A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI

DEPARTMENT OF COMPUTER SCIENCE

(Students admitted from the academic year 2015 – 2016 onwards)

B.Sc. COMPUTER SCIENCE

Sem.	S. Code	Courses	Title of the paper	Hours	Credits	Total Credits
I		LC I	Tamil I	6	3	20
		ELC I	English I	6	3	
		CC I – Theory	Programming in C	5	5	
		CC II – Practical	Practical I – Programming in C Lab	2	2	
		AC I – Theory	Mathematics I	9	5	
		SBC I	Office Automation Lab	2	2	
II		LC II	Tamil II	6	3	20
		ELC II	English II	6	3	
		CC III – Theory	C++ and Data Structures	5	5	
		CC IV – Practical	Practical II – C++ and Data Structures Lab	2	2	
		AC II – Theory	Mathematics II	9	5	
		SBC II	Desktop Publishing Lab	2	2	
III		LC III	Tamil III	6	3	20
		ELC III	English III	6	3	
		CC V – Theory	Java Programming	5	5	
		CC VI – Practical	Practical III – Java Programming Lab	2	2	
		AC III – Theory	Physics I	7	4	
		AC IV – Practical I	Practical I – Physics I	2	1	
		SBC III	Animation Lab	2	2	
IV		LC IV	Tamil IV	6	3	20
		ELC IV	English IV	6	3	
		CC VII – Theory	Web Design	5	5	
		CC VIII – Practical	Practical IV – Web Design	2	2	
		AC V – Theory	Physics II	7	4	
		AC VI – Practical II	Practical II – Physics II	2	1	
		NMEC I	Mathematics Aptitude –I	2	2	
V		CC IX – Theory	Relational Database Management System	4	4	30
		CC X - Theory	Operating System	4	4	
		CC XI – Theory	Computer System Architecture	4	4	
		CC XII – Practical	Practical V – RDBMS	5	5	
		EC I	Elective I– Software Engineering	4	4	
		EC II	Elective II – Network Security	4	4	
		NMEC II	Mathematics Aptitude II	2	2	
		SSD I	Soft Skills Course	2	2	
		EA I	Gender Studies	1	1	
VI		CC XIII – Theory	Dot Net Programming	5	5	29
		CC XIV – Theory	Data Communications and Networks	5	5	
		CC XV – Theory	Microprocessor and Its Applications	5	5	
		CC XVI – Practical	Practical VI – Dot Net Programming	6	5	
		EC III	Elective III – Multimedia and Its Applications	5	5	
		VBC	Human Values & Professional Ethics	2	2	
		ES	Environmental Studies	2	2	
		EA II	Extension Activity	-	1	1
		TOTAL				**140**

Elective: I

1. **Software Engineering**
2. System Analysis and Design
3. Object-oriented Analysis and Design

Elective: II

1. **Network Security**
2. Software Quality and Testing
3. Management Information System

Elective: III

1. **Multimedia and Its Applications**
2. Embedded Systems
3. E-Commerce

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B.Sc., Computer Science – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – I	Hrs	Credits	Marks (CIA+ESE)
	Programming in 'C'	5	5	25+75

Objectives:

- To acquire basic knowledge on Computers.
- To acquire knowledge on programming skills using 'C' language

Unit – I: (15 Hours)

Introduction to computers, classification of digital computer systems, anatomy of a digital computer, computer architecture number systems, memory units, auxiliary storage devices, input and output devices – Introduction to computer software, algorithm and flowchart -operating systems, programming languages – computer networks –Internet and WWW.

Unit – II: (15 Hours)

Introduction to C – History and Importance of C – Key words, identifiers, constant and variables, C tokens – declaring variables, symbolic constant, data types – operators and expressions – I/O functions.

Unit – III: (15 Hours)

Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursions – Passing array to functions – Storage classes – Strings – String library functions.

Unit – IV: (15 Hours)

Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types – Union – Pointers – pointers and arrays – pointers and functions – pointers and strings – pointers and structures.

Unit – V: (15 Hours)

Files – operations on a file – Random access to files – Command line arguments – Introduction to preprocessor – Macro substitution directives – File inclusion directives – Conditional compilation directives – Miscellaneous Directives.

TEXT BOOK

1. "Fundamentals of Information Technology" Alexis Leon and Mathews Leon, Vikas Publishing. (For Unit I)
2. "Programming in ANSI C", Balagurusamy E –Tata McGraw Hill, 6th edition, 2012.

REFERENCES:

1. "A Workbook on C", Vikas Verma, Cengage Learning, 2nd Edition, 2012
2. "Programming in ANSI C " – Kumar Agrawal,
3. "Computer Programming in C", V. Rajaraman.
4. "Computer Programming", Ashok N Kamthane, Pearson education, Second Impression, 2008.

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B.Sc., Computer Science – Semester - I
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Code	Core Course – II	Hrs	Credits	Marks (CIA+ESE)
	Practical – I: Programming in 'C' Lab	2	2	25+75

LIST OF PRACTICALS

1. Temperature conversion
2. Quadratic equation
3. Sorting of numbers
4. String functions (user defined)
5. String sorting
6. Recursion (ncr)
7. Matrix multiplication
8. File creation (using command line arguments and structures)
9. File copy (using command line arguments)
10. File concatenation (using command line arguments)

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B.Sc., Computer Science – Semester - I
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Code	Skill Based Course – I	Hrs	Credits	Marks (CIA+ESE)
	Office Automation Lab	2	2	40+60

Objectives:

- To learn the important facilities, commands and menu options available in MS-Word, MS-Excel, MS-Power point and MS-Access.

Ms-Word:

1. Create a Word document in which perform the following operations:
    a. Create bookmarks
    b. Adding End notes and comments
    c. Find and Replace the text
    d. Entering the text with Autocorrect and Autotext
    e. Use Dropcaps to emphasize your text.
2. Create a Word document and perform the following operations on the text:
    a. Edit the document using cut, copy and paste
    b. Format the text with Bullets and Numbers
    c. Check for Spelling and Grammar
    d. Modifying Font, Line Spacing
    e. Protecting document by setting password.
3. Create a Word document and perform the following operations on it:
    a. Inserting and Deleting Manual Page Break
    b. Format the document using page setup
    c. Adding lines, borders, shading, background and watermarks, dates and page numbers to your document
    d. Creation and Deletion of Headers and Footers to your document
    e. Opening, Closing and Printing of a document.

4. Create a Table in the document and perform the following operations on it:
    a. Convert text to a table
    b. Convert a table to text
    c. Merging and Splitting cells, tables
    d. Applying Table formats
    e. Change case of typed text
5. Create a document which uses Advanced Mail-Merge techniques.

Ms-Excel:

6. Create a worksheet and perform various operations on it.
   (Apply different types of Formulas and Built-in functions)
7. Create a worksheet and prepare a Graph using :
    a. Possible types of charts with Gridlines, Datalables, Legends, and Titles.
    b. Adding Background Colour and Pictures.
8. Create a Data-Entry form just like an Invoice of an organization and maintain the information in a database.
9. Modify the worksheet layout by,
    a. Changing column width and row height
    b. Inserting and deleting columns, rows and cell
    c. Moving and Copying cell contents.
10. Create a worksheet to do the following:
    a. Generate the series using File Series command
    b. Transferring data between worksheets.

Ms-Powerpoint:

11. Create a presentation using Autocontent Wizard.
12. Create a Slide show which should use graphics, multimedia, transition, animation and Special effects.
13. Create presentation slides using Design Templates.
14. Method of using the different views of slides to create presentation: Normal, Outline, Slide, Slide sorter views.

Ms-Access:

15. Create a Student database using design view and generate a student report using Wizard.
16. Create an employee database and design a Form to maintain the database.

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B.Sc., Computer Science – Semester - II
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Code	Core Course – III	Hrs	Credits	Marks (CIA+ESE)
	C++ and Data Structures	5	5	25+75

Objectives:

- To understand the difference between the Structured and Object oriented programming.
- To learn the Object oriented programming and Data Structures concepts.
- To acquire knowledge on C++ language features using Data Structures.

Unit – I: (15 Hours)

Principles of Object Oriented programming-Beginning with C++-Tokens, Expressions and control structures.

Unit – II:

Functions in C++-Classes and Objects - Constructor and Destructors.

Unit – III: (15 Hours)

Operator Overloading and Type Conversions - Inheritance: Extending Classes.

Unit – IV: (15 Hours)

Pointers, Virtual Functions and Polymorphism - Managing Console Operators - Working with files. Templates - Exception Handling – Manipulating Strings.

Unit - V: (15 Hours)

Linked List, Stacks and Queues: LIST: Linked list-Doubly Linked List - Insertion-Deletion. **Stack:** Representation, Operation and implementation of stack- **Queues:** Linear and Circular queues- Insertion and deletion.

Text Book:

1. ” Object Oriented Programming with C++’, E.Balagurusamy, Tata McGraw Hill Publishing Company Limited, Second Edition, 2000.
2. “Object Oriented Programming Using C++”, B Chandra, Narosa Publications, Second Edition, 2009. (For Unit V – Chapter 13).

Reference Books:

1. “The Waite Group’s Object oriented Programming in TURBO C++”, Robert Lafore, Galgotia Publications.
2. “ C++ and Objecte Oriented Programming Paradigm “ Jana, 2nd Edition, PHI Learning pvt. Ltd.
3. “ C++ How to program “ , Deitel & Deitel , 7th Edition, PHI Learning pvt. Ltd.
4.. “ Object Oriented C++ Programming “, Hirday Narayan Yadav, 1st Edition, Laximi publication pvt. Ltd., 2008.
5. “The Essence of Data Strucrires Using C++”, Ken Brownsey, Pearson Education, 2004.
6. “Data Structures and Algorithm Analysis in C++”. Mark Allen Weiss, Third Edition, Pearson Education, 2008.

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B.Sc., Computer Science – Semester - II
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Code	Core Course – IV : Practical - II	Hrs	Credits	Marks (CIA+ESE)
	C++ and Data Structures Lab	2	2	40+60

Objectives:

- To enable students to understand the Object oriented programming and Data Structures concepts
- To gain programming skills in 'C++' language

C++:

1. Write an OOP Program to Perform Complex Arithmetic Operations which passes objects from functions.
2. Write a class to represent a vector. Include member functions to perform the following tasks:
    a. To create the vector
    b. To modify the value of a given element
    c. To multiply by a scalar value
    d. To display the vector in the form (10,20,….)
3. Write an OOP Program for matrix manipulation using constructor with dynamic allocation of memory.
4. Write an OOP Program to overload any 5 operation using unary operator overloading.
5. Write an OOP Program to prepare mark sheet using inheritance and manipulator functions
6. Write an OOP Program to perform Runtime Polymorphism.
7. Write an OOP Program to perform the following Conversion Operations:
    a) From Built-in type to class type
    b) From Class type to Built-in type.
    c) From one class type to another class type.
8. Write an OOP program to create a data file for storing student's data and print mark list for a particular student.
9. Write an OOP program to create and manipulate employee data file.
10. Write an OOP program to implement Stack.
11. Write an OOP program to implement Queue.
12. Write an OOP program to implement List.

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B.Sc., Computer Science – Semester - II
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Code	Skill Based Course - II	Hrs	Credits	Marks (CIA+ESE)
	Desktop Publishing Lab	2	2	40+60

Objectives:

- To acquire knowledge on Desktop publishing
- To learn the method of preparation of document and manipulation of pictures

Pagemaker:

1. Prepare a Letter in PageMaker.
2. Prepare a Letter Head in PageMaker.
3. Prepare your Resume in PageMaker.
4. Create a Document in PageMaker and use the Hyperlink Concept.
5. Prepare a Newspaper Layout in PageMaker.
6. Create a Trifold Broucher in PageMaker.
7. Design an Invitation Card in PageMaker.
8. Design Front Cover of a Book in PageMaker.

Photoshop:

1. Change the color modes of the picture, resize and rotate the picture.
2. Define the background pattern for a canvas.
3. Apply stroking effects to the picture.
4. Merge a picture and a text into the single layer.
5. Create a shadow of the image without using the in-built tool.

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B.Sc., Computer Science – Semester – III
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Code	Core Course – V	Hrs	Credits	Marks (CIA+ESE)
	Java Programming	5	5	25 + 75

Objectives:

- To understand the features of Java language.
- To acquire knowledge on Java programming.

Unit – I: **(15 Hours)**

Java Evolution – Overview of Java language – Constants, variables and data types.

Unit – II: **(15 Hours)**

Operators and Expressions – Decision making and branching – Decision making and looping.

Unit – III: **(15 Hours)**

Classes, objects and methods – Arrays, Strings and Vectors.

Unit – IV: **(15 Hours)**

Interfaces:Multiple Inheritance – Packages: Putting classes together – Multithreaded programming – Managing errors and exceptions

Unit – V: **(15 Hours)**

Applet programming – Graphics programming: The Graphics class – Lines & Rectangles – Circles & Eclipses – Drawing Arcs & Polygons – Managing Input/Output files in Java: Introduction – concept of streams – stream classes – byte stream classes – character stream classes – using streams – other useful I/O classes – using the File class – Input/Output Exceptions – Creation of files – Reading/Writing characters – Reading/Writing bytes – Random access files.

Text Book:

"Programming with JAVA – A Primer", 4th Edition, 2011, E. Balagurusamy, Tata McGraw Hill Publishing Company Limited.

Reference Books:

1. "Java2 – The Complete Reference", 8th Edition, Herbert Schildt, TataMcGraw Hill, 2011.
2. " Java and Object oriented programming Paradigm", Jana, PHI Leaning pvt. Ltd, 2005.
3. " Java programming for absolute beginner ", Russell, PHI Leaning pvt. Ltd, 2001.
4. " Java : How to program " , 8th Edition, Deitel & Deitel, PHI Learning pvt. Ltd, 2010.
5. " Object oriented programming from problem solving to Java ", Jose M. Garrido, Laximi publication pvt. Ltd., 2004.

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B.Sc., Computer Science – Semester – III
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Code	Core Course-VI : Practical III	Hrs	Credits	Marks (CIA+ESE)
	Java Programming	2	2	40 + 60

Objectives:

- To enable students to learn programming in Java
- To understand the features like packages, multithreading, exception handling and applets

Java Programming:

1. Write a Java program to compute the NCR Value.
2. Write a Java program to generate the Fibonacci Series for the given number.
3. Write a Java program to handle the various Mathematical Functions.
4. Write a Java program to demonstrate the usages of Class and Object.
5. Write a Java program to demonstrate the usages of Constructor inside the Class.
6. Write a Java program to handle the various String Functions.
7. Write a Java program to demonstrate the usages of Vector Class.
8. Write a Java program to create and import the Package.
9. Write a Java program to handle the Multi-threading processes.
10. Write a Java program to demonstrate the usages of the Exception Handling Processes.
11. Write a Java program to create and use your own Exception
12. Write an applet program to display your Personal Details.
13. Write an applet program to draw the various Geometric Figures.

