Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

Revised Syllabus of

Computer Application (optional)

Semester wise

[Effective from 2009-10]

SUBJECT : Comp. App.(opt.) **Semester : I** **Hours/week : 3**
Code : CA101 **Credit : 3**

Computer Fundamentals

Objective: *To impart basic introduction to computer hardware components, computer numbering, how the CPU works, fundamental about algorithms and flowchart as well as different type of software.*

Sr. No	Topic	Ref.	No. of Lect.
1.	**Fundamentals of Computer System**		**3**
	• Introduction.	1/1	
	• Characteristics & features of Computers.		
	• Components of Computers.		
	• Organization of Computer.		
2.	**Data Representation**		**12**
	• Introduction to Number System	1/3	4
	o Decimal Number System		
	o Binary Number System		
	o Hexadecimal Number System		
	• Conversion within Numbers Systems	1/3	4
	• Arithmetic Operation on Binary and Hexadecimal Numbers		
	• Normalized Floating point Number	2/2	4
	• Representation of Character in Computers		
	• Representation of Integer Numbers		
	• Representation of Fraction Numbers		
	• Hexadecimal Representation of Number		
3.	**Algorithm and Flowcharts**		**6**
	• Algorithm	2/1	3
	o Definition		
	o Characteristics		
	o Advantages and disadvantages		
	o Examples		
	• Flowchart	3/3	3
	o Definition		
	o Define symbols of flowchart	3/ 4	
	o Advantages and disadvantages		
	o Examples		
4.	**Computer Generation & Classification**		**3**
	• Generation of Computers : First to Fifth	2/12	
	• Classification of Computers		
	• Distributed & Parallel computers		
5.	**Computer Languages**		**3**
	• Types of Programming Languages	2/9	
	o Machine Languages		
	o Assembly Languages		
	o High Level Languages		
	• Assembler, Linker, Loader, Interpreter & Compiler.	2/9	

6. Computer Memory **3**

- Memory Cell & Organization 2/4
- Types of Memory (Primary And Secondary) 2/4
  - RAM
  - ROM
  - PROM
  - EPROM
  - Secondary Storage Devices (FD, CD, HD, Pen drive, DVD, Tape Drive, DAT)

7. I/O Devices **3**

- Input Devices : 1/4
  - Touch screen , OMR, OBR , OCR, Light pen
- Output Devices : 1/4
  - Scanners, Digitizers, Plotters, LCD
  - Plasma Display, Printers

8. Processor **6**

- Structure of Instruction 2/5
- Description of Processor
- Processor Features
- RISC & CISC

9. Operating system Concepts **6**

- Why Operating System 2/10 2
- Functions of Operating System
- Types of Operating System 2/10 4
  - Batch O.S.
  - Multiprogramming O.S.
  - Time Sharing O.S
  - Personal Computers O.S.
  - Network O.S.

Core Reference:

1. Fundamentals of Information Technology
   By Chetan Srivastava, Kalyani Publishers
2. Fundamentals of Computers
   By V.Rajaraman, PHI Publication , IVth Edition.
3. Fundamentals of Programming
   By Raj K.Jain, S.Chand Publication

Additional Reference:

1. Computer Today
   By Suresh K. Basandra, Galgotia Publication,Updated Edition
2. Computer Fundamental
   By B.Ram, BPB Publication.

Digital Electronics.

Objective: *To impart basic knowledge in digital logic and circuits and to introduce basic concepts of data communications. Student will be able to learn basic concepts of digital logic and the design of basic logic circuits using commonly used combinational and sequential circuits*

Sr. No	Topic	Ref.	No. of Lect.
1	**Number Systems and Arithmetic**	1/1	**10**
	Decimal Number System & Binary Number System		1
	Decimal to Binary conversion(Double-dabble method only)		1
	Binary to Decimal Conversion		1
	Binary Arithmetic : Binary addition, subtraction, multiplication & division		2
	Hexadecimal number system , Hexadecimal to binary, binary to Hexadecimal, Hexadecimal to decimal conversion		2
	Hexadecimal arithmetic: Addition, subtraction, multiplication & division		2
	Binary subtraction using 1' complement, 2's complement method		1
2	**Boolean Algebra and Logic Gates**	1/3	**7**
	Postulates of Boolean Algebra		1
	Theorems of Boolean Algebra: Complementation , commutative, AND, OR, Associative,Distributive,Absorption laws , De morgan's theorems		2
	Reducing Boolean expressions		1
	Logic Gates : AND, OR, NOT, Ex-OR, Ex-NOR		1
	NAND as Universal building block		1
	Logic diagrams of Boolean expressions Boolean expressions for logic diagrams		1
3	**Minimization Techniques**	1/5	**5**
	Introduction , Minterms and Maxterms		1
	K-Map, K-map for 2 variables		1
	K-map for 3 variables		1
	K-map for 4 variables		2
4	**Combinational and Arithmetic Logic Circuits**	1/6	**7**
	Half Adder & Full Adder		1
	Binary parallel Adder		1
	Half Subtractor, Full Subtractor		1
	Adder/Subtractor in 2's complement system		1
	BCD to Decimal decoder		1
	2 : 4 demultiplexer		1
	4 line to 1 line multiplexer		1

