computer Science	2016-2017
Core: 13	DATA MINING AND WAREHOUSING	
M16UCS13		
Credit: 4		

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	B.Sc. Computer Science	2016-2017
Core: 14	MAT LAB PROGRAMMING	
M16UCS14		
Credit: 4		

Unit I

Introduction to MATLAB: Getting into MATLAB - The MATLAB Desktop Environment - Variables and Assignment Statements - Expressions - Characters and Encoding - Vectors and Matrices.

Unit II

Input / Output Scripts: MATLAB Scripts - Input and Output - Scripts with Input and Output - Scripts to Produce and Customize Simple Plots - Introduction to File Input / Output (load and Save) - User defined Functions that Return a Single Value.

Unit III

Selection Statements: Relational Expressions - The If Statement - The If-Else Statement - Nested If-Else Statements- The Switch Statement - The Menu Function - The Is Functions in MATLAB Private Functions, and Nested Functions. **Loop Statements:** The For Loop - Nested For Loops - While Loops.

Unit IV

Vectorized Code: Loops with Vectors and Matrices - Operations on Vectors and Matrices - Vectors and Matrices as Function Arguments - Logical Vectors - Vectorizing Code - Timing. **String Manipulation:** Creating String Variables - Operations on Strings - The Is Functions for Strings - Converting Between String and Number Types.

Unit V

Data Structures: Cell Arrays and Structures - Cell Arrays - Structures. **Advanced File Input and Output:** Lower-Level File I/O Functions - Writing and Reading Spreadsheet Files - Using MAT-Files for Variables. **Advanced Plotting Techniques:** Plot Functions - Animation - Three Dimensional Plots - Customizing Plots -Handle Graphics and Plot Properties - Plot Applications.

Text Book

1. MATLAB A Practical Introduction to Programming and Problem Solving - Stormy Attaway, Second Edition, 2012 - ButterWorth-Heinemann.

Reference Book

1. MATLAB Programming for Engineers – Stephen J. Chapman – 4th Edition, 2008 – Thomson.

Semester - VI	B.Sc. Computer Science	2016-2017
Core: 15	PRINCIPLES OF CLOUD COMPUTING	
M16UCS15		
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 - VI	B.Sc. Computer Science	2016-2017
Core Practical : VI	Practical -VII – DATA MINING USING RAPID MINOR	
M16UCSP06		
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	B.Sc. Computer Science	2016-2017
SBEC-III	BUSINESS PROCESS OUTSOURCING	
M16UCSS03		
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	B.Sc. Computer Science	2016-2017
SBEC-IV	DESKTOP PUBLISHING	
M16UCSS04		
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

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

Semester - VI	B.Sc. Computer Science	2016-2017
Elective - II	INTERNET OF THINGS	
M16UCSE05		
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 Madisetti 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	B.Sc. Computer Science	2016-2017
Elective - II	CLIENT / SERVER TECHNOLOGY	
M16UCSE06		
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

1. 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	B.Sc. Computer Science	2016-2017
Elective - II	MULTIMEDIA SYSTEMS	
M16UCSE07		
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

1. Multimedia Making It Work – Seventh Edition by Tay Vaughan – Tata McGraw-Hill Edition 2008.
2. 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	B.Sc. Computer Science	2016-2017
Elective - II	E-LEARNING	
M16UCSE08		
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.