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B.Sc., Computer Science – Semester – III
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Code	Skill Based Course – III	Hrs	Credits	Marks (CIA+ESE)
	Animation	2	2	40 + 60

Objectives:

- To understand the concepts of animation
- To enable students to learn the importance of layers, creating animations, drawing curves and polygons

Flash Practicals:

1. Move an animated object in path using GUIDE LAYER
2. Dynamic Masking in the Text.
3. Retrieve the Drive information in the system using URL.
4. Apply the animation on an Image.
5. Design Drag Masking application using Movie Clip.
6. Design the Arithmetic Calculator using BUTTON and get the user input through Mouse.
7. Create a changing shape motion: Change the shape of drawn image or text to another Shape of image or text.
8. Design Pay bill format & calculate allowances from basic pay and get the empno, Name & basic pay from the keyboard.
9. Create a Spider man with animation.
10. Design a movie file in Flash and convert it into other file format. (Ex. Gif, jpeg, etc)

Coreldraw Practicals:

1. Draw straight line in Bezier mode.
2. Draw curves in freehand mode.
3. Draw curves in Bezier mode.
4. Create an effective Coreldraw screen using dimension line tools.
5. Create a drawing using lines, curves and polygons.

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B.Sc., Computer Science – Semester – IV
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Code	Core Course – VII	Hrs	Credits	Marks (CIA+ESE)
	Web Design	5	5	25 + 75

Objectives:

- To learn the method of creating web pages
- To understand the features of HTML and PHP
- To acquire knowledge on writing scripts

Unit – I: **(15 Hours)**

Introduction to HTML – Web server – Web Client/Browser – HTML – Commonly used HTML commands – Titles and footers – Text formatting – Emphasizing material in a web page – Text styles – other text effects. *Lists:* Types of lists. *Adding graphics to HTML documents:* Using the border attribute – using the width and height attribute – using the align attribute – using the ALT attribute.

Unit – II: **(15 Hours)**

Tables: Introduction – using the width and border attribute – using the cellpadding attribute - using the cellspacing attribute – using the background-color property – using the colspan and rowspan attributes. *Linking Documents:* Links – images as hyperlinks. *Frames:* Introduction to frames, <Frameset>, <Frame> tags and Targeting named frames.

Unit – III: **(15 Hours)**

PHP & HTML: PHP & HTML – Getting started – writing PHP – running the PHP script. *The Basics of PHP:* data types – variables – constants – HERE documents - operators – arrays – conditional statements – iterations.

Unit – IV: **(15 Hours)**

Functions: User Defined Functions – Built-in functions – PHP server variables – working with date and time – performing mathematical operations – working with string functions.

Unit – V: **(15 Hours)**

Working with forms: Introducing HTML form tags and elements – the main <FORM> tag – FORM elements – adding elements to a form – uploading files to the web server using PHP. *Debugging and errors:* Error handling in PHP: displaying errors – types of errors- error levels in PHP – acting on errors/exceptions.

Text Book:

"Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP", 4th Revised Edition, **Ivan Bayross**, BPB publications, 2010.

Reference Books:

1. "World Wide Web design with HTML", C. XAVIER, Tata McGraw Hill, 2008.
2. "HTML – A Beginners Guide", Wendy Willard, Tata McGraw Hill, Fifth Edition, 2009.
3. "PHP – A Beginners Guide", Vikram Vaswani, Tata McGraw Hill, 2009.
4. "The Complete Reference PHP", Steven Holzner, Tata McGraw-Hill Edition 2008
5. Programming PHP, Rasmus Lerdorf, Kevin Tatroe and Peter MacIntyre, O'Reilly, 3rd Edition, 2013.

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B.Sc., Computer Science – Semester – IV
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Code	Core Course-VIII : Practical – IV	Hrs	Credits	Marks (CIA+ESE)
	Web Design	2	2	40 + 60

Objectives:

- To understand the method of creating web pages using different tags, lists, tables, frames, style sheets, images, links and buttons.
- To acquire knowledge on PHP features using MySQL

HTML:

1. Design a webpage to display the Resume.
2. Design a webpage for the Application Form of a college.
3. Design a web site to display your Department Profile.
4. Create a web page to display the Marksheet.
5. Create a web site to display information about the Tourist Place in your native place.
6. Create a Site Map for your college and display the information about each block using imagemap.
7. Design a website to display the Menu Card for a Hotel.
8. Design an E-NewsPaper.

PHP:

9. Develop a PHP program for String Functions.
10. Develop a PHP program to illustrate the Array concepts.
11. Develop a PHP program to check Message Passing mechanism between web pages.
12. Develop a PHP application for Student Result Processing using MYSQL table.
13. Design a web application for Payroll Processing using MYSQL table.

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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course - IX	Hrs	Credits	Marks (CIA+ESE)
	Relational Database Management System	4	4	25+75

Objectives:

- To enable students to learn the database concepts, DBMS, relational databases and Normal forms
- To understand the usage of SQL commands

Unit – I: **(15 Hours)**

An overview of Database Management: What is the Database System – What is database – Why Database – Database Independence.

Database System Architecture: Introduction – Three Levels of Architecture – The External Level – Conceptual Level – The Internal Level – Mappings – The Database Administrator – The Database Management System – Client server architecture – Distributed processing.

An Introduction to Relational databases: Introduction – An Informal Look relational model – The catalog – Base Tables and Views - Transactions - Suppliers and parts database.

Unit – II: **(15 Hours)**

An Introduction to SQL: Introduction – overview - The catalog – Views – Transactions - Embedded SQL – Dynamic SQL and SQL/CLI. **Relations:** Introduction – Tuples - Relation types – Relation values - Relation variables.

Relational Algebra: Introduction- Closure revisited – Relational Operators - Examples.

Unit – III: **(15 Hours)**

Relational Calculus: Introduction – Tuple Calculus –Examples – Calculus Vs Algebra – Domain Calculus - Query-by-Example.

Integrity: Introduction –Internal vs External predicates – Correctness vs consistency – Integrity and views – Constraints classifications scheme – keys.

Views: Introduction – What are views for – View Retrieval – View Updates.

Unit – IV: **(15 Hours)**

Functional Dependencies: Introduction – Basic Definitions – Trivial and Non-trivial Dependencies.

Further Normalization I: 1NF, 2NF, 3NF,BCNF : Introduction – Non loss decomposition and functional dependencies – First, Second and Third Normal forms – Dependency preservation – Boyce/Codd Normal form.

Further Normalization II: Higher Normal Form: Introduction – Multi valued Dependencies and fourth normal form – Join dependencies and fifth normal form.

Unit – V: **(15 Hours)**

SQL: Interactive SQL Part-I: Table Fundamentals – Viewing data in the Tables – Eliminating duplicate rows when using a select statement – Sorting data in a table – Creating a table from a table –Inserting data into a table from another table – Delete operations – Updating the contents of a table – Modifying the structure of tables – Renaming tables – Truncating tables – Destroying tables- Creating synonyms – Examining objects created by a user.

Interactive SQL Part II : I/O constraints: primary key constraint, Foreign key constraint, Unique key constraint – Business rule constraints – Null value concepts – NOT NULL constraint defined at the column level – The check constraint.

Interactive SQL PART III: ORACLE FUNCTIONS - Aggregate functions – Numeric functions – String functions – Conversion functions- Manipulating dates in SQL using the Date()

Interactive SQL PART IV: Grouping data from tables in SQL – Subqueries – Joins.

Text Books:

1. **"**An Introduction to Database Systems", C. J. Date, A.Kannan, S. Swamynathan, 8th Edition, Pearson Publication, 2012.

2. "SQL, PL/SQL The Programming Language of Oracle", Ivan Bay Ross, BPB Publications, Fourth Revised edition, 2013.

Reference Books:

1. "Database system concepts", Silberchartz korth, Sudarashan, Tata McGraw Hill, 4th Edition, 2002.
2. "Database management system, Oracle, SQL & PL/SQL ", Das Gupta, PHI Learning Pvt. Ltd., 2009.
3. "Database system using Oracle a simplified guide to SQL & PL/SQL ", Shah, 2nd Edition, PHI Learning Pvt. Ltd 2002.
4. "Introduction to SQL & PL/SQL ", Sharad Maheswari, Ruchin Jain, 2nd Edition, Laximi publication Pvt. Ltd., 2007.
5. "DBMS – Complete Practical approach ", 2nd Edition, Laximi publication Pvt. Ltd., 2006.

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B.Sc., Computer Science – Semester – V
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Code	Core Course – X	Hrs	Credits	Marks (CIA+ESE)
	Operating System	4	4	25+75

Objective

- To understand the history, concepts and structure of Operating Systems
- To gain knowledge on scheduling, deadlocks, storage and I/O management
- To learn the structure of Unix and Windows NT OS.

Unit – I: **(15 Hours)**

Introduction: What is Operating System? Computer system organization – computer system architecture – operating systems structure – operating system operations – process management – memory management – storage management – protection and security – distributed system.

System structures: Operating System Services – user operating system interface - System calls – types of system calls - System Programs – operating system design and Implementation – operating system structure – virtual machines.

Unit – II: **(15 Hours)**

Process concept: process concept - process scheduling – operation on processes – Inter process communication .

Process Scheduling : Basic concepts - scheduling criteria - scheduling algorithms – thread scheduling - multiple - processor scheduling – Algorithm Evaluation.

Synchronization: The critical section problem – Synchronization hardware – Semaphores.

Unit III : **(15 Hours)**

Deadlocks: System model – Deadlock characterization – Methods of handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

Memory Management strategies: Background – swapping - Continuous memory allocation – Paging – structure of page table – segmentation.

Virtual Memory management : Background – Demand Paging – page replacement - allocation of frames .

Unit – IV: **(15 Hours)**

File system : file concept – access methods – directory and disk structure – protection.

Secondary Storage Structure: Disk structure – Disk scheduling – Disk management – Swap Space management – RAID structure.

I/O systems : overview – I/O hardware – application I/O interface – kernel I/O system – transforming I/O request to hardware operations.

Unit V :

CASE STUDY **(15 Hours)**

The Linux System : History - Design Principles – kernel models - Process management – scheduling - Memory management – File System – I/O system – Inter Process Communication.

Windows 2000: History - Design principles – System Components – Environment Subsystems – File System – Networking – Programmer Interface.

Text Book:

"Operating System concepts", Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Wiley India, Eighth Edition, 2011.

Reference Books:

1. "Advanced Concepts in Operating Systems " , Mukesh Singhal and Nirajan G. Shivaratri, Tata McGrawHill, New Delhi, 2001.
2. " Operating System: Design and Implementation ", Tanenbaum & Woodhull, PHI Learning Pvt. Ltd., 2006.
3. " Operating system principles and design", Palchaudhury, PHI Learning Pvt. Ltd., 2009.
4. " Operating system fundamentals ", D. Irtegov, Laximi publication Pvt. Ltd., 2004.
5. " Operating system concepts" , PS.Gill, 1st Edition, Laximi publication Pvt. Ltd., 2006.

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B.Sc., Computer Science – Semester – V
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Code	Core Course – XI	Hrs	Credits	Marks (CIA+ESE)
	Computer System Architecture	4	4	25+75

Objectives:

- To learn functions of digital logic circuits
- To understand basic computer organization and design
- To gain knowledge on CPU, Memory and I/O organization, and Multiprocessors

Unit – I: **(15 Hours)**

Digital Logic Circuits: Digital Computers – Logic Gates – Combinational Circuits – Flip-Flops. **Data Representation:** Data Types – Complements – Fixed and Floating Point Representation – Other Binary Codes – Error Detection Codes.

Unit – II: **(15 Hours)**

Register Transfer and Microoperations: Register Transfer Language – Register Transfer – Arithmetic Microoperations – Logic Microoperations – Shift Microoperations – Arithmetic Logic Shift Unit. **Basic Computer Organization and Design:** Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input/Output and Interrupt.

Unit – III: **(15 Hours)**

Central Processing Unit : General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Program Control – Reduced Instruction Set Computer.

Unit – IV: **(15 Hours)**

Computer Arithmetic: Addition and Subtraction - Multiplication Algorithms – Division Algorithms. **Input-Output Organization:** Peripheral Devices – Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer.

Unit – V: **(15 Hours)**

Memory Organization: Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory – Memory Management Hardware. **Multiprocessors:** Characteristics of Multiprocessors – Interconnection Structures – Interprocessor Arbitration.

Text Book:

"Computer System Architecture" – M. Morris Mano - PHI Pvt. Ltd., 3rd Edition, 2013.

Reference Books:

1. Computer Architecture & Parallel Processing", Bharat Bhushan Agarwal, Sumit Prakash Tayal , 1st Edition, Laxmi Publication Pvt. Ltd., 2009.

2. "Computer System Architecture", Rao, PHI Learning Pvt. Ltd., 2008.

3. "Computer Organization and Architecture", Rajaraman & Radhakrishnan, PHI Learning Pvt. Ltd., 2007.

4. "Advanced Computer Architecture: A System Design Approach", Kain, PHI Learning Pvt. Ltd., 2002.

A. V. C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XII : Practical - V	Hrs	Credits	Marks (CIA+ESE)
	RDBMS	5	5	40+60

Objectives:

- To acquire knowledge on DDL, DML and DCL commands
- To understand the usage of SQL queries
- To learn the features on PL/SQL programming and Oracle forms

SQL:

1. Table creation with various data types and constraints.
2. DDL statements (CREATE, ALTER, DROP)
3. DML statements (Retrieval, Update, Delete, Insertion)
4. Arithmetic Functions
5. Character and String Functions.
6. Group functions
7. Conversion functions Date functions
8. JOINS (Self, Equi and Outer)
9. Sub queries and correlated sub queries.

PL/SQL:

10. Control structures
11. Simple and multiple loop structures.
12. Exception handling
13. Explicit and Implicit cursors

FORMS:

14. Design a Form in oracle for student detail using default form.
15. Design a Form in oracle for Employee detail using controls.

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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – I	Hrs	Credits	Marks (CIA+ESE)
	1. Software Engineering	4	4	25+75

Objectives:

- To understand the basic concepts of software engineering
- To learn the methods of planning a software project, software cost estimation, requirements definition, software design implementation, testing and maintenance

Unit – I: **(9 Hours)**

Introduction to Software Engineering: Definitions – Size factors – Quality and Productivity factors – managerial issues. **Planning a Software Project:** Defining the problem – Developing a solution strategy – Planning the development Process – Planning an organizational structure.

Unit – II: **(9 Hours)**

Software cost estimation: Software cost factors – Software cost estimation techniques – Expert Judgment –Delphi cost Estimation –Work Breakdown Structures – Algorithm Cost models. **Software requirement definition**: Software requirement specification – Formal specification techniques – Relational Notations – State-Oriented Notations.