5	**Flip Flops**	1/7	**6**
	Introduction : RS FF		1
	Clocked RS FF, D FF		1
	Triggering, preset and clear		1
	JK FF , T FF , Race around condition		2
	Master slave FF		1
6	**Counters**	1/8	**7**
	Introduction : Asynchronous/ ripple counter		1
	Modulus Counter , MOD-12 counter		1
	Synchronous counter : Synchronous serial & synch parallel counter		2
	BCD counter		1
	Ring counter		1
	Johnson counter		1
7	**Shift Registers**	1/9	**3**
	Introduction, Buffer register		1
	Serial- in serial -out Serial-in parallel-out		1
	Parallel-in serial-out, parallel-in paralle-out		1

Core Reference:

1. Digital Electronics and Micro-Computers – R.K.Gaur , Dhanpat Rai Publication

Additional Reference:

1. Digital Electronics and Logic Design – N.G.Palan, Technova Publication

Office Lab

Objective: To impart the student hands on practice so that students should be able to: *Create, Save, Copy, Delete, Organize various types of files and manage the desk top in general, use a standard word and spread-sheet processing package exploiting popular features.*

- **GUI Operating System :** Mouse Practice, Starting, Login, Shutdown, Exploring Directories, Resizing, Moving, Minimizing, closing of software windows, familiarization with file icons, Launching Applications, Deleting, Renaming files, Managing Directories, Searching for files, Using Accessories.
- **Web Browser:** Basic Browsing, Buttons: forward, backward, home, adding to favorites, stop, save, save as, Saving an Image from the Web, printing, Specifying a Home Page, **Browsing**: Using Web URLs, Anatomy of a URL, Membership Websites: Signing up for email service, **Searching:** Academic Search on the web**.**
- **Word Processing Tool**: Menus, Shortcut menus, Toolbars, Customizing toolbars, Creating and opening documents, Saving documents, Renaming documents, Working on multiple documents, Close a document ; **Working With Text** :Typing and inserting text, Selecting text, Deleting text, Undo, Formatting toolbar, Format Painter, Formatting Paragraphs: Paragraph attributes, Moving, copying, and pasting text, The clipboard, Columns, Drop caps; **Styles** : Apply a style, Apply a style from the style dialog box, Create a new styles from a model, Create a simple style from the style dialog box, Modify or rename a style, Delete a style; **Lists** : Bulleted and numbered lists, Nested lists, Formatting lists **Tables** :Insert Table button, Draw a table, Inserting rows and columns, Moving and resizing a table, Tables and Borders toolbar, Table properties **Graphics** :Adding clip art, Add an image from a file, Editing a graphic, AutoShapes; **Spelling and Grammar**: AutoCorrect, Spelling and grammar check, Synonyms, Thesaurus; **Page Formatting**: Page margins, Page size and orientation, Headers and footers, Page numbers, Print preview and printing.
- **Spreadsheet Basics**: Screen elements, Adding and renaming worksheets, The standard toolbar - opening, closing, saving, and more; **Modifying A Worksheet**, Moving through cells, Adding worksheets, rows, and columns, Resizing rows and columns, Selecting cells, Moving and copying cells,, Freeze panes; **Formatting Cells:** Formatting toolbar, Format Cells dialog box, Dates and times; **Formulas and Functions:** Formulas, Linking worksheets, Relative, absolute, and mixed referencing, Basic functions, Function Wizard, Autosum, **Sorting and Filling:** Basic ascending and descending sorts, Complex sorts, Autofill; Alternating text and numbers with Autofill, Autofilling functions; Graphics; Adding clip art; Add an image from a file; Editing a graphics; AutoShapes; **Charts:** Chart Wizard; Resizing a chart; Moving a chart, Chart formatting toolbar; **Page Properties and Printing:** Page breaks, Page orientation, Margins, Headers, footers, and page numbers, Print Preview, Print; Keyboard Shortcuts.

- **Presentation Tool**: AutoContent Wizard, Create a presentation from a template, Create a blank presentation, Open an existing presentation, AutoLayout, Presentation Screen: Screen layout, Views, Working with Slides: Insert a new slide, Applying a design template, Changing slide layouts, Reordering slides, Hide slides, Create a custom slide show, Edit a custom slide show Adding Content: Resizing a text box, Text box properties, Delete a text box, Bulleted lists, Numbered lists, Adding notes, Video and Audio Working with Text: Adding text, Editing options, Formatting text, Replace fonts, Line spacing, Change case Spelling check Color & Background: Color schemes, Backgrounds, Graphics, Adding clip art, Adding an image from a file, Editing a graphic, AutoShapes, WordArt Slide Effects: Action buttons, Slide animation, Animation preview, Slide transitions, Slide show options, Master Slides, Slide master, Header and footer, Slide numbers, Date and time Saving and Printing, Save as a web page, Page setup, Print

- **Integrating Programs** Word, spreadsheet and Presentation.