Unit – III: **(9 Hours)**

Software Design: Fundamental design concepts – Modules and modularization criteria – Coupling and cohesion – other modularization criteria - Design notations – Design techniques.

Unit – IV: **(9 Hours)**

Implementation issues: Structured coding techniques – Coding style – standards and guide lines – Documentation guidelines. **Modern programming Language features**: Type checking – User defined data types – Exception handling – Concurrency mechanisms.

Unit – V: **(9 Hours)**

Verification and Validation techniques: Quality assurance – Walkthroughs and inspections – Static analysis – Symbolic execution – Unit Testing and debugging – System Testing**. Software maintenance:** Enhancing maintainability during development – Managerial Aspects of Software maintenance.

Text Book:

"Software Engineering concepts", Richard Fairly, Tata McGraw Hill Publishing Company Limited, 33rd reprint 2010.(Relevant portions only)

Reference Books:

1. "Software Engineering Applications approach", 12th edition, Rogan S Pressman, Tata McGraw Hill,2010.
2. "Software Engineering", James , PHI Learning Pvt. Ltd., 2011.
3. "Software Engineering: A Concise study", Kelkhar, , PHI Learning Pvt. Ltd., 2007.
4. "Human aspects of Software Engineering", James E.Tomayko, Orit Hazzan, Laximi publication Pvt. Ltd. 2005.
5. "Software Engineering", Bharat, Bhushan, Agarwal, Sumit, Prakash Tayal, 1st Edition, Laximi publication Pvt. Ltd.2007.

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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – I	Hrs	Credits	Marks (CIA+ESE)
	2. System Analysis And Design	4	4	25+75

Objectives:

- To understand the concepts of Systems and Information systems
- To learn the role of Systems analyst, processes involved in system analysis, tools available, cost-benefit analysis, file organization and database design

Unit – I: **(9 Hours)**

Systems concepts and the Information Systems Environment: Introduction – The Systems concept: Definition – Characteristics of a system: Organization – Interaction – Interdependence – Integration – central objective – Elements of a system: Outputs and inputs – processor – control – feedback – environment – boundaries and interfaces – types of systems: physical or abstract systems – open or closed systems – man-made information systems. The system development life cycle: introduction – the system development life cycle – recognition of need – what is problem? – Feasibility study – analysis – design – implementation – post implementation and maintenance – considerations for candidate systems: political considerations – planning and control for system success – prototyping.

Unit – II: **(9 Hours)**

The Role of the Systems Analyst: Introduction – definition – Historical perspective: the early years – the war effort – what does it take to do systems analysis? – academic and personal qualifications – the multifaceted role of the analyst: change agent – investigator and monitor – architect – psychologist – salesperson – motivator – politician – the analyst/user interface: behavioral issues – conflict resolution – the place of the analyst in the MIS organization - the MIS organization – rising positions in system development paraprofessional – the technical writer. System analysis: System planning and the initial investigation: introduction – base for planning in systems analysis:

dimensions of planning – initial investigation: needs identification – determining the user's information requirements – case scenario – problem definition and project initiation – background analysis – fact-finding – fact analysis – determination of feasibility.

Unit – III: (9 Hours)

System analysis: Information Gathering: introduction – what kinds of information do we need? – Information about the firm. – Information about user staff – Information about work flow – where does information originate? – Information-gathering tools: review of literature, procedures and forms – on-site observation – interviews and questionnaires – type of interviews and questionnaires. The tools of structured analysis: introduction – what is structured analysis? – the tools of structured analysis: the data flow diagram (DFD) – data dictionary – decision tree and structured English – decision tables – pros and cons of each tool. Feasibility study: introduction – system – performance definition: statement of constraints – identification of specific system objectives – description of outputs – feasibility study: feasibility consideration – steps in feasibility analysis – feasibility report – oral presentation.

Unit – IV: (9 Hours)

Cost /benefit analysis: introduction – data analysis – cost/benefit analysis: cost and benefit categories – procedure for cost / benefit determination – the system proposal.

Systems design: the process and stages of systems design: introduction – the process of design: logical and physical design – design methodologies: structured design – form-driven methodology – the IPO charts – structured walkthrough. – Major development activities: personnel allocation – audit considerations: processing controls and data validation – audit trail and documentation control. Input /Output and forms design: introduction – input design: input data – input media and devices: output design – forms design: what is a form? – Classification of forms – requirements of forms design – carbon paper as a form copier – types of forms – layout considerations – forms control.

Unit – V: **(9 Hours)**

File organization and data base design: introduction – file structure – file organization: sequential organization – indexed-sequential organization – inverted list organization – direct-access organization – data base design: objectives of data base- key terms – logical and physical views of data. Data structure – normalization – the role of the data base administrator. System implementation: System testing and quality assurance: introduction – why system testing? – What do we test for? – The nature of test data.- the test plan: activity network for system testing. – System testing – quality assurance: quality assurance goals in the systems life cycle. – Levels of quality assurance – trends in testing – role of the data processing auditor: the audit trail. Implementation and software maintenance: introduction – conversion: activity network for conversion – combating resistance to change – post-implementation review: request for review – a review plan – software maintenance: maintenance or enhancement? – Primary activities of a maintenance procedure – reducing maintenance costs.

Text Book:

"System Analysis and Design ", Elias M. Awad, Galgotia Publications (P) Ltd., second edition, New Delhi, 2000.

Reference Books:

1. "Introducing system analysis and design", Lee, Vol. I & II, Galgotia Publication, 2002.
2. " System analysis and design", Kendall & Kendall, 7th Edition, PHI Learning Pvt. Ltd, 2007.
3. "System analysis and design: Techniques, Methodologies, Approaches and Architectures",Chaing. et al(Eds) , PHI Learning pvt. Ltd., 2005.
4. "Analysis and design of Information Systems", Rajaraman, 2nd Edition, PHI Learning pvt. Ltd, 2007.
5. "Structured system analysis and design", J.B.Dixit, Raj Kumar, Laxmi publication Pvt. Ltd.,2010.

A. V. C. COLLEGE (AUTONOMOUS)
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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – I	Hrs	Credits	Marks (CIA+ESE)
	3. Object Oriented Analysis and Design	4	4	25+75

Objectives:

- To learn the basics of object, object-oriented systems development methodologies
- To understand the usage of UML and the process involved in object-oriented analysis
- To enable students to learn the procedure of ensuring software quality assurance

Unit – I: (9 Hours)

Object Basics: Introduction – An Object-Oriented Philosophy – Objects – Object are grouped in classes – Attributes: Object state and properties – Object Behavior and methods – Object respond to message – Encapsulation and Information hiding – class hierarchy – polymorphism – Object relationship and associations – Aggregations and object containment.

Object-Oriented systems development life cycle: Introduction – The software development process – Building high-quality software – Object-Oriented system development: A use-case driven approach- Reusability.

Unit – II: (9 Hours)

Object-Oriented Methodologies: Introduction – Survey of some of the object-oriented methodologies – Rumbaugh et al.'s object modeling technique – the Booch methodology – the Jacobson et al. methodologies – Patterns – Frameworks – The Unified Approach.

Unified Modeling Language: Introduction – static and dynamic models – why modeling? – Introduction to the Unified modeling language – UML Diagrams – UML Class Diagram – Use-case Diagram – UML Dynamic modeling – Model Management: packages and model Organization – UML Extensibility – UML Meta-model.

Unit – III: **(9 Hours)**

Object-Oriented analysis process: Identifying use cases – Introduction – why analysis is a difficult activity – 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 – common class patterns approach – Use-case driven approach: Identifying classes and their behavior through sequence / collaboration modeling – Classes, Responsibilities, and Collaborations- Naming classes.

Unit – IV: **(9 Hours)**

Identifying object relationships, attributes, and methods: Introduction – Associations – Super-sub class relationships – A-part-of relationships-Aggregation- Class Responsibility: Identifying attributes and methods – Class Responsibility: Defining attributes by analyzing use case and other UML Diagrams – Defining attributes for ViaNet Bank objects – Object Responsibility: methods and messages – Defining methods for vianet bank objects.

The object-oriented design process and design axioms: Introduction – the object-oriented design process – object-oriented design axioms – corollaries – design patterns.

Unit – V: **(9 Hours)**

Software quality assurance: Introduction – Quality assurance tests – testing strategies – impact of object orientation on testing – test cases – test plan – continuous testing – Myers's debugging principles.

System usability and measuring user satisfaction: Introduction – usability testing – user satisfaction test – A tool for a analyzing user satisfaction: the user satisfaction test template.

Text Book:

"Object Oriented Systems Development", Ali Bahrami, Tata– McGraw Hill, New Delhi, International edition, 2001.

Reference Books:

1. "Object Oriented Analysis and Design with applications", Gredy Booch,II edition, Addision Wesley, 1994.
2. "Object Oriented Analysis and Design using UML: Introduction Unified Process and design pattern", Matha, PHI Learning Pvt.Ltd., 2002.
3. "Object Oriented Analysis and Design", Andrew Haigh, TMH, 2002.
4. "UML & C++: A practical guide to object-oriented development", Lee & Tepfenhart, 2nd Edtion, PHI Learning Pvt. Ltd., 2003.
5. " Structured systems analysis and design: A Concise Study", Kelkar, PHI Learning Pvt. Ltd., 2002.

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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – II	Hrs	Credits	Marks (CIA+ESE)
	1. Network Security	4	4	25+75

Objectives:

- To enable students to learn Information security, policies and process
- To understand the security technologies
- To acquire knowledge on Internet Security

Unit – I: **(9 Hours)**

Information security basics: Information Security : Define Security as a process, Not point products - **Types of Attacks - Hacker Techniques:** A hacker's motivation – Hacking Techniques – Methods of untargeted Hacker. **Information Security Service.**

Unit – II: **(9 Hours)**

Information Security Services : The confidentiality service – The integrity service – The availability service – The accountability service. **Policy:** Why policy is important – The various policies used by organizations – Create appropriate policy – Deploy Policy.

Unit – III: **(9 Hours)**

Managing Risk: Define Risk – Measuring risk. **Information security process**: Conducting an assessment – Developing Policy – Implementing security – Awareness training.

Unit – IV: **(9 Hours)**

Information security best practices: Administrative security practices– Technical security practices. **Network Security technology: Perimeter Technology:** Perimeters and Perimeter Policy basics – Perimeter control – Creating a architecture.

Unit – V: **(9 Hours)**

Monitoring Technology : The purposes of monitoring – Monitoring technologies – Creating a monitoring architecture –correlating events – separation of duties. **Encryption Technologies** : Basic encryption concepts – Encryption terms – Symmetric key encryption – Public key encryption – Digital signatures – Key management.

Text Book:

"Network security A Beginners Guide" by Eric Maiwald, 3rd edition, Mc Graw hill publication, 2013.

Reference Books:

1. "Cryptography and Network Security"-William Stallings-1st edition, Delhi: Pearson Education 1998.
2. "Network Security"- Ankit Fadia – 1st edition , Delhi : McMillan Publications, 1998.
3. "Network security & Management", Sigh., 2nd Edition, PHI Learing Pvt, Ltd.
4. " Networks Security: Private Communication in a public world", Kaufman, Perlman & Speciner, 2nd Edition, PHI Learning Pvt. Ltd., 2002.
5. "Networking", Balvir Singh, 2nd Edition, Laxmi publication Pvt. Ltd. 2009.

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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course– II	Hrs	Credits	Marks (CIA+ESE)
	2. Software Quality and Testing	4	4	25+75

Objectives:

- To gain knowledge on Software Quality Assurance, Testing Fundamentals
- To understand the Specialization of Testing, Test Management and Test Automation

Unit – I: Software Quality Assurance **(9 Hours)**

Quality Concepts - Quality Movement - Software Quality Assurance – Software Reviews - Formal Technical Reviews - Formal Approaches to SQA - Statistical Software Quality Assurance - Software Reliability - The ISO 9000 Quality Standards - The SQA Plan.

Unit – II: Testing Fundamentals **(9 Hours)**

Testing Fundamentals - Types of Testing: White box testing - Black box testing - Integration testing - System and acceptance testing - Performance testing.

Unit – III: Specialized Testing **(9 Hours)**

Testing of Object Oriented Systems - Usability and Accessibility testing.

Unit – IV: Test Management **(9 Hours)**

Organizational issues in testing: Organization structure for testing teams. Test Management: Test Planning, Management, Execution and Reporting.

Unit – V: Test Automation **(9 Hours)**

Software Test Automation - Test Metrics and Measurements.

Text Books:

1. “Software Engineering” , Roger S Pressman, Tata McGraw hill, 5th Edition, 2003.

2. “Software Testing” (Units II, III, IV, V), Srinivasan Desikan, Gopalaswamy Ramesh - Pearson Education 2006.

Reference Books:

1. “Introducing Software Testing”, Louis Tamres, Addison Wesley Publications, First Edition., 2003.
2. “Software Testing”, Ron Patton, SAMS Techmedia, Indian Edition 2001.
3. “Software Quality - Producing Practical, Consistent Software”, Mordechai Ben – Menachem, Gary s. Marliss, Thomson Learning, 2003.
4. “Effective Software Testing “ Elfriede Dustin, low price edition, Pearson education – 2003.
5. “Software Quality – Producing practical, Consistent software”, Mordechai Ben, eachem & Garry S. Marliss, International Thompson computer press, 2004.

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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – II	Hrs	Credits	Marks (CIA+ESE)
	3. Management Information System	4	4	25+75

Objectives:

- To enable students to learn the componenets of Information System
- To understand the Enterprise Business systems

Unit – I: Foundation Concepts **(9 Hours)**

Information system in Business – Components of information systems – Fundamentals of strategic advantages – using information technology for strategic advantages.

Unit – II: Information Technology **(9 Hours)**

Computer Hardware: Computer systems – computer peripherals. Computer software: Application software – system software. Data resource management: Managing data resources.

Unit – III: Business Applications **(9 Hours)**

Enterprise Business systems – Functional business systems – customer relationship management (CRM) – Enterprise Resource Planning (ERP) – supply chain management (SCM) – E-Commerce fundamentals.

Unit – IV: Development Process **(9 Hours)**

Planning fundamentals – Implementation challenges – Developing business system – implementing business systems.

Unit – V: Management Challenges (9 Hours)

Security management of Information technology – Managing information technology.

Text Book:

"Management Information System" by James A O'Brien, George M. Marakas. Special India 7th Edition, Tata McGrawHill, 2003.

Reference Book:

1. "Management Information Systems", Gupta, S.Chand company Ltd., New Delhi, 2002.
2. " Management Information Systems", Sadagopan, PHI Learning Pvt. Ltd., 2001.
3. "Management Information Systems", Chatterjee, , PHI Learning Pvt. Ltd., 2003
4. " Management Information Systems: A Concise Study", Kelkar, 2nd Edition, PHI Learning Pvt. Ltd., 2001.
5. " Management Information System in Knowledge Economy", Joseph & Mohapatra, PHI Learning Pvt. Ltd., 2003.

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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	NMEC – II	Hrs	Credits	Marks (CIA+ESE)
	Mathematics Aptitude – II	2	2	25+75

Department of Mathematics

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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	SSD – I	Hrs	Credits	Marks (CIA+ESE)
	Soft Skills Course	2	2	25+75

Common paper for all departments

A. V. C. COLLEGE (AUTONOMOUS)
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B.Sc., Computer Science – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	EA – I	Hrs	Credits	Marks (CIA+ESE)
	Gender Studies	1	1	25+75

Common paper for all departments

A. V. C. COLLEGE (AUTONOMOUS)
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B.Sc., Computer Science – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XIII	Hrs	Credits	Marks (CIA+ESE)
	Dot Net Programming	5	5	25+75

Objectives:

- To enable students to learn IDE of Microsoft visual studio .Net
- To understand the Control structures, Procedures and Arrays
- To gain skills on Graphical User Interface Controls and Databases

Unit – I: **(15 Hours)**

Essential Visual Basic .NET: Putting Visual Basic to Work – What's new in VB.NET – The .NET Framework and the common language runtime – Building VB.NET Applications – The Visual Basic Integrated Development Environment. **Visual Basic Language: operators, conditionals, and Loops:** keywords – statements – syntax – options and imports statements. ***Immediate Solutions:*** declaring constants – creating enumerations – declaring variables – data types, converting between data types, checking data types – declaring arrays and dynamic arrays – handling strings, converting string to number, characters and character codes – operators and operators precedence – commenting your code – if..else, select case, switch and choose, do loop, for, for each..next, while, with statement.

Unit –II: **(15 Hours)**

Windows Forms: All about windows forms – window MDI forms – creating windows applications – Adding Controls to Forms – Handling Events – A Windows Forms in Code. ***Immediate Solutions:*** setting title bar text – adding/removing min/max buttons and setting a form's border – setting control tab order – setting forms initial positions – moving and sizing forms and controls in code, showing and hiding controls and forms – using MsgBox function – using the MessageBox..Show method – using InputBox function – working with multiple forms – using properties to communicate

between forms – setting the startup form – creating MDI applications – creating dialog boxes – creating owned forms – passing forms to procedures – minimizing/maximizing and enabling/disabling forms – adding and removing controls at run time – handling mouse events – handling keyboard events.

Windows Forms: Text boxes – Rich Text Boxes – Labels and Link Labels:

Immediate Solutions: **Text boxes:** creating multiline, word-wrap, accessing text, adding scroll bar, align text, read-only, select and replace text, copying or getting selected to or from the clipboard, creating a password control, controlling input, creating a text box in code – **Rich Text Boxes:** accessing text, creating bold, .italic, underlined and strikeout text, indent text, adding bullet, setting text color, save and load RTF file, align text, creating rich text box in code – **Labels:** labels, formatting and aligning text, access keys to controls without captions – **Link Labels:** creation, using code, link to another form and web.

Unit – III: **(15 Hours)**

Windows Forms: Buttons, Checkboxes, Radio buttons, Panels and group boxes. ***Immediate Solutions:*** **Buttons:** about buttons, setting buttons caption, foreground and background color, fonts, handling button clicks, Imitating control arrays, resetting the focus after the button click, button tab order, disabling buttons, show/hide, resizing and moving buttons from code, adding pictures to a button, adding button at run time, passing button to procedure, handling button releases – **Checkbox:** using its class, creation, getting state, setting state, creating three-state checkbox – **Radio button:** Class , creation, getting state, setting state, creating toggle buttons – **Panel:** class, creation, adding controls to panels in code – **Groupbox:** class, creation, adding controls.

Unit – IV: **(15 Hours)**

Windows Forms: List Boxes, Checked List Boxes, Combo Boxes and Picture Boxes, Scrollbar and Timer. ***Immediate Solutions:*** **ListBox:** class, adding items, referring items, responding to event, removing items, sorting, determining how many items, items are selected, making list boxes scroll horizontally, multi select, clearing – **CheckedList Box:** class adding items, determining checked items, unchecked items, handling events – **ComboBox:** class, creating simple, drop-down and drop-down list comboboxes, adding item, responding to selection, removing items, getting current selection, sorting, clearing, getting number of items, sorting and clearing a combobox – **Picture box:** class, setting or

getting images, adjusting size, handling events. **– Scroll bar:** HScrollBar and VScrollBar classes**,** setting scroll bar minimum and maximum value, setting up scroll bar clicks and arrow clicks –**Timer:** class, setting interval, turning on/off timer, handling events.

Menus, Built-in dialog boxes and printing: Menus, Menu Items, Context menus – Built-in dialog boxes, **dialogs:** open file, save file, font, color, print dialogs. ***Immediate Solutions:*** using MainMenus class, using MenuItems class, creating menu and sub menus, adding checkmarks to menu item, creating menu access keys, shortcut, changing caption at run time, creating menu separator, using popup event, show and hide the menu items, disabling menu items, drawing menu items yourself, creating menus in code – merging MDI menus, creating MDI window menus, using context menu class, creating context menu, open dialog class, creating open file dialogs, using the save file dialog class, creating save file dialogs, using font dialog class, creating font dialogs, using color dialog class, creating color dialogs – printing.

Unit – V: **(15 Hours)**

Data Access with ADO.NET: What are databases?, accessing data with server explorer – accessing data with data adapters and dataset – working with ADO.NET – overview of ADO.NET objects. ***Immediate Solutions:*** using basic SQL – using the server explorer – creating new data connection – dragging tables from the server explorer to a form – creating a dataset – populating a dataset – display data in a data grid – selecting a data provider – data access using the data adapter controls – previewing data from the data adapters – examining dataset properties – examining dataset schema – connecting to an MS Jet database – using RDBMS – adding multiple tables to a dataset – using data views.

Building controls to Database: simple binding – complex binding – binding data to control – navigating in datasets – using the display members and value member properties – creating data forms with the data form wizard – using SQL parameters.

Immediate Solutions: using the data binding's property for data binding – creating simple and complex data binding – binding**:** text boxes, check boxes, combo boxes, list boxes, checked list boxes. Using the display and value member properties – using the data grid class – binding data grid – using binding context class – navigating in datasets – creating data forms automatically – using parameterized SQL queries – using master/detail relationships and data relation objects – using the error provider class – performing data validation in controls**.**

Text Book:

"Visual Basic .NET programming", [Black Book] by Steven Holzner, Dreamtech, Reprint edition 2011.

Reference Books:

1. "VB.Net programming in easy steps" by Tim Anderson, DreamTech, 2002.
2. "Programming and problem solving with VB.NET" by Nell Dale, Michael McMillan, Chip Weems, Mark Headington, Narosa Publishing house, 2003.
3. "VB.Net Complete Reference" by Jeffrey R. Shapiro, Tata Mc Graw Hill Publication, 2002.
4. "Programming Microsoft Visual Basic .NET (Core Reference)" by Francesco Balena, First Edition, 2002.

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B.Sc., Computer Science – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XIV	Hrs	Credits	Marks (CIA+ESE)
	Data Communications and Networks	5	5	25+75

Objectives:

- To learn the concepts of Data communications and networks and Transmission Errors, Topologies and Routing Algorithms.
- To understand the Classification of Networks and Internetworking Concepts
- To acquire knowledge on TCP/IP, DNS, FTP and UDP

Unit – I: **(15 Hours)**

Introduction to data communications and networks: Fundamental concepts, Data communications, Protocols, Standards, Standards organizations, Signal propagation, Analog and Digital signals, Bandwidth of a signal and a medium – Fourier analysis and the concept of Bandwidth of a signal, Data Transmission Rate and Bandwidth**- Analog and digital transmission methods:** Analog signal, analog transmission, Digitasl signal and Digital transmission, Digital signal and analog transmission, Baud rate and bits per second, Analog signal and digital transmission, Nyquist Therorem **- Modes of data transmission and multiplexing:** Introduction, parallel and serial communications, asynchronous, synchronous and isochronous communication, simplex, half duplex and full duplex communication - multiplexing and demultiplexing - types of multiplexing.

Unit – II: **(15 Hours)**

Transmission errors: Deduction and correction: Error Classification, Types of Errors, Error Detection **- Network topologies, switching and routing algorithm:** Mesh Topology, star Topology, Tree Topology, Ring Topology, Bus Topology, Hybrid Topology, Basics of switching, Router and routing, Routing algorithms **- networking protocols and OSI model:** Protocols in computer communications, The OSI Model, OSI layer functions, Queuing theory and M/M/1 queues**.**

Unit – III: **(15 Hours)**

LAN, MAN, WAN Networks- **Medium Access sublayer and ISDN:** Static and dynamic channel allocation, Medium Access Control sublayer, MAC in LAN and WAN, Classification and study of MAC sublayer protocols/collisions, ISDN and Its background, ISDN Architecture, ISDN Interfaces, Functional grouping, Reference points, ISDN protocol Architecture, Narrowband-ISDN and Broadband ISDN – **X.25 protocol:** Understanding How X.25 works, Characteristics of X.25, Packet Format, X.25 Operation, CCITT X.21 **- Frame relay and congestion control:** The need for frame relay, How frame relay frame format, congestion control, congestion control algorithms, traffic control, frame relay assembler/disassembler, other features**.**

Unit – IV: **(15 Hours)**

Internetworking Concepts, Devices, Internet basics, History and Architecture: Repeaters, bridges, routers, gateways **TCP/IP Part I:**TCP/IP basics , IP addresses, ARP, RARP, ICMP.

Unit – V: **(15 Hours)**

TCP/IP –Part 2 : TCP and UDP : TCP Basics, Feature of TCP – Relationship between TCP and IP –Ports And sockets – TCP Connections –TCP Packet Format - UDP Packet -Differences between UDP and TCP. **TCP/IP –Part 3 :** DNS – Email – FTP – TFTP . **TCP/IP –Part 4 :** Web Browser Architecture-Telnet.

Text Book :

"Data communications and networks", Achyut and Godbole, Tata McGraw Hill Publishing company limited, 2nd edition 2011 (Relevant portions only).

Reference Books:

1. "Data communications and Networking", Behrouz A.Forouzan , Tata McGraw Hill Publication Company Limited, 2nd Edition, 2002.
2. "Data Communication and Computer Networks", Gupta, , PHI Learning Pvt. Ltd., 2001.
3. " Data Communication and Computer Networks", Singh, 2nd Edition, , PHI Learning Pvt. Ltd., 2003.
4. " Data Communication and Distributed Networks", Black, 3rd Edition, , PHI Learning Pvt. Ltd., 2005.
5. "Elements of Data Communications Networks", S.A. Amutha, Jeevakumari, 1st Edition, , PHI Learning Pvt. Ltd., 2003.

A. V. C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

B.Sc., Computer Science – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XV	Hrs	Credits	Marks (CIA+ESE)
	Microprocessor and Its Applications	5	5	25+75

Objectives:

- To enable students to learn Microprocessor Architecture, Assembly language programming
- To understand the 8085 instructions, Counters, Time delays, Interrupts and I/O communication.
- To acquire knowledge on Pentium processors

Unit – I : **(15 hours)**

Introduction : Evolution of microprocessor – Single chip micro computers – Embedded micro processor – Types of microprocessor.

Intel 8086 and Intel's other 16-bit microprocessors : Introduction – Intel 8086 – classifications of 8086 Instructions – Binary address of 8086 Registers.

Unit – II : **(15 hours)**

Description of 8086 Instructions - Example of 8086 Assembly language programs - Assembler directives – Assembler directives for Intel 8086 microprocessor in alphabetical order.

Unit – III: **(15 hours)**

Assembly language programs using assembler – Intel 80186 – Intel 80286 – Intel 8088. **Intel's 32-bit and 64-bit microprocessors:** Introduction – Intel 80386 – Intel's Pentium processor – MMX technology – Pentium MMX – Pentium pro microprocessor – Dynamic execution of instructions – Speculative execution - branch prediction – Pentium II – Pentium III – Celeron – Pentium 4 – IA-64.

Unit – IV: **(15 hours)**

Speculative loading – Itanium. **Some other microprocessors :** Introduction – AMD – Sun micro processors – MIPS microprocessors – POWER PC micro processors – DEC's Alpha microprocessors – National semiconductor microprocessors – ARM micro processors – ZILOG Z80 – ZILOG Z8000

Unit – V: **(15 hours)**

Motorola microprocessors – MCS 6500 – Transmeta corporation's crusoe chips – VIA's C3 processor – Hewlett Packard processors.

Text Book:

Fundamentals of Microprocessor and Microcomputers , B. RAM, Dhanpat Rai Publications, 2010.

Reference Books:

1.Microprocesor 8085:Architecture , Programming and Interfacing " , Wadhwa , , PHI Learning Pvt. Ltd., 2005.

2. Microprocessor 8085 and its Interfacing ", Mathur, , PHI Learning Pvt. Ltd. 2001.

3. "Microcomputers and Microprocessor: The 8080, 8085 and z-80 programming , Interfacing and Troubleshooting " Uffenbeck , 3rd Edition , PHI Learning Pvt. Ltd. 2003.

4. "Introduction to microprocessor", Mathur Aditya .P , Third Edn., TMH Publication, 2006.

5. Microprocessor based design : A comprehernsive guide to effective hardware design", Slater , PHI Learning Pvt. Ltd., 2004.

A. V. C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

B.Sc., Computer Science – Semester – VI
(For the candidates admitted to the course under CBCS Pattern from 2015-2016 onwards)

Code	Core Course – XVI : Practical VI	Hrs	Credits	Marks (CIA+ESE)
	Dot Net Programming	6	5	40+60

Objectives:

- To enable the student to learn application designing and handling events
- To acquire knowledge on developing database programs

Dot Net Programming:

1. Design an application to change background color of forms using scroll bars.
2. Write a .NET application to design a simple calculator.
3. Design a file browser using vb.net
4. Using menus develop a notepad.
5. Write a .NET program to demonstrate the usage of checkbox and radio button.
6. Write a .NET program to demonstrate the usage of Listbox and Checked List box controls.
7. Create a web page with all validations.
8. Design a web page with dynamic advertisements.
9. Develop a vb.net program for implement mouse handling events.
10. Prepare a student mark sheet using database.
11. Develop a database program to do all manipulations in a table.
12. Write a database program to display details of an employee if his/her number is the input using crystal report.

A. V. C. COLLEGE (AUTONOMOUS)
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B.Sc., Computer Science – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – III	Hrs	Credits	Marks (CIA+ESE)
	1. Multimedia and Its Applications	5	5	25+75

Objectives:

- To enable students to learn the introduction of multimedia, Setting up a Multimedia Studio and Multimedia Elements
- To acquire knowledge on Multimedia Text, Audio, Animation and Multimedia Projects

Unit – I: **(15 hours)**

Multimedia-An overview: Introduction – Multimedia Presentation and Production – Characteristics of multimedia presentation – Hardware and Software requirements – Uses of Multimedia – Analog and Digital Representations – Digitization.