Note:

The above practical is to be conducted using the either Microsoft-Office or OpenOffice.

SUBJECT : Comp. App.(opt.) Semester : I Hours/week : 3
Code : CA104 Credit : 1.5

Digital Electronics Lab

Objective: *To provide hands-on practice of the basic knowledge in digital logic and circuits and to provide hands-on practice in some commonly used combinational and sequential circuits*

Instruction: The Laboratory work will have to be performed during the semester consisting of any of the 8 experiments from the given list below***:***

List of Experiments:

1. Study and Testing of measuring instruments: Digital and Analog multimeters, CROs and Signal Generators – measurement of AC & DC voltages, measurement of frequency.
2. Study of Components: Identification and testing of resistors, capacitors, inductors, diodes, LEDs & transistors
3. Study of Logic Gates: Study of truth table of basic gates, realization of Boolean functions
4. Study of Half adder and Full Adder
5. Study of Half Subtractor and Full Subtractor
6. Study of Implementation of a 3:8 decoder,
7. Study of 4-line to 16 bit decoder
8. Study of BCD to 7-segment decoder
9. Study of Generating a Boolean expression with a multiplexer
10. Study of Clocked JK Flip Flop
11. Study of 4-bit ripple counter
12. Study of Parallel-in, serial-out, 4-bit shift register

Operating Systems

Objectives: To introduce students the basic functioning *of operating systems as resource manager and its Salient features. Also to study about process states, scheduling, Memory and I/O Management techniques.*

Sr. No	Topic	Ref	No. of Lect.
I	**Introduction to Software:**		**2**
	• **Software:** Definition, classification and components of software, operating system as the main component of system software;		2
II	**Operating System Fundamental**	2/1	**7**
	• **Operating Systems**: OS as a resource manager, Structure of OS, Evolution of OS, OS functions, Characteristics of modern OS.		2
	• **Types of O.S.:** Early systems, simple batch systems, multi-programmed batch systems, Time sharing system, Personal Computer systems, Parallel systems, Distributed systems, Real time systems		3
	• **OS Structures:** Components of OS: Process management, Memory management, Storage management, File management, I/O management.		2
III	**Process Management**	1/2	**18**
	• **Concept of Process**: Process State, Operation on Processes, thread.		3
	• **CPU Scheduling** : Types of Schedulers, Criteria for scheduling, Scheduling Algorithms.		5
	• **Process Synchronization:** Need for synchronization, Critical Section, Hardware Synchronization, Semaphores, Monitors, Problem of synchronization.		5
	• **Deadlocks:** Concept of Deadlock, Deadlock Modeling, Methods for Handling Deadlock		5
IV	**Storage Management**	1/3	**12**
	• **Memory Management**: Address Binding, Logical Vs. Physical Address space, Memory Allocation, Paging, Segmentation, Segmentation and paging of Intel Pentium.		4
	• **Virtual Memory:** Demand Paging, Page replacement Algorithms (FIFO, Optimal, LRU), Virtual Memory in windowsXp.		4
	• **File System Interface**: Files, File Access, Directory Structure, Protection		2
	• Implementation of File System: Allocation Methods, Free space Management		2

V	**I/O System**	1/4	**6**
	• I/O System Components : I/O Devices , I/O Hardware , Application I/O interface		3
	• Secondary Storage Structure : Disk fundamental, Disk Scheduling , Disk Management		3

Core References:

1. "Operating System", By S.R.Sathe & Anil S.Mokhade , MacMillan Publication.

2. "Operating System", By Stuart E.Madnick, John J.Donovan.

Additional References:

1. Operating System Concepts- A. Silberzchaz & P.B. Galvin, Addison – Wesley Publishing Company.

SUBJECT : Comp. App.(opt.) **Semester : II** **Hours/week : 3**
Code : CA202 **Credit : 3**

Programming in C

Objective: *To expose students to algorithmic thinking and problem solving and impart moderate skills in programming using C Language in a industry-standard. Introduce students to learn basic features, Create, execute simple C programs using conditional statements, loops and arrays.*