Text : Introduction – Types of Text – Unicode standard – Font – Insertion of Text – Text Compression – Text File Formats.

Unit – II : **(15 hours)**

Image : Introduction - Image Data Representation – Image Acquisition – Image Processing – Binary Image processing – Gray Scale Image Processing – Color Image Processing – Image output on monitors.

Unit – III: **(15 hours)**

Graphics : Introduction – Advantages of Graphics – Uses of Graphics – Components of a Graphics System – 2D co-ordinate systems – 2D Transformations – Line Drawing Algorithms – Circle Drawing Algorithms – Filling Algorithms – Clipping Algorithms.

Audio: Introduction – Acoustics – Sound waves – Types and Properties of Sounds – Psycho-Acoustics – Components of an Audio Systems – Digital Audio – Synthesizers – Musical Instrument Digital Interface – Digital Audio Processing – Speech – Sound Card.

Unit – IV: **(15 hours)**

Video: Introduction – Motion Video – Analog Video Camera – Analog Video Signal Representation – Television Systems – Video Color Spaces – Digital Video – Digital Video Processing – Video Recording and Storage Formats.

Animation : Introduction – Historical Background – Uses of Animation – Traditional Animation – Principles of Animation – Computer Based Animation – Animation on the Web – 3D Animation – Rendering Algorithms.

Unit – V: **(15 hours)**

Compression : Introduction – Basic Concepts – Lossless compression Techniques – Lossy compression Techniques.

Multimedia Application Development : Introduction - Software Life Cycle Overview – ADDIE Model – Multimedia Production Steps – Case Study – Authoring Software.

Text Book:

Principles of Multimedia – Ranjan Parekh, Second Edition, TMH publication, 2013. (Relevant portions only)

Reference Books:

1. ”Multimedia making it work”, Tay Vaughan, 8th Edition, TataMcGraw-Hill, 2011.
2. “Multimedia communication systems – Techniques , Standards and Networks “, Rao, Bojkovic & Milovanovic, 1st edition, PHI Learning Pvt. Ltd, 2007.
3. “Multimedia fundamentals: Vol – 1: Media coding and content processing”, Steinmetz & Nahrstedt, PHI Learning Pvt. Ltd, 2003.
4. “Multimedia information networking “, Sharadha, PHI Learning Pvt. Ltd., 2009.
5. “Multimedia basis – Technologies (Vol-1), Andreas, Holzinger, Laximi Publication Pvt. Ltd., 2004.

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B.Sc., Computer Science – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – III	Hrs	Credits	Marks (CIA+ESE)
	2. Embedded Systems	5	5	25+75

Objectives:

- To understand the basic concepts of Embedded systems
- To learn the concepts of Interrupts and Real-Time Operating Systems (RTOS)
- To know the design of RTOS and debugging techniques

Unit – I: **(15 Hours)**

A First Look at Embedded Systems: Examples of Embedded Systems-Typical Hardware-Hardware Fundamentals for the Software Engineer: Terminology-Gates- A Few Other Basic–Considerations-Timing Diagrams- Memory-Advanced Hardware Fundamentals: Microprocessors-Buses-Direct Memory Access-Interrupts-Other-Common Parts-Built-Ins on the Microprocessor-Conventions Used on Schematics.

Unit – II: **(15 Hours)**

Interrupts: Microprocessor Architecture-Interrupt Basics-The Shared-data Problem Interrupt Latency-Survey of Software Architectures-Round-Robin-Round-Robin with Interrupts-Function- Queue Scheduling Architecture- Real –Time Operating system Architecture-Selecting an Architecture.

Unit – III: **(15 Hours)**

Introduction to Real –Time Operating Systems: Task and Task States-Tasks And data- Semaphores and Shared data-More Operating System Services- Message Queues, Mailboxes and Pipes-Timer Functions-Events-Memory Management-Interrupt routines in an RTOS Environment.

Unit – IV: **(15 Hours)**

Basic Design Using a Real-Time Operating System: Overview-Principles-An Example-Encapsulating Semaphores and Queues-Hard Real-Time Scheduling Considerations-Saving Memory Space-Saving Power-Embedded Software Development Tools-Host and Target Machines-Linker/Locator for Embedded Software-Getting Embedded Software into the Target System.

Unit – V: **(15 Hours)**

Debugging Techniques: Testing on Your Host Machine-Instruction Set Simulators-The assert Macro-Using-Laboratory Tools An Example System: What the Program Does-Environment in which the program Operates – A Guide to the Source Code-Source Code

Text Book:

"An Embedded Software Primer", David E. Simon, PEARSON Education, 2004.

Reference Books:

1. "Embedded Systems Architecture, Programming and Design", Rajkamal, Tata Mcgraw Hill,2003.
2. "TCP/IP application layer protocol for Embedded systems", M.Tim Jones, Laxmi publication Pvt. Ltd. 2004.
3. "Practical Linux programming: Device Drivers, Embedded Systems and the internet", Ashfaq A.Khan, Laxmi publication Pvt. Ltd. 2004.
4. "Fundamentals of Embedded software: Where C and Assembly Meet", Lewis, PHI Learning Pvt. Ltd., 2003.
5. "Embedded Systems" , Kanta Rao, PHI Learning Pvt. Ltd., 2002.

A. V. C. COLLEGE (AUTONOMOUS)
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B.Sc., Computer Science – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – III	Hrs	Credits	Marks (CIA+ESE)
	3. E- Commerce	5	5	25+75

Objectives:

- To understand the fundamentals of E-Commerce, network infrastructure
- To learn the network security and firewalls, Interorganizational commerce, Electronic Data Interchange (EDI) and Software agents

Unit – I: **(15 Hours)**

Introduction to Electronic Commerce:- Electronic commerce framework – The anatomy of E-commerce applications – Electronic commerce consumer applications – Electronic commerce organization applications.

The Network Infrastructure for Electronic commerce:- Components of the I-way – Network access equipment – Global information distribution networks.

Unit – II: **(15 Hours)**

The Internet as a Network Infrastructure:- The Internet Terminology – Chronological History of the Internet.

The Business of Internet Commercialization:- Telco/Cable/On-Line Companies – National Independent ISPs – Regional Level ISPs – Local Level ISPs.

Unit – III: **(15 Hours)**

Network Security and Firewalls:- Client-server network security – Firewalls and Network security – Data and Message Security – Challenge-Response Systems – Encrypted documents and Electronic mail.

Electronic commerce and world wide web:- Architectural framework for electronic commerce – Technology behind the web – security and the web.

Unit – IV: **(15 Hours)**

Inter organizational commerce and EDI:- Electronic data interchange – EDI applications in business.

EDI implementation, MIME, and value-added networks:- EDI software implementation – EDI envelope for message transport – value-added networks – Internet based EDI.

Unit – V: **(15 Hours)**

Advertising and marketing on the internet:- The new age of Information-based marketing – Advertising on the Internet – Charting the on-line marketing process.

Software Agents:- Characteristics and properties of Agents – The technology behind software agents – Applets, browsers, and software agents.

Text Book:

"Frontiers of Electronic commerce", Kalakota whinston, Pearson Education, Sixth Impression, 2008 (Relevant Portions only).

Reference Books:

1. **"**Cyber laws intellectual property & E-commerce security", Edi, Dominant publishers and distributors, 2003.
2. "E-Commerce: An Indian Perspective", Joseph, 3rd Edition, PHI Learning Pvt. Ltd., 2002.
3. "E-Commerce – From Vision to Fulfillment", Award, 3rd Edition, PHI Learning Pvt. Ltd., 2003.
4. "Essentials of E-Commerce Technology", Rajaraman, PHI Learning Pvt. Ltd., 2005.

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B.Sc., Computer Science – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	VBC	Hrs	Credits	Marks (CIA+ESE)
	Human Values & Professional Ethics	2	2	25+75

Common paper for all departments

A. V. C. COLLEGE (AUTONOMOUS)
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B.Sc., Computer Science – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	ES	Hrs	Credits	Marks (CIA+ESE)
	Environmental Studies	2	2	25+75

Common paper for all departments

A.V.C. COLLEGE (AUTONOMOUS) MANNAMPANDAL, MAYILADUTHURAI

DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

(Student admitted from the academic year 2015 – 2016 onwards)

Sem.	Sub. Code	Courses	Title of the paper	Hours	Credits	Total Credits
I		CC I	Object Oriented System Design	6	4	23
		CC II	Data Structures and Algorithms	6	4	
		CC III	Advanced Database Management Systems	5	4	
		CC IV	**Practical I** – Data Structures	4	4	
		CC V	**Practical II**– RDBMS	4	3	
		EC I	**Elective – I**	5	4	
II		CC VI	Dot Net Programming	5	4	25
		CC VII	Distributed Operating Systems	4	4	
		CC VIII	Open Source Technology	5	4	
		CC IX	**Practical III-** Dot-Net Programming	4	3	
		CC X	**Practical IV**– Open Source Technology	4	4	
		EDC I	**EDC – I**	4	2	
		EC II	**Elective II**	4	4	
III		CC XI	Java Server Programming	5	4	25
		CC XII	Compiler Design	5	4	
		CC XIII	Digital Image Processing	4	4	
		CC XIV	**Practical V:** Digital Image Processing	4	4	
		CC XV	**Practical VI :** Java Server Programming	4	3	
		EDC II	**EDC – II**	4	2	
		EC III	**Elective III**	4	4	
IV			**Project & Viva-voce**		17	17
	TOTAL					90

Elective – I:

1. Data Mining and Warehousing
2. Software Testing
3. Neural networks and Fuzzy logic

Elective – II:

1. Cyber Security and Cyber Laws
2. Cryptography and Network Security
3. Artificial Intelligence and Expert Systems

Elective –III:

1. Mobile and Satellite Communications
2. Advanced Virtual Techniques
3. Advance Computing Technologies

EDC Offered to other Department.

EDC – I:

1. Web Technology

EDC – II:

1. Mobile Technology

A. V. C. COLLEGE (AUTONOMOUS)
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M.Sc., Computer Science – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course-I	Hrs	Credits	Marks (CIA+ESE)
	Object Oriented System Design	6	4	25+75

Objectives:

- To gain knowledge about object oriented concepts.
- To understand Unified Modeling Language.

Unit-I: (18 Hours)

Object Basics: Introduction – An Object-Oriented Philosophy – Objects – Object are grouped in classes – Attributes: Object state and properties – Object Behavior and methods – Object respond to message – Encapsulation and Information hiding – class hierarchy – polymorphism – Object relationship and associations – Aggregations and object containment.

Object-Oriented systems development life cycle: Introduction – The software development process – Building high-quality software – Object-Oriented system development : A use-case driven approach- Reusability.

Unit-II: (18 Hours)

Object-Oriented Methodologies: Introduction – Survey of some of the object-oriented methodologies – Rumbaugh et al.'s object modeling technique – the Booch methodology – the Jacobson et al. methodologies – Patterns – Frameworks – The Unified Approach.

Unified Modeling Language: Introduction – static and dynamic models – why modeling? – Introduction to the Unified modeling language – UML Diagrams – UML Class Diagram – Use-case Diagram – UML Dynamic modeling – Model Management: packages and model Organization – UML Extensibility – UML Meta-model.

Unit-III: (18 Hours)

Object-Oriented analysis process: Identifying use cases – Introduction – why analysis is a difficult activity – 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 – common class patterns approach – Use-case driven approach: Identifying classes and their behavior through sequence / collaboration modeling – Classes, Responsibilities, and Collaborations- Naming classes.

Unit-IV: (18 Hours)

Identifying object relationships, attributes, and methods: Introduction – Associations – Super-sub class relationships – A-part-of relationships-Aggregation- Class Responsibility: Identifying attributes and methods – Class Responsibility: Defining attributes by analyzing use case and other UML Diagrams – Defining attributes for ViaNet Bank objects – Object Responsibility: methods and messages – Defining methods for vianet bank objects.

The object-oriented design process and design axioms: Introduction – the object-oriented design process – object-oriented design axioms – corollaries – design patterns.

Unit-V: (18 Hours)

Software quality assurance: Introduction – Quality assurance tests – testing strategies – impact of object orientation on testing – test cases – test plan – continuous testing – Myers's debugging principles.

System usability and measuring user satisfaction: Introduction – usability testing – user satisfaction test – A tool for a analyzing user satisfaction: the user satisfaction test template.

Text Book:

1. Ali Bahrami "Object Oriented Systems Development", Irwin – McGraw Hill, New Delhi, International editions, 2007. (Related Topics only)

Reference Book:

1. Gredy Booch, "Object Oriented Analysis and Design with applications", II edition, Addition Wesley, 1994.
2. Martin Fower, Kendall Scott, "UML Distilled applying the standard object modeling language", Addition Wesley, 1977.

A. V. C. COLLEGE (AUTONOMOUS)
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M.Sc., Computer Science – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course-II	Hrs	Credits	Marks (CIA+ESE)
	Data Structures and Algorithms	6	4	25+75

Objectives:

- To gain knowledge about data structures and its applications.
- To understand basic data structure algorithms.

Unit – I: (18 Hours)

Linear Data Structures & Their Sequential Storage Representation: - Concept & Terminology – Storage Structure for Arrays – Structures and arrays of Structures – Stack – Applications of Stack – Queues – priority queues. Linear Data Structures & Their Linked Storage Representation: - pointers & linked allocation – Linear linked lists – applications of linked lists – associative lists.

Unit – II: (18 Hours)

Non linear data structures: - definitions – operations of binary trees – storage representation and manipulation of binary trees. Graphs & their representation: - matrix representations – breadth first search – depth first search – spanning trees – applications of graphs.

Unit – III: (18 Hours)

Dynamic storage management: - fixed block storage allocation – first fit storage allocation – buddy systems –garbage collection – compaction. File structures: - external storage devices – sequential files – indexed sequential files – direct files – hashing techniques.

Unit – IV: (18 Hours)

Sorting algorithms: - straight insertion sort (SIS) – bubble sort – heap sort – quick sort- merge sort – tree sort – radix sort. Searching techniques: - sequential searching – binary searching – search trees – hash table methods.

Unit – V: (18 Hours)

Distance based network algorithms: - Dijikstras algorithms – Floyd's algorithms – Prims - Kruskal - minimum spanning tree problem. Heuristics: - travelling sales man problem – machine scheduling algorithms – total covering problem. Searching algorithms: - variable based algorithms – branch & bound algorithms.

Text Book:

1. Tremblay, J.P. & Sorenson P.G. – "An introduction to data structures with applications" – 2nd edition – Tata McGraw Hill – New Delhi – 2002.

Reference book:

1. R.Paneer Selvam – "Design and analysis of algorithms" – Prentice Hall of India - New Delhi – 2007.
2. AV Aho, JE Hopcraft & JD Ullaman – "Data structures and algorithms" – Perason Edition - New Delhi – 2002.
3. Nicklaus Wirth – "Algorithms & data structures programmes" - Prentice Hall of India - New Delhi – 2002.

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M.Sc., Computer Science – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course-III	Hrs	Credits	Marks (CIA+ESE)
	Advanced Database Management Systems	5	4	25+75

Objectives:

- To gain knowledge about data base and its concepts.
- To understand commands and Data access with SQL and PL/SQL.

Unit – I: (15 Hours)

PL/SQL - Introduction - the PL/SQL execution environment - the PL/SQL syntax - understanding the PL/SQL block structure - cursors - error handling in PL/SQL - stored procedures - stored functions - database triggers – forms – reports.

Unit – II: (15 Hours)

Introduction-data models- entity-relationship model- constraints- keys-entity relationship diagram -weak entity sets-extended ER features-design of an ER database schema-reduction of an ER schema to tables-the unified modeling language.

Unit - III: (15 Hours)

Relational model-structure of relational databases-the relational algebra -extended relational algebra operations-modification of the database-views-the tuple relational calculus - the domain relational calculus.SQL basic structure- set operations-aggregate functions-null values-needed subqueries-views-complex queries-modification of the database-joined relations-data definition language-embedded sql-dynamic sql-other sql features.

Unit – IV: (15 Hours)

Integrity and security - domain constraints - referential integrity - assertions-triggers - security and authorization-authorization in SQL - encryption and authentication. Relational database design - distributed databases.

Unit – V: (15 Hours)

Transaction management: Transactions: Concepts – Model – Storage Structure – Atomicity & Durability – Isolation – Serailzability – Concurrency: Lock based protocols – deadlock handling – multiple granularity – timestamp based protocols – validation based protocols - control-recovery system: classification – storage – recovery & atomicity – algorithm – buffer management.

Text Books:

1."Database System concepts", Silberchartz ,Korth,Sudarashan, TataMcGrawHill, New Delhi, Sixth Edition, 2011.
2."Commercial application development using oracle developer 2000", Ivan Bayross, BPB publications, 2002

Reference Books:

1."Database Systems", Raghu Ramakrishnan/JohannesGehrke,TataMcGrawHill, Second edition.
2." Fundamentals of Database Systems", Elmasari Navathe, Pearson education New Delhi, Third Edition.

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M.Sc., Computer Science – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course-IV	Hrs	Credits	Marks (CIA+ESE)
	Practical – I: Data Structures Lab	4	4	40+60

Objectives:

- To gain knowledge about data structures and its applications.
- To understand basic data structure algorithms.

Data Structures Lab

1. Stack and Queues
2. Infix, prefix & postfix notations - conversions
3. Linked list
4. Circular linked list
5. Binary tree operations
6. Quick sort using divide and conquer algorithm
7. Sorting (Bubble, Heap, Merge, Insertion, Shell)
8. Binary search
9. Shortest path algorithm
10. Tree traversals
11. Minimum spanning tree algorithms
12. Knapsack problem

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M.Sc., Computer Science – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course-V	Hrs	Credits	Marks (CIA+ESE)
	Practical – II: RDBMS Lab	4	3	40+60

Objectives:

- To gain knowledge about data base and its concepts.
- To understand commands and Data access with SQL and PL/SQL.

PL/SQL:

1. Write a PL/SQL block to manipulate(Insert, delete and update) a table for the specific condition
2. SUBQUERIES and CORRELATED SUBQUERIES
3. Explicit and Implicit Cursors
4. Internal and External Exception handling
5. Write a Trigger for a table
6. Stored procedure and functions
7. Package

ORACLE FORMS

8. Develop a Oracle form to a Calendar using OLE items.
9. Develop a Oracle form to a simple Arithmetic Calculator.
10. Develop a Oracle form to a application problem using Default forms in oracle.
11. Develop a Oracle form to a application problem using items.
12. Write a SQL *FORMS to relate Master_detail relationship.

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M.Sc., Computer Science – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective –I	Hrs	Credits	Marks (CIA+ESE)
	1. Data Mining and Warehousing	5	4	25+75

Objectives:

- To gain knowledge about data mining concepts.
- To understand data warehouse concepts.

Unit - I: (15 Hours)

Introduction: Basic data mining tasks-data mining versus knowledge discovery in databases-data mining issues-data mining metrics-social implications of data mining-data mining from a database perspective-the future. Related concepts: Database/OLTP systems-fuzzy sets and fuzzy logic-information retrieval-decision support systems-dimensional modeling-data warehousing-OLAP-web search engines-statistics-machine learning-pattern matching.

Unit - II: (15 Hours)

Data Mining techniques: Introduction-a statistical perspective on data mining-similarity measures-decision trees-neural networks-generic algorithms. Classification: Introduction-statistical-based algorithms-distance-based algorithms-decision tree-based algorithms-neural network-based algorithms.

Unit - III: (15 Hours)

Clustering: Introduction-similarity and distance measures-outliers-hierarchical algorithms- partition algorithms- clustering large databases – clustering with categorical attributes-comparison. Association rules: Introduction-large item sets-basic algorithms—parallel and distributed algorithms-comparing approaches-Incremental rules-advanced association rule techniques-measuring the quality of rules.

Unit - IV: (15 Hours)

Data Warehousing: Introduction – Background – What is data warehouse? – Delivery process – Data warehouse delivery method – System Processes – overview – Typical process flow within a data warehouse – Extract and load process – Clean and transform data – Backup and archive process – Query management process – Process Architecture – Load manager – Warehouse manager – Query manager – Detailed information – Summary information – Metadata – Data marting.

Unit - V: (15 Hours)

Partitioning Strategy – Horizontal partitioning – Vertical partitioning – Hardware partitioning – Which key to partition by? – Sizing the partition - Aggregation – Why aggregate? – What is an aggregation? – Designing summary tables – Which summaries to create – Data Marting – When is a data mart appropriate? – Designing data marts – Costs of data marting – Metadata – Data transformation and load – Data management – Query generation.

Text Books :

1. "Data Mining Introductory and advanced topics", Margaret H.Dunham, Pearson Education, 2005
2. "Data Warehousing In The Real World", Sam Anahory, Dennis Murray, Pearson Education, 2003.

Reference Books:

1. "Data mining concepts and techniques", Han Jiawia,Elsevier, New Delhi,2006.
2. "Data warehousing",Sinha, Anitesh.k,Thomson Asia Pvt. Ltd,2002.
3. "Data warehousing-concepts, techniques, products and applications", Prabhu, PHI, Third Edn.
4. "Data mining :Techniques and Trends", Gopalan and Sivaselvan, PHI.
5. "Principles and Implementation of Data warehousing",Rajeev A. Parida, , Laxmi Publishers Pvt Ltd.,2006.

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M.Sc., Computer Science – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Elective-I	Hrs	Credits	Marks (CIA+ESE)
	2. Software Testing	5	4	25+75

Objectives:

- To gain knowledge about software testing and its concepts.
- To understand software testing tools and its operations.

Unit – I: (15 Hours)

Software quality assurance: - an overview – the software crisis – the birth of software engineering – testing usage – the software chaos – criteria for a success of a software project – process oriented software development- phases of SDLC – SDLC models – the management process – SQA – quality management process – PCM.

Unit – II: (15 Hours)

Software testing process: - psychology of testing – verification and validation – testing team vs development team – cost of quality – characteristics of software test engineers – testing difficulties – testing approaches – types of testing – test plan – criteria for completion of testing – software reliability – manual testing drawbacks and limitations – software testing tools: - Overview.

Unit – III: (15 Hours)

WinRunner: - overview – testing application using WR – Test Script Language – GUI Map file – synchronization of test cases – data driven testing –rapid test script wizard – mapping custom object to a standard class – checking GUI object. Silktest: - overview – architecture - tests an application – 4test scripting languages – checkpoints - data driven test cases.

Unit – IV: (15 Hours)

SQA Robot: - overview – architecture - tests application - synchronization of test cases – checkpoints. LoadRunner: - Overview – creating Vuser Script – creating virtual users. JMeter: - overview – JDBC test – HTTP test.

Unit – V: (15 Hours)

Test Director: - overview - management process – managing testing process. QTP: - overview – tests application - synchronization of test cases – checkpoints – Testing Calculator – Testing DB – Testing a web application.

Text book:

1. "Software testing tools" - K.V.K.K Prasad – Dreamtech Press – New Delhi – 2007.

Reference Book:

1. William E Perry – Effective methods of software testing – john Wiley & sons Inc. – 2000.
2. P.C Jorgensen – "Software testing a craft mans approach" – CRC press – 1999.

A. V. C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

M.Sc., Computer Science – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Elective-I	Hrs	Credits	Marks (CIA+ESE)
	3. Neural Networks and Fuzzy Logic	5	4	25+75

Objectives:

- To gain knowledge about neural networks and its concepts.
- To understand fuzzy logic and its operations.

Unit - I : (15 Hours)

FUZZY SET THEORY :Introduction to Neuro-Fuzzy and SoftComputing-Fuzzy Sets-Basic Definition and Terminology-Set-theoretic Operations-Member Function Formulation and Parameterization -Fuzzy Rules and Fuzzy Reasoning –Extension Principle and Fuzzy Relations-Fuzzy if then Rules-Fuzzy Reasoning_Fuzzy Inference Systems-Tsukamoto Fuzzy Models-Input Space Partitioning and Fuzzy Modelung.

Unit - II : (15 Hours)

OPTIMIZATION:Derivative-based Optimization-Descent Methods-The Method of Steepest Descent –Classical Newton's Method-Step Size Determination – Derivative-free Optimization-Genetic Algorithms-Simulafted Annealing – Random Search-Downhill Simplex Search.

Unit - III : (15 Hours)

NEURAL NETWORKS : Supervised Learning Neural Networks- Perceptrons – Adaline – Backpropagation Multilayer Perceptrons – Radial Basis Function Networks-Unsupervised Learning Neural Networks-Competitive Learning Networks-Kohonen Self-Organizing Networks-Learning Vector Quantization – Hebbian Learning.

Unit - IV: (15 Hours)

NEURO FUZZY MODELING : Adaptive Neuro - Fuzzy Inference Systems – Architecture – Hybride Learning Algorithm-Learning Methods that Cross-fertilize ANFIS and RBFN-Coactive Neuro Fuzzy Modeling-Framework Neuron Fuctions for Adaptive Networks- Neuro Fuzzy Spectrum.

Unit - V: (15 Hours)

APPLICATION OF COMPUTATIONAL INTELLIGENCE : Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

Text Book :

"Neuro-Fuzzy and Soft Computing", J.S.R.Jang, C.T.Sun And E.Mizutani, Pearson Education, 2004.

Reference Books:

1. "Fuzzy Logic with Engineering Applications", Timothy J.Ross, Tata McGraw Hill, 1997.
2. "Neural Networks, Fuzzy Logic and Genetic Algorithms", S. Rajasekaran and G.A.V.Pai, PHI , 2003.
3. "Neural Networks, Fuzzy Logic and Genetic Algorithms", S.Rajasekaran and G.A.V.Pai, PHI, 2003
4. "Neural networks and Fuzzy systems: A Dynamical System Approach to machine Intelligence", Kosko ,PHI.
5. "Fuzzy Logic with Engineering Applications", Timothy j.Ross, McGraw-Hill. 1997.

A. V. C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

M.Sc., Computer Science – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course-VI	Hrs	Credits	Marks (CIA+ESE)
	Dot Net Programming	5	4	25+75

Objectives:

- To gain knowledge about Dot Net Programming and its concepts.
- To understand Dot Net Programming tools and its operations.

Unit - I: (15 Hours)

Building ASP.NET pages : ASP.NET and the .NET framework – understanding ASP.NET controls – understanding ASP.NET pages – installing the ASP.NET framework.

Unit - II: (15 Hours)

Using validation controls: overview of the validation controls – using the RequiredFieldvalidator, RangeValidator, CompareValidator, CustomValidator, RegularExpressionValidator, ValidationSummary - Using rich controls : Accepting File Uploads – Displaying a calendar – displaying advertisements – displaying different page views.

Unit - III: (15 Hours)

Performing data access : using DataBound controls – using DataSource controls – using programmatic DataBinding – understanding templates and DataBinding Expressions – using the SqlDataSource control: Creating database connections – executing database commands – using ASP.NET parameters with the SqlDataSource Control – programmatically executing SqlDataSource commands – catching database data with the SqlDataSource control.

Unit - IV: (15 Hours)

Using GridView control: GridView control fundamentals – using fields with the GridView control – working with GridView control Events – Extending the GridView control Events – Extending the GridView control - using Repeater and DataList controls: Using the repeater control – using the DataList Control.

Unit - V: (15 Hours)

Security : overview of the login controls – Maintaining application state : using browser cookies – using session state. Building custom controls : overview of custom control building.

Text Book:

1. ASP.NET 3.5 unleashed by Stephen Walther – Pearson Education, 2008.

Reference Books:

1. "Essentials of .NET and related technologies", by Stephen C. Perry, Atul Kahate, Stephen Walther, Joseph Mayo, Pearson Education.
2. "Core C# and & .Net", Stephen C. Perry, Prentice Hall.
3. "Introducing Microsoft ASP.NET 2.0",Esposito,PHI.
4. "Magic of ASP.NET with C#",Shibi Panikkar, Kumar Sanjeev, , Laxmi Publishers Pvt Ltd., First Edn.,2002.
5. "Microsoft @ ASP.NET 3.5 step by step", Shepherd,PHI.

A. V. C. COLLEGE (AUTONOMOUS)
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M.Sc., Computer Science – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course-VII	Hrs	Credits	Marks (CIA+ESE)
	Distributed Operating Systems	4	4	25+75

Objectives:

- To understand the concepts of remote processing calls, synchronization
- To gain knowledge about resource management and distributed file system

Unit - I: (12 Hours)

Fundamentals - Evolution - System model - Distributed operating system - Issuses - Distributed Computing Environment. Message Passing: Features- Issuses Synchronization - Buffering - Messages - Encoding and Decoding - Process addressing - Failure Handling.

Unit - II: (12 Hours)

Remote Processing Calls : Model - Transparency - Implementation - Stub generation - Messages - Marshaling arguments and results - Server management - Parameter passing semantics - Call semantics - Communication Protocols - Complicated RPC's - Client-Server Binding - Exception handling - Security. Distributed shared memory: Architecture - Issuses - Granularity - Structure - Consistency models - Replacement strategy - Thrashing.

Unit - III: (12 Hours)

Synchronization : Clock synchronization - Event ordering - Mutual Exclusion - Deadlock - Election algorithms.