Sr. No	Topic	Ref.	No. of Lect.
1.	**Introduction** • An Overview of C , History of C language, • C as a Structured Language, Features of C.	2/1, 1/1,	3
2.	**Basic Elements & Operators** • Character set, C Token, Identifier & Keywords, Variables • Constant and its types. Integer constant, floating point constant, character constant, string constants. • Operators: Arithmetic, Relational, Logical, Unary operators: Increment & decrement Assignment and Conditional operator. • Precedence & Associatively of Operators	2/2,3, 1/1	6
3.	**Data Types** • Data Types: *int, char, float, double.* Declaration & Initialization. • Type modifiers: long, short, signed and unsigned	2/2, 1/1, 1/6	3
4.	**C Program & I/O statements** • Structure of C Program, Compilation & Execution of C program I/O: Introduction, Formatted Input/Output function: *scanf & printf*, Escape sequence characters. • Library functions: General used & Mathematical.	2/4, 2/3, 1/1	3
5.	**Control and Iterative Statements :** • Simple if, nested if, if-else, else if ladder • Switch-case statement • The conditional expression (? : operator) • *while* and *do-while* loop, and *for* loop • *break* & *continue* statement, *goto* statement	2/5, /6, 1/3, 1/4	12
6.	**Arrays:** • Introduction, Declaration and initialization Accessing array elements, Memory representation of array. • One dimension and multidimensional arrays, character array, Introduction to string	2/7, 2/8, 1/8, 3	9

7.	**Functions** • Introduction, types of functions. Defining functions, Arguments, Function prototype, actual parameters and formal parameters, Calling function, Returning function results, Call by value, Recursion.	2/9, 1/5, 3	6

Core Reference:

1. Let us C : Y.P. Kanetkar [bpb publication]
2. Programming in C : E. Balaburuswamy [Tata macgraw hill]
3. Programming in C : Goterfried [Shaums' Series]

Additional References:

1. Spirit of "C" : Moolish Kooper.

SUBJECT : Comp. App.(opt.) **Semester : II** **Hours/week : 3**
Code : CA203 **Credit : 1.5**

Operating System

Assignments: Write the Program using C (if applicable) :

Operating System:

1. **Study of DOS Commands.**
2. **Study of Unix/Linux Commands.**
3. Write a program to implement the FCFS Scheduling Algorithm.
4. Write a program to implement the SJF Scheduling Algorithm.
5. Write a program to implement the Priority Scheduling Algorithm.
6. Write a program to implement the Round Robin Scheduling Algorithm.

SUBJECT : Comp. App.(opt.) **Semester : II** **Hours/week : 3**
Code : CA204 **Credit : 1.5**

Lab for Programming in 'C'

List of Experiments:

1. Find Area, Perimeter of Triangle & Rectangle.
2. Find maximum amongst 3 numbers.
3. Program for nested loops.
4. Program to Calculate x^y
5. Program to check Prime Number.
6. Program to find Armstrong Number.
7. Program to print the Fibonacci Series
8. Searching and element from array.
9. Transpose of matrices
10. Multiplication of matrices
11. Sorting array using bubble sort technique
12. Program for recursion e.g. factorial, reverse of digit
13. Program for structure initialization
14. Array of Structure e.g. student result, Employee pay slip , Phone bill
15. Function with parameter & return values

B.Sc. (Computer Application-Optional)
Semester III

Course :	B.Sc.	Semester	III	Hours/week :	3
Code :	CA301	Subject	Computer Application (Optional)	Prerequisite :	

Advance C Programming and Introduction to OOP

Sr. No.	Topics in Details	No. of Lect.
Unit-I		**15**
1.	**Structure & Union** Structure: Introduction, Declaration and initializing structure, Accessing structure members, Nested structures, Arrays of structure, *typedef* statement. Unions: Declaration, Difference between structure and union	
2.	**Pointers:** Introduction, Memory organization. Declaration and initialization of pointers. The pointer operator * and &, De-referencing, Pointer expression and pointer arithmetic, Pointer to an array, Pointer to pointer, Constant pointers.	
Unit-II		**15**
1.	**Functions & Pointers:** Call by reference, Passing array and structure to function, functions returning pointers, character pointer, Two dimensional array of string, array of pointer to string, passing structure pointer to function, arrow (->) operator.	
2.	**Storage Classes & Preprocessor Directives** Storage classes, Scope, visibility and lifetime of variable, block and file scope, auto, extern, static and register storage classes. File inclusion and conditional compiler directives, Macro substitution, #define, #if, #ifdef, #else, #elif, #endif	
Unit-III		**15**
1.	**File Handling:** Introduction, Opening & closing a file, Input/Output operations on files, text and binary files, getc(), putc() function. File copy program, fprintf() and fscanf(). fread() and fwrite() function. Writing and reading records from binary file, modifying and deleting a record from file, Random access functions fseek(), rewind(), flushall(), remove(), rename()	
2.	**Object Oriented Programming:** Introduction, Procedural Vs Object Oriented Programming, Basic concepts of Object Oriented Programming, Class, Object, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing. Benefits and applications of OOP. Object Oriented Programming Languages	

Core Reference:

1. Programming in C : E. Balagurusamy. [Tata macgraw hill]
2. Let us C Solutions : Y.P. Kanetkar [bpb publication]
3. Programming in C++ : E. Balagurusamy. [Tata macgraw hill]

Course :	B.Sc.	Semester :	III	Hours/week :	3
Code :	CA302	Subject	Computer Application (Optional)	Prerequisite :	