Unit - IV: (12 Hours)

Resource management : Features - Task assignment approach - Load-balancing approach - Load-sharing approach. Process management : Process migration - Threads.

Unit - V: (12 Hours)

Distributed File System : Features - File models - Accessing models - Sharing semantics - Caching Schemes - File replication - Fault tolerance - Atomic transactions - Design principles. Naming : Features - Terminologies and concepts.

Text book :

1. "Distributed Operating Systems, Concepts and Design", Prdeep K. Sinha, Prentice Hall of India, New Delhi, 2001.

Reference books :

1. "Distributed Operating Systems", Andrew S. Tanenbaum, Pearson Education, New Delhi, 2002.
2. "Advanced Concepts in Operating Systems " , Mukesh Singhal and Nirajan G. Shivaratri, Tata McGrawHill, New Delhi, 2001.
3. "An Introduction to distributed and parallel processing", John A. Sharp, Black Well scientific publications.
4. "Data communications and distributed network", Uyless D. Black.
5. "Distributed databases principles and systems", Stefans ceri, Ginseppe pelagatti.

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M.Sc., Computer Science – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course-VIII	Hrs	Credits	Marks (CIA+ESE)
	Open Source Technology	5	4	25+75

Objectives:

- To gain knowledge about shell programming and scripting language
- To understand PHP scripting and Data access with MySQL

Unit – I: (15 Hours)

Introduction – shell Programming: Shell – Pipes and redirection – shell as a programming language – Shell Syntax.

Unit – II: (15 Hours)

Working with File structure – System calls and Device drivers – Library functions – Low – level File Access – The standard I/O Library – File & Directory Maintenance – Scanning directories.

Unit – III: (15 Hours)

Reading from & Writing to the Terminal – Terminal Structure – Terminal output – Detecting keystrokes – Debugging: Types of errors – General debugging Techniques.

Unit – IV: (15 Hours)

Process management: Process structure – Starting new Processes – Signals – threads – Synchronization – thread attributes – Canceling a Thread.

Unit – V: (15 Hours)

Introduction to PHP - PHP Scripting – Variables – Operators and Expressions - Control constructs – Arrays - Using Functions - Form Processing - Cookies Session Tracking - Database Access with PHP and MySQL

Text Books :

1. "Beginning LINUX Microprogramming", Richard Stones & Neil Mathew
2. "Internet and www - How to program?", Deitel & Deitel, Prentice Hall 2000.

Reference Books:

1. "Practical Linux programming", Ashfaq A. Khan, Lexmi publication, 2004
2. "The Linux Book", David Elboth, PHI, 2001
3. "Advanced Linux Programming",mark Mitchell, Jeffrey Oldham, Alex Samuel, New Riders,First Edition, 2001
4. "Straight to the point – PHP", Dinesh Maidasani, Firewall Media, 2008
5. "Linux command line bible",wiley publication, 2008

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M.Sc., Computer Science – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course-IX	Hrs	Credits	Marks (CIA+ESE)
	Practical III–Dot Net Programming Lab	4	3	40+60

Objectives:

- To acquire skills in Dot Net Programming and scripting language
- To enable the students to access the data stored in data base table

Using VB.NET

1. Create a File Browser
2. Design a scientific calculator.
3. Design a simple word processor using menus.
4. Create a simple painter application.
5. Design a login page by using all validation controls.
6. Prepare a student mark sheet using OLEDB connection.

Using C#.Net

7. Prepare invoice bill using database.
8. Prepare employee pay slip using SQL connection.
9. Design a banking application for doing deposit, withdrawal and balance enquiry. Print transaction details of customer using crystal reports.
10. Create a simple shopping cart program.

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M.Sc., Computer Science – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course- X	Hrs	Credits	Marks (CIA+ESE)
	Practical – IV: Open Source Technology Lab	4	4	40+60

Objectives:

- To acquire skills in shell programming and scripting language
- To enable the students to access the data stored in mysql table

I - Unix:

1. Write a shell program to create a menu for copy, edit, rename and delete a file.
2. Write a shell program to generate menu creation.
3. Write a shell program to prepare the E.B.Bill.
4. Write a Unix program for file handling.
5. Write a shell program for merging a file.
6. Write a Unix program to find a given word in the specific file.
7. Write a shell program for file checking and formatting and difference between two files.
8. Write a shell program to perform sorting and unsorting the file name.
9. Write a shell program for sorting the file depends upon the primary key.
10. Write a Unix program to find whether the given number is palindrome or not.
11. Write a Shell program for counting words, lines and characters in a file.
12. Write a Unix program to convert the Upper case to lowercase and lowercase to Uppercase.
13. Write a Shell program to generate a Fibonacci series.
14. Write a Unix program to find out the sum of digits.
15. Write a Shell program to generate the use of pipeline and tree command.
16. Write a Shell program to demonstrate the use of grep command.
17. Write a Unix program for finding whether the number is Armstrong or not.
18. Write a program to find the given number is prime or not.

II - PHP programming:

1. Write a server side PHP program that displays marks, total, grade of a student in tabular format by accepting user inputs for name, number and marks from a HTML form.
2. Write a PHP program that adds products that are selected from a web page to a shopping cart.
3. Write a PHP program to access the data stored in a mysql table.
4. Write a PHP program interface to create a database and to insert a
5. table into it.
6. Write a PHP program using classes to create a table.
7. Write a PHP program to upload a file to the server.
8. Write a PHP program to create a directory, and to read contents from the directory.
9. Create a mysql table and execute queries to read, add, remove and modify a record from that table.

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M.Sc., Computer Science Semester - II
(For candidates admitted to the course under CBCS Pattern during 2015 - 2016)

Code	Elective – II	Hrs	Credits	Marks (CIA+ESE)
	1. Cyber Security and Cyber Laws	4	4	25+75

Objectives:

- ❖ To acquire skills in cyber security and its crime.
- ❖ To enable the students to understand the cyber laws.

Unit – I: (12 Hours)

Information System Threats and attacks, Classification of Threats and Assessing Damages, Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security, Basic Principles of Information Security, Confidentiality, Integrity Availability.

Unit – II: (12 Hours)

Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of Biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges.

Unit - III: (12 Hours)

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key. Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues,

Unit - IV: (12 Hours)

Policies Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN.

Unit – V: (12 Hours)

Security metrics- Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data mining Security, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy Cyber Crime Types & overview of Cyber Crimes

Text books:

1. Godbole," Information Systems Security", Willey - Merkov, Breithaupt," Information Security", Pearson Education

Reference:

1. Yadav, "Foundations of Information Technology", New Age, Delhi
2. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
3. Sood,"Cyber Laws Simplified", Mc Graw Hill
4. Furnell, "Computer Insecurity", Springer IT Act 2000

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M.Sc., Computer Science – Semester - II
(For candidates admitted to the course under CBCS Pattern during 2015 - 2016)

Code	Elective- II	Hrs	Credits	Marks (CIA+ESE)
	2. Cryptography and Network Security	4	4	25+75

Objectives:

- To acquire skills on cryptography and network security
- To enable the student to learn security attacks, services, cryptosystem, network security and web security and cryptographic Algorithms

Unit - I : (12 Hours)

Introduction to Cryptography - Security Attacks - Security Services - Security Algorithm - Stream cipher and Block cipher - Symmetric and Asymmetric-key Crypto System - Symmetric Key Algorithms : Introduction - DES - Triple DES - AES - IDEA - Blowfish - RC5.

Unit - II : (12 Hours)

Public-Key Crypto System: Introduction to Number Theory - RSA Algorithm - Key Management - Diffie-Hell man Key Exchange - Introduction to Elliptic Curve Cryptography. Message Authentication and Hash functions - Hash and Mac Algorithm - Digital Signatures and Authentication Protocol.

Unit - III : (12 Hours)

Network Security Practice : Authentication Applications - Kerberos - X.509 Authentication Services and Encryption Techniques. Email Security - PGP - S/MIME - IP Security.

Unit - IV : (12 Hours)

Web Security - Secure Socket Layer - Secure Electronic Transaction. System Security - Intruders and Viruses - Firewalls - Password Security.

Unit - V : (12 Hours)

Case Study : Implementation of Cryptographic algorithms - RSA - DSA - ECC(C/Java Programming). Network Forensic - Security Audit - Other Security Mechanisms: Introduction to Stenography -Quantum Cryptography - Water Marking - DNA Cryptography

Text Book :

1. "Cryptography and Network Security ", William Stallings , Delhi: Pearson Education, First Edition, 1998.

Reference Books :

1. "Network Security"- Ankit Fadia – 1st edition , Delhi : McMillan Publications, 1998.
2. "Applied Cryptography"- Bruce Sehneir-1st edition ,New Delhi: CRC press,1998.
3. "Cryptography and Information Security",Pachghare,PHI.
4. "Network Security and Management", Singh, Second Edn., PHI.
5. "Network Security : Private communication in a public world",Kaufman,Perlman and Speciner, Second Edn., PHI.

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M.Sc., Computer Science - Semester - II

(For candidates admitted to the course under CBCS Pattern during 2015 - 2016)

Code	Elective- II	Hrs	Credits	Marks (CIA+ESE)
	3. Artificial Intelligence and Expert Systems	4	4	25+75

Objectives:

- To acquire skills on Artificial Intelligence and its concepts.
- To enable the student to learn Artificial Intelligence and Expert Systems Algorithms

Unit – I: (12 Hours)

Artificial intelligence definition – importance of AI – knowledge based systems – knowledge representation – state space search – production systems – AI programming languages – PROLOG – Heuristic search – Depth first search – Breadth first search – Hill climbing – A* algorithms – Game playing.

Unit – II: (12 Hours)

Predicate logic – Propositional logic – Clause form – Resolution – Inference rules – Unification – Semantic Networks – Conceptual dependency – Frames – scripts – representing knowledge using rules.

Unit – III: (12 Hours)

Non monotonic reasoning – truth maintenance system – closed world assumption - model logic – temporal logic – certainty factors – Baye's theorem – Bayesian Networks – Dempster Shafer theory – fuzzy logic.

Unit – IV: (12 Hours)

Overview of linguistics – grammars & languages – basic parsing techniques – semantic analysis and representation structures – natural language generation – natural language systems – distributed reasoning systems – intelligent agents.

Unit – V: (12 Hours)

Expert systems – architecture – non production systems and architecture – knowledge acquisition and validation – knowledge system building tools – types of learning – general learning models – learning by induction – generalization and specialization – inductive bias – explanation based learning.

Text books:

1. Elaine Rich & Kevin Knight – "Artificial Intelligence" - Tata McGraw Hill – New Delhi – 2001.
2. Den W. Patterson – "Introduction to Artificial Intelligence & Expert systems" - Prentice Hall of India - New Delhi – 2001.

Reference Book:

1. George F Luger – "Artificial Intelligence, Structures & strategies for complex problem solving" – Pearson education – New Delhi – 2001.

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M.Sc., Computer Science Semester - II

(For candidates admitted to the course under CBCS Pattern during 2015 - 2016)

Code	EDC – I	Hrs	Credits	Marks (CIA+ESE)
	Web Technology	4	2	25+75

Objectives:

- To learn the method of creating web pages
- To understand the features of the HTML and PHP
- To acquire the knowledge on writing scripts

Unit – I: (12 Hours)

Introduction to HTML: Designing a Home page-History of HTML-HTML generations-HTML documents-Anchor tag-Hyper Links-Sample HTML Documents. **Head and Body Sections**: Header Section-Title-prologue-links-colorful web page-comment lines-Some sample html documents.

Unit – II: (12 Hours)

Designing the body section: Heading printing-Aligning the Headings-Horizontal rule-paragraph-tab settings-images and pictures-Embedding PNG format images

Unit – III: (12 Hours)

Ordered and Unordered lists: lists-Unordered lists-headings in a list-ordered lists-nested lists. **Table handling**: Tables-table creation in html-width of the table and cells-cells spanning multiple rows/columns-coloring cells-column specification-some sample tables.

Unit – IV: (12 Hours)

DHTML and style sheets: Defining styles-Elements of styles-Linking a style sheet to an html document-In line styles-External style sheets-Internal style sheets-multiple styles

Unit – V: (12 Hours)

Frames: frameset definition-frame definition-nested framesets. **A web page design projec**t: Frameset definition-Animals-birds-fish. **Forms**: Action Attribute-method attribute-Enctype attribute-drop down list-sample forms.

Text Books:

"World Wide Web design with **HTML**", **C.XAVIER, Tata McGraw Hill**, 2008.

Reference Book:

"Internet & World wide web - How to program", HM DEITEL, 4th Edition, PHI, New Delhi, 2008.

A.V.C. COLLEGE (AUTONOMOUS)
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M.Sc., Computer Science – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2015 - 2016)

Code	Core Course – XI	Hrs	Credits	Marks (CIA+ESE)
	Java Server Programming	5	4	25 + 75

Objectives:

- To gain knowledge on J2EE programming, web applications, JDBC, servlet, RMI and EJB
- To understand JSP, JNDI, LDAP, API and JMS architecture

Unit – I: **15 Hrs**

Introducing J2EE: Need for Enterprise Programming – J2EE Advantage – Enterprise Architecture Types – Architecture of J2EE – Introducing J2EE Components – Introducing J2EE Containers – Types of J2EE Technologies.

Understanding EJB: EJB Fundamentals – EJB Architecture – EJB Interfaces – EJB Roles –Enterprise Beans – Session Bean – Features of Session Beans – Developing Session Beans – Entity Beans – Message-Driven Beans – Container-Managed Persistence – Bean Class – Home Interface – Remote Interface – Callback Methods – Comparing CMP and BMP Entity Beans – Caching – Finder Methods.

Unit – II: **15 Hrs**

Understanding Directory Service and JNDI: Introducing Naming and Directory Services – Introducing LDAP and JNDI – Understanding LDAP – LDAP operation – Working with LDAP Server.

Introducing RMI: Understanding RMI Architecture – Working with RMI – Application Development with RMI – Creating Distributed Applications Using RMI – Building a Generic Compute Engine – RMO over IIOP – Interoperability with CORBA – RMI-IIOP Design Policy.

Unit – III: **15 Hrs**

JDBC and Database Programming: Introduction to JDBC – JDBC Drivers – java.sql Package – Using DataSource Object – JDBC Processes with java.sql – ResultSet – JDBC Processes with javax.sql – Connection Pooling.

Introducing Web Containers: Understanding the HTTP Protocol – Introducing Web Applications and Web Containers – Web Application Life-Cycle – Creating a Web Application – EJB-Centric Applications.

Unit – IV: **15 Hrs**

Understanding Servlet Programming: Servlet Life-Cycle – Security Features – HTML-Aware Servlets – HHTP-Specific Servlets – Performance Features – 3-Tier Architecture – Web Publishing System – Package javax.Servlet Description – Servlet Configuration – Servlet Life-Cycle – Understanding Response and Request – Reading From Data from Servlet.

Understanding Servlet Sessions: Session – Introducing Session Tracking – Session Tracking and Java Servlet API – On-Line Store Using Session Tracking – Introducing ServletContext and Collaboration – Servlet Collaboration.

Unit – V: **15 Hrs**

Understanding of JSP and JSTL: Introducing JSP Technology – Understanding the Page Life-Cycle – JSP Documents – JSP Elements – JSP 2 Expression Language – JSP Tag Extensions – Tag Libraries – Validation – Tag Extension API – JSP Classic Tag Handlers – SimpleTag Handlers - JSP Fragments – Translation-time Class – JSTL – JSTL Functional Overview.

Text Book:

"Java Server Programming J2EE 1.4 Edition Black Book" – 2006 Print - DreamTech Software Team – DreamTech Press.

(**Related Topics only in syllabus**)

Reference Books:

1. "J2EE unleased ", first edition by Jospeh J. Bambara, Paul R. Allen, Mark Ashnault, Zujad Dean, Thomas Garben, Shery Smith, Sams Tech Media
2. "Developing Java Enterprise Applications", second edition by Stephen Asbury, Scott R. Weiner, Wiley dreamtech India Pvt. Ltd.
3. "Java server pages", Hans Bergsten, Third edition, O'Rielly
4. "Mastering Enterprise Java Beans",Ed Roman,Scott Ambler, Tyler Jewell, Second edition, wiley publication
5. "Professional Java Server Programming – J2EE ", Subramanyam Allamraju and Cedric Buest ,1.3 Edition – APress.

A.V.C. COLLEGE (AUTONOMOUS)
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M.Sc., Computer Science – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XII	Hrs	Credits	Marks (CIA+ESE)
	Compiler Design	5	4	25 +7 5

Objectives:

- To Gain Knowledge on Compiler Design.
- To Enable The Students To Learn The Phases Of Compiler, Lexical Analyzer, Parser, Syntax Analysis , Type Checking , Intermediate Code Generator And Code Optimization.

Unit - I: (15 Hours)

Introduction: The Structure of a Compiler – Applications of Compiler Technology. A Simple Syntax – Directed Translator: Syntax Definition- Syntax Directed Translation- Parsing- A Translator For Simple Expressions- Lexical Analysis – Symbol Tables- Intermediate Code Generation. Lexical Analysis: The Role Of The Lexical Analyzer- Input Buffering- Specification Of Tokens- Recognition Of Tokens- Finite Automata-From Regular Expressions To Automata.

Unit - II: (15 Hours)

Syntax Analysis: The Role Of The Parser- Context Free Grammar-Writing a Grammar- Top Down Parsing-Bottom Up Parsing- Introduction To LR Parsing. Syntax Directed Translation: Syntax Directed Definition- Application of Syntax Directed Translation.

Unit - III: (15 Hours)

Intermediate Code Generation: Variants Of Syntax Trees- Three Address Code- Types And Declarations – Type Checking- Control Flow- Back patching – Switch Statements- Runtime Environments: Storage Organization-Stack Allocation Of Space-Heap Management.

Unit - IV: (15 Hours)

Code Generation: Issues in the Design of a Code Generator-Basic Blocks and Flow Graphs – Optimization of Basic Blocks –Peephole Optimization – Register Allocation and Assignment.

Unit - V: (15 Hours)

Machine Independent Optimizations: The Principles Sources Of Optimization-Introduction To Data-Flow Analysis- Loops In Flow Graphs – Want To Write A Compiler: Planning A Compiler – Approaches To Compiler Development- The Compiler Development Environment-Tesing And Maintenance.

Text Book:

"Compilers Principles, Techniques and Tools", Alfred V.Aho, Monica S.Lam, Ravi Sethi, Jeffrey D. Ullman, Second Edition-2007, Pearson Education.

Reference Books:

1. "Theory Of Computations", Dr.O.G.Kakde, Laxmi Publication Pvt. Ltd, First Edn., 2007.
2. "Compiler Design", Dr.O.G.Kakde, Laxmi Publication Pvt. Ltd,Fourth Edn., 2006.
3. "Compiler Design", Chattopadhyay,PHI-2005.

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M.Sc., Computer Science – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XIII	Hrs	Credits	Marks (CIA+ESE)
	Digital Image Processing	4	4	25 + 75

Objectives:

- To Gain Knowledge on Digital Images.
- To understand the different phases of Digital Image Processing.

Unit - I: (12 Hours)

Introduction: What Is Digital Image Processing- Fundamental Steps In Digital Image Processing-Components Of An Image Processing System. Digital Image Fundamentals: Light And The Electromagnetic Spectrum-Image Sensing And Acquisition-Image Sampling And Quantization-Some Basic Relationships Between Pixels.

Unit - II: (12 Hours)

Intensity Transformations And Spatial Filtering: Some Basic Intensity Transformation Functions-Histogram Processing-Fundamentals Of Spatial Filtering-Smoothing Spatial Filters-Sharpening Spatial Filters.

Unit - III: (12 Hours)

Filtering In The Frequency Domain: The Discrete Fourier Transform(DFT) Of One Variable-Extension To Functions Of Two Variables-The Basics Of Filtering In The Frequency Domain-Image Smoothing Using Frequency Domain Filters-Image Sharpening Using Frequency Domain Filters.

Unit - IV: (12 Hours)

Image Restoration and Reconstruction: A Model Of The Image Degradation/Restoration Process-Restoration In The Presence Of Noise Only-Spatial Filtering. Color Image Processing: Color Fundamentals-Color Models- Smoothing and Sharpening-Image Segmentation Based On Color.

Unit - V: (12 Hours)

Image Compression: Fundamentals-Image Compression Models-Image Formats,Containers, And Compression Standards-Some Basic Compression Methods-Image Segmentation: Fundamentals-Point Line, And Edge Detection-Thresholding-Region-Based Segmentation-Object Recognition: Patterns And Pattern Classes- Recognition Based On Decision-Theoretic Methods-Matching.

Text Book:

1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image processing", 3nd ed., Pearson Prentice Hall, 2009.

Reference Books:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image processing using MATLAB", Pearson Education, 2004
2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson 2002.
3. William K. Pratt, , Digital Image Processing' , John Wiley, New York, 2002
4. I. Pitas, "Digital Image Processing, Algorithms and Applications", A Wiley-Interscience Publication, 2000.
5. Kenneth R. Castleman, "Digital Image Processing", Pearson Education, 2007.

M.Sc., Computer Science – Semester II
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course-XIV	Hrs	Credits	Marks (CIA+ESE)
	Practical – V Digital Image Processing	4	4	40+60

Image Conversion:

1. Convert the given grayscale to negative image.
2. Increase the contrast of an Image using contrast stretching method.
3. Detecting edges of an image.
4. Implementation of Histogram generation.
5. Conversion of RGB to color, mirror image.
6. Implementation of image shrinking, zooming and cropping.

Image Filtering:

7. Implement low pass and high pass filters using weighted mean.
8. Implement median filter on a gray scale Image.
9. Implementation of Noise removal using image filtering.

Image Transformation:

10. Image negative transformation.
11. Gamma transformation.
12. Log transformation.
13. Cosine transformation.
14. Implement fast Fourier transform on a gray scale Image.

Image Arithmetic Operations:

15. Image addition, complementation, division, Multiplication.

Image Segmentation:

16. Segment the various regions in an Image using threshold.

Image Compression:

17. Compress a gray scale Image using predictive coding techniques.

18. Implement the cosine transforms to compress an Image.

Image Representation:

19. Implement prewitt and sobel operators to find the edges in the grayscale Image.

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M.Sc., Computer Science- Semester – III
(For candidates admitted to the course under CBCS Pattern during 2015-2016)

Code	Core Course – XV	Hrs	Credits	Marks (CIA+ESE)
	Practical – VI : Java Server Programming	4	3	40 + 60

Java Server Programming**:**

1. Write a RMI program where a client invokes a method on the server, which performs any numerical calculations.
2. Write a RMI program where a client invokes a method on the server, which perform
   multiplication table.
3. Write a JSP program to demonstrate the usage of exception handling process.
4. Write a Java program that illustrates the use of JNDI service.
5. Write a Java program that uses JMS technology to send a message.
6. Write a Servlet program to illustrate the life cycle of the Servlet.
7. Write a Servlet program to get the information about the Server.
8. Write a Servlet program that describes the mechanism of session tracking.
9. Write a Stateless Session Bean to check whether given number is even or not.
10. Write a Container Managed Persistent Bean Customer. The functionality of the bean
    is to get the username and password of the customer. The bean validates the user based on the password.
11. Write a JSP program to create a web page about yourself.
12. Develop JSP Database connectivity program to display EB bill list.

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PG – EDC – II: Semester – III

[Offered by Department of computer science for other than Computer Science Students]

(For candidates admitted to the course under CBCS Pattern during 2015 - 2016)

Code	EDC – II	Hrs	Credits	Marks (CIA+ESE)
	Mobile Technology	4	2	25 + 75

Objectives:

- To understand the basic concepts of Mobile Technology.
- To learn the different generations of Mobile Communications.
- To acquire knowledge on Mobile communication features.

Unit – I: **12 Hrs**

Introduction: History of communication – Zero generation(0G)- First Generation(1G) - Second Generation(2G) - Technologies-Third Generation(3G) - Fourth Generation(4G).

Unit – II: **12 Hrs**

Cellular Concept: Introduction – Frequency allocation – Concepts – GSM – GSM types – Cell – Cell size – Omni directional cells – Cell Architecture – Pico Cells - Frequency reuse – Microcellular-Antenna types-Cellular repeater for range of extensions.

Unit – III: **12 Hrs**

Bluetooth: Introduction – Specifications – Profiles – Applications – Future – Connection setup- Security. **Subscriber services:** Introduction – services – Telecommunication services – Teleservices – Supplementary services – Innovative services. **Billing:** Introduction – structure – processing – billing gateway**(BGW)-** Accounting between operators.

Unit – IV: **12 Hrs**

Mobile Intelligent Network(MIN) Services: Introduction – Parties – Architecure – MIN calls – **Mobile Phone and Human Health:** Introduction – RF fields – IF Fields – ELF fields – Static fields – Environmental effects.

Unit – V: **12 Hrs**

Access techniques and Mobile OS: Introduction – FDMA – TDMA –CDMA.

Case Study: Android OS, IOS, Windows OS.

Text Book :

"Mobile Communications" – G.K.Behera, Lopmudra Das, Scitech Publishers (P) Ltd., Chennai, 2nd Edition 2009.

Reference Books:

1. "Mobile Commnications", Jochen Schiller, Pearson Education, Delhi,2000.
2. "Principles of Wireless Networks", Kaveh Pahlavan Prashant krishnamurthy, Prentice- Hall India, 2008.
3. "Handbook of wireless networks and mobile computing", Ivan Stojmenovic, John wiley publishers.

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M.Sc., Computer Science – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective – III	Hrs	Credits	Marks (CIA+ESE)
	1. Mobile and Satellite Communications	4	4	25 + 75

Objectives:

- To gain knowledge about mobile and satellite communications.
- To understand mobile and satellite concepts.

Unit – I: (12 Hours)

Introduction: History of cellular systems – Characteristics – Fundamentals – Infrastructure – Network protocols – IEEE 802.11 technologies – Ad Hoc Networks – Sensor Networks –Wireless LANs, MANs, WANs and PANs – Security and Privacy in Wireless Networks - Satellite Systems – Recent Advances. Mobile Radio Propogation:Types of Radio Waves – Propogation mechanisms – Free space propagation – Land propagation – Path Loss – Delay spread – Intersymbol, cochannel interferences.

Unit – II: (12 Hours)

Cellular Concept: Cell Area – Signal Strength and Cell Parameters- Capacity of a Cell – Frequency Reuse – How to form a Cluster – Cochannel Interference – Cell splitting-Cell Sectoring. Multiple Radio Access: Access Protocols – Contention Based Protocols – Comparison of CSMA/CD and CSMA/CA.

Unit – III: (12 Hours)

Multiple Division Techniques: Concepts and Models for Multiple Divisions – Modulation Techniques – Channel Allocation: Static Vs Dynamic – FCA - DCA – HCA. Mobile Communication Techniques: Cellular system infrastructure – Registration – Handoff Parameters and Underlying support – Roaming support – Multicasting – UWB – Femto Cell Network.

Unit – IV: (12 Hours)

Existing Wireless Systems: AMPS – IS 41 – GSM - PCS- IMT 2000. Satellite Systems: Types – Characteristics – Infrastructure – Call Setup – GPS.

Unit – V: (12 Hours)

Wireless LANs, PANs, WANs and MANs: ETSI High-Performance LAN(HiperLAN)-HomeRF-WPANs-Bluetooth-WMAN Using 3GPP and Long Term Evolution.

Text Book:

"Introduction to Wireless & Mobile Systems" – Dharma prakash Agrawal, Qing- An Zeng, 3rd Edition,Cengage Learning -2013.

Reference Books:

1. "Principles of Wireless Networks", Kaveh Pahlavan, Prashant krishnamurthy, Prentice-Hall India, 2008.
2. "Mobile Communications" – G.K.Behera, Lopmudra Das, Scitech Publishers (P) Ltd., Chennai, 2nd Edition 2009.
3. "Mobile and Satellite communications – Principles and Trends" – Madhavendra Richharia ,John wiley & sons Ltd., 2nd Edition 2014.
4. "Mobile Satellite communication Networks" – Ray E.Sheriff and Y.Fun Hu, John wiley & sons Ltd., 2006.
5. "Mobile Satellite Communications Handbook" – Roger Cochetti, John wiley & sons Ltd., Second Edition, 2015.

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M.Sc., Computer Science – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective – III	Hrs	Credits	Marks (CIA+ESE)
	2. Advanced virtual techniques	4	4	25 + 75

Objectives:

- To know the advanced virtual techniques
- To understand the latest trends in virtual concepts.

Unit – I: (12 Hours)

A model of virtualization – Access virtualization: Providing universal access – Application Virutalization: Application isolation, delivery, performance – Processing virualization: Doing system tricks – Network virtualization: Controlling the view of the network.

Unit – II: (12 Hours)

Storage virualization: Where are your files and applications – Security for virtual environments: Guarding the treasure – Management for virtual environments – Using virtualization : The right tool for the job.

Unit – III: (12 Hours)

Introduction – The Business imperatives: innovatice or Die – How we got here – Constraints: The enemy or agility – What is service virtualization? – Capabilities of service virtualization technology.

Unit – IV: (12 Hours)

Where to start with the service virtualization? – Intermission – Best Practice1: Deliver faster – Best Practice2: Reduce your infrastructure footprint – Best Practice3: Transform performance and scale – Best Practice4: Data Scenario Management – Rolling out service virtualization – service virtualization and DevTest Cloud – Assessing the value.

Unit – V: (12 Hours)

Case Studies:

Virtual