Data Structures

Sr.No.	Topics in Details	No. of Lect.
Unit-I		**17**
1.	**Introduction** Introduction, Basic Terminology: Data item, Fields. Data types and Data Structure, types of data structure, operations on data structure. Algorithm and its characteristics	
2.	**Arrays:** Representation of Linear Arrays, Traversing, Insertion and Deletions, Multidimensional Arrays: 2D & M-D Concept, Linear & binary search algorithm, Bubble sort, Insertion sort, selection sort	
Unit-II		**18**
1	**Linked List:** Introduction, Representation of linked list in memory, Types of linked list, Traversing a linked list, Insertion into a linked list, Deletion from a linked list	
2	**Stacks and Queues** Stack: Operation (Push and Pop operation), Array Representation of Stack, linked representation of stack Queue: Representation of queue in memory, insertion and deletion operation, types of queues	
Unit-III		**10**
1	**Trees** Introduction, Binary tree, Representation, Traversing binary tree. Binary search tree (BST), Constructing binary search tree, Heap tree, Expression trees.	

References Books:

1. Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication.
2. Fundamentals of Data structures, by Horowitz and Sahani (Galgotia publications).
3. An introduction to data structures and application, by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill).

B.Sc.-III Semester
Subject: Computer Application (Optional)

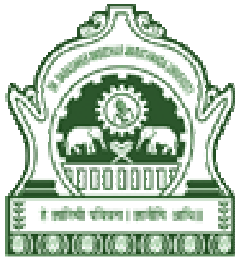
Paper: **CA303:** Practical based on CA301 (Advance C Programming & Introduction to OOP)

1. Program for structure initialization
2. Program for Array of structure e.g. student result, Employee pay slip , Phone bill
3. Program to demonstrate the use of union.
4. Swapping of numbers by using call by reference
5. Program to illustrate the use of array of pointers to strings.
6. Program to pass array to function.
7. Program to pass structure variable to function.
8. Program for passing structure pointer to function. (use of -> arrow operator)
9. Program to demonstrate the storage class.
10. Program for reading/writing text file.
11. Program for reading/writing binary file
12. File copy program.
13. Program to modify and delete a record from binary file
14. Program on macro substitution.
15. Program using command line arguments

B.Sc.-III Semester
Subject: Computer Application (Optional)

Paper CS304: Practical based on CS302 (Data Structures) to be implemented in C

1. Algorithm and Program for array traversal
2. Algorithm and Program for array insertion
3. Algorithm and Program for array deletion
4. Algorithm and Program for linear search
5. Algorithm and Program for bubble sort
6. Algorithm and Program for Insertion sort
7. Algorithm and Program for Selection sort
8. Program to demonstrate 2 dimensional array (matrix addition/multiplication)
9. Algorithm and Program for singly linked list creation and traversal
10. Algorithm and Program for doubly linked list creation and traversal
11. Algorithm and Program for singly list insertion and deletion
12. Algorithm and Program for doubly linked list insertion and deletion.
13. Program for Stack push and pop operation
14. Program for Queue insertion and deletion
15. Algorithm for Binary tree traversal



B.Sc. (Computer Application-Optional)
Semester IV

Course :	B.Sc.	Semester :	IV	Hours/week :	3
Code :	CA401	Subject	Computer Application (optional)	Pre-requisite :	

GUI Programming using Visual BASIC

Sr.No.	Topics in Details	No. of Lect.
Unit I		**18**

Introduction to VB, Difference between CUI & GUI, Event Driven Programming, Integrated Development Environment Hierarchy of a Project, Forms properties, Methods and Events. Form module, Standard Module, Class Module. Controls with main Properties, Methods & Events Command Buttons, Radio Buttons, Check Box, Label, Text Box, Timer, Scroll Bars, Drive, Directory and File List Box,

Variables, Types of variables, scope and life time, Data Types, User defined data types Operators, Constants, If…Then, If…Then…Else, Select. Loop statements Do….Loop, For…Next, While…wend Nested control structures,

Arrays: Declaring arrays, Multidimensional arrays. Static and Dynamic Arrays, Collection, Inputbox () & Msgbox () functions, exit statement. Built In Functions: Date, String, Mathematical functions.

Unit II **12**

Control array, Image Custom Controls, Common Dialog Box, Tree View, List View, Image List, Tabs, Status Bar, Tool Bar, Grid Control, Rich Text Box.

MDI Applications- the basic Built-in capabilities of MDI, Parent & Child menus. Accessing Child forms Adding, loading, unloading forms. Difference between MDI and SDI, creating Menus using menu editor, Menu Control Array, Creating Objects at Runtime. Functions and Procedures, Subroutines, Functions with Arguments, with return values.

Unit III **15**

Understanding Databases, Record sets, Accessing fields in database Data Control – Properties, Methods Creating Application Using Data Control, DAO Hierarchy, Creating Application using DAO, DAO objects, methods and Properties.

Advanced Data bound controls. Using Visual Data Manager, Database connectivity with controls, ADO: Establishing connection Executing SQL statements, cursor types , Manipulating Record set object, simple record adding & editing, database connectivity using code, data grid control.

Reference Books:

1. Mastering VB - Evangelos Petroutsos [bpb]
2. The Complete Reference VB6 - Noel Jerke [TMH]
3. Visual Basic 6 - Peter Atkins [Comdex]
4. Teach yourself VB6 – Scott Warner [TMH]

Course :	B.Sc.	Semester :	IV	Hours/week :	3
Code :	CA402	Subject	Computer Application (optional)	Pre-requisite :	

Database Management System Using SQL

Sr.No.	Topics in Details	No. of Lect.
Unit I	**Introduction to Basic Concepts of DBMS**	**12**
1.	Database, Database System application. Purpose of database system, Advantages & Disadvantages of DBMS Schemas, Instances & Database state	
2.	Data independence, database system utilities Database architecture- Three level architecture Database users & Adminstors responsibilities, Structure of DBMS	
Unit II	**Data Modeling & Enhanced E-R**	**15**
1.	Types of Data model – Relational, E-R, Object based Overview of Hierarchical & Network Data models Phases of database design	
2.	E-R Model- Entity, Entity sets, Entity Types, Attribute, Attribute types, Naming Conventions. Data Association – Attribute association & Mapping Cardinalities E-R diagram, Subclass, Superclass, Specialization & Generalization	
Unit III	**Relational data model & SQL**	**18**
1	Basic Structure, Database Schemas, Anomalies in database, Universal relation, Constraints- domain, key & Integrity rules, Relational algebra- Unary & Binary operations, Natural join & Division	
2	SQL – Features, Data types, Constants, Commands - DDL, DML, TCL. ,Constraints – Column level & Table level Joins – Simple, Self, Outer joins & Table aliases Aggregate Functions, Group by, Order by & Between clauses Views in SQL	

Reference:

1. Database System Concepts- Korth, Siberschatz, Fifth Edition
2. An Introduction to Database System – B Desai, Revised Edition
3. Database System Concepts- Navathe, Fourth Edition

Paper CA403: Practical based on CA401 (GUI Programming Using VB)

Any 14 to 15 practical based on VB. Form design, using various controls, data controls, database connectivity.

Paper CA404: Practical based on CA402 (DBMS Using SQL)

Following queries to be implemented using SQL/Oracle/MySQL etc.

1. Queries for data definition and data manipulation language.
2. SQL queries using logical operators (= < > etc)
3. SQL queries using logical SQL operators (between, AND, In, like, is null)
4. SQL queries using character, number, date
5. SQL queries using group function
6. SQL queries for relational algebra (union, interest and minus)
7. SQL queries for extracting data from more than one table (join, equi join, outer join etc.)
8. SQL queries for sub queries, nested queries

Software Project Management

Sr. No.	Topics in Details	No. of Lect.
Unit I		**15**
	Introduction to Software Project Management Software project versus other types of project. Problems, Requirement specifications. Introduction to step wise project planning - Select - identify scope and objectives - identify project infrastructure - Analyse project characteristics - products and activities.	
Unit II		**15**
	Project evaluation - Introduction to Strategic assessment - technical assessment - cost benefit analysis - cash flow forecasting - cost benefit evaluation techniques - risk evaluation.	
Unit III		**15**
	Selection of an appropriate project approach - choosing technologies - technical plan contents list - choice of process models - structured methods - rapid application development - waterfall model - spiral model - software prototyping - ways of categorizing prototypes - tools - incremental delivery.	

Books for Study:

- **Software project management** : Bob Hughes and Mike Cotterell - - Fourth edition - McGraw Hill
- **Software Project Management** : Walker Royce - - Addison Wesley.

Course: B.Sc.(I.T. Optional) – V Seme. **Paper Code:** IT502

E-Business

Sr. No.	Topics in Details	No. of Lect.
UNIT I		**15**
1	Introduction, IT and business, E-commerce: Concepts Electronic Communication, PCs and Networking, E-mail, Internet and intranets. EDI to E-commerce, EDI, UN/EDIFACT	
UNIT II		**14**
2	Concerns for E-commerce Growth, Internet bandwidth, Technical issues, Security issues. India E-commerce Readiness, Legal issues. **Security Technologies:** Cryptography, Public Key Algorithms, Private Key Algorithms, Hashing techniques, Certification and key Distribution, Cryptographic	
UNIT III		**15**
3	**Applications, Encryption, Digital Signature** Protocols for Transactions. SSL-Secure Socket Layer, SET-Secure Electronic Transaction, Credit Card Business Electronic Commerce providers. CyberCash, Digicash, VeriSign Software Package: PGP e-mail encryption software	

TEXT BOOK :

E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill

Course: B.Sc.(I.T.) – V Seme. **Paper Code:** IT331AT

Multimedia Technology

Sr.No.	Topics in Details	No. of Lect.
Unit-I		**15**
1.	1. **Introduction to Multimedia Technology**	**[Ref. 1/1]**
	1. Multimedia Elements 2. Multimedia Application 3. Multimedia System Architecture 4. Object for Multimedia Systems 5. Data Compression & its types	
2.	**Multi-media Authoring System**	
	1. Designing issue for Multimedia Authoring 2. Design Approached to Authoring 3. Types of Multimedia Authoring system: Dedicated, Timeline-Based, Structured, Programmable and Telephone Authoring System.	**[Ref. 1/..]**
Unit-II		**15**
3.	**Gaphics & Image Data Represntation**	**[Ref. 2/2]**
	1. Graphics / Image Data Types 2. Popular File Formats: GIF, JPEG, PNG, TIFF, BMP, WMF.	
4.	**Introduction to anima8or software**:	**[Mannual]**
	1. Basics, 2. Object Editor - Basics and Object/Edit Mode, 3. Object Editor - Object/Point Mode, 4. Figure Editor	
Unit-III		**15**
	5. Sequence Editor, 6. Scene Editor, 7. Animation	**[Mannual]**

Reference:

1. **Multimedia Technology :** Prabhat & thakker
2. **Fundamental of Multimedia :** Ze-Nian Li & Mark S.Drew (Pearson)

Manual of Anim8or Software: Free download Manual & Software from the website : http://www.anim8or.com/main/index.html

Course: B.Sc.(I.T. optional) – V Seme. **Paper Code:** IT503

Software Project Management : Case Study

Case Study based on Software Development Models.

Course: B.Sc.(I.T. optional) – V Seme. **Paper Code:** IT504

E-Business : Case Study

Case Study : As per directive of the Concerned Faculty.

Course: B.Sc.(I.T. optional) – V Seme. **Paper Code:** IT503

Multimedia Technology

Development of modules given in the Manual at least 10 different.

B.Sc. (Information Technology-Opt.)
Semester VI

Course: B.Sc.(I.T.Optional) – VI Seme. **Paper Code:** IT601

Software Testing and Quality Assurance

Sr.No.	Topics in Details	No. of Lect.
Unit-I		**15**
	Introduction: Software Quality, Role of testing, verification and validation, objectives and issues of testing, Testing activities and levels, Sources of Information for Test Case Selection, White-Box and Black-Box Testing , Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation	
Unit-II		**15**
	Unit Testing: Concept of Unit Testing , Static Unit Testing ,Dynamic Unit Testing , Outline of Control Flow Testing, Overview of Dynamic Data Flow Testing, Data Flow Graph, Data Flow Terms, Data Flow Testing Criteria, Comparison of Data Flow Test Selection Criteria, Feasible Paths and Test Selection Criteria, Comparison of Testing Techniques.	
Unit-III		**15**
	System Integration Testing: Concept of Integration Testing, Different Types of Interfaces and Interface Errors, Test Plan for System Integration, System Test Categories: Basic Tests, Functionality Tests, Robustness Tests, Interoperability Tests, Performance Tests, Reliability Tests, and Documentation Tests.	

Text Book

1. **"Effective methods for Software Testing"** William Perry, Wiley.
2. **"Software Testing and Quality Assurance: Theory and Practice",** Sagar Naik, University of Waterloo, Piyu Tripathy, Wiley , 2008

References:

1. "Software Testing - A Craftsman's Approach", Paul C. Jorgensen, CRC Press, 1995.
2. "The Art of Creative Destruction", Rajnikant Puranik, SPD.

Course: B.Sc.(I.T.Optional) – VI Seme. **Paper Code:** IT602

Ethics & Cyber Law

Sr.No.	Topics in Details	No. of Lect.
Unit-I		**15**
	Basic Concepts of Technology and Law , Understanding the Technology of Internet, Scope of Cyber Laws , Cyber Jurisprudence	
Unit-II		**15**
	Law of Digital Contracts The Essence of Digital Contracts The System of Digital Signatures The Role and Function of Certifying Authorities The Science of Cryptography E-Governance Cyber Crimes and Cyber Laws	
Unit-III		**15**
	Information Technology Act 2000 Cyber Law: Issues in E-Business Management Major issues in Cyber Evidence Management Cyber Law Compliancy Audit, The Ethics of Computer Security	

Text books:

1. Godbole," Information Systems Security", Willey
2. Merkov, Breithaupt," Information Security", Pearson Education
3. Yadav, "Foundations of Information Technology", New Age, Delhi
4. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill
5. Sood,"Cyber Laws Simplified", Mc Graw Hill
6. Furnell, "Computer Insecurity", Springer

Course: B.Sc.(I.T.Optional) – VI Seme. **Paper Code:** IT602

Internet Programming Using PHP

Sr.No.	Topics in Details	No. of Lect.
Unit-I		**15**
	1. Introduction to PHP, 2. Configuring Apache, 3. Configuring PHP, 4. The building Block of PHP	
Unit-II		**15**
	5. Decision and loops, 6. functions in PHP, types of functions 7. Arrays in PHP, 8. Objects in PHP,	
Unit-III		**15**
	9. Working with String, 10. Date and Time, 11. Handling Forms (HTML).	

Reference Books:

1. **"BEGINNING PHP 5.3"** by MATT DOYLE WROX publication
2. **"PHP, MySQL and Apache All in One"** by Juliea C. Meloni, SAMS series

Course: B.Sc.(I.T. Optional) – VI Seme. **Paper Code:** IT603

Major Project Work

PROJECT:-

- Students of semester VI will have to perform ONE project of 80 marks. (A group of maximum 3 candidates [Exceptionally 4] will allow working on one project work).
- Each Faculty must have at the max. 5-6 Projects.
- Distribution of project marks will as follows:-
    - Review 1 Report
    - Review 2 Report
    - Project work (certified)
    - Project work Presentation.
    - Viva/ Oral.

Course: B.Sc.(I.T.Optional) – VI Seme. **Paper Code:** IT604

SEMINAR

SEMINAR:-

- **Every Student will have to have to submit one seminar report based on current trends and technology and will have to present the same in the front of external examiner along with the students of practical examination batch as an open viva.**

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

Curriculum Structure and Scheme of Evaluation: Computer Application (Optional)

Sr. No.	Course Code	Name of the Subject	Scheme of Teaching			Scheme of Evaluation(Marks)			
			T Hrs/ Week	P Hrs/ Week	Total Hrs/ Week	University Theory Exam.	University Practical Exam.	Duration	Total Marks
Semester I									
1	CA101	Computer Fundamentals	3	-	3	50	-	3	50
2	CA102	Digital Electronics	3	-	3	50	-	3	50
3	CA103	Office Suite	-	3	3	-	50	3	50
4	CA104	Digital Electronics	-	3	3	-	50	3	50
Total of Semester – I			6	6	12	100	100		200
Semester II									
5	CA201	Operating System I	3		3	50	-	3	50
6	CA202	Programming in C	3		3	50	-	3	50
7	CA203	Operating System	-	3	3	-	50	3	50
8	CA204	Programming in C	-	3	3	-	50	3	50
Total of Semester – II			6	6	12	100	100		200

Computer Application (Optional)

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

Curriculum Structure and Scheme of Evaluation: Computer Application (Optional)

Sr. No.	Course Code	Name of the Subject	Scheme of Teaching			Scheme of Evaluation(Marks)			
			T Hrs/ Week	P Hrs/ Week	Total Hrs/ Week	University Theory Exam.	University Practical Exam.	Duration	Total Marks
Semester III									
1	CA301	Advance C Programming and Introduction to OOP	3	-	3	50	-	3	50
2	CA302	Data Structures	3	-	3	50	-	3	50
3	CA303	Practical based on CA301	-	3	3	-	50	3	50
4	CA304	Practical based on CA302	-	3	3	-	50	3	50
Total of Semester – III			6	6	12	100	100		200
Semester IV									
5	CA401	GUI Programming using Visual BASIC	3		3	50	-	3	50
6	CA402	Database Management System Using SQL	3		3	50	-	3	50
7	CA403	Practical based on CS401	-	3	3	-	50	3	50
8	CA404	Practical based on CS402	-	3	3	-	50	3	50
Total of Semester – IV			6	6	12	100	100		200

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

Curriculum Structure and Scheme of Evaluation: Computer Application (Optional)

Semester V										
17	**CA501**	**Soft.Project Mgmt.**	**3**		**3**	**3**	**50**	**-**	**3**	**50**
18*	**CA502**	**E-Business**	**3**		**3**	**3**	**50**	**-**	**3**	**50**
18*	**CA502**	**Multimedia Tech.**	**3**		**3**	**3**	**50**	**-**	**3**	**50**
19	**CA503**	**Practical based on IT501 (Case Study)**	**-**	**3**	**3**	**1.5**	**-**	**50**	**3**	**50**
20	**CA504**	**Practical based on IT502 (Case Study)**	**-**	**3**	**3**	**1.5**	**-**	**50**	**3**	**50**
Total of Semester – V			**6**	**6**	**12**	**9**	**100**	**100**		**200**
Semester VI										
21	**CA601**	**S/w. Testing & Q.A.**	**3**		**3**	**3**	**50**	**-**	**3**	**50**
22*	**CA602**	**Internet Prog. Using PHP**	**3**		**3**	**3**	**50**	**-**	**3**	**50**
22*	**CA602**	**Ethics & Cyber Law**	**3**		**3**	**3**	**50**	**-**	**3**	**50**
23	**CA603**	**Project**	**-**	**5**	**5**	**2**	**-**	**80**	**3**	**80**
24	**CA604**	**Seminar**	**-**	**1**	**1**	**1**	**-**	**20**	**3**	**20**
Total of Semester – VI			**6**	**6**	**12**	**9**	**100**	**100**		**200**

Note : * : Select Any one of the subject as paper No. 18 and 22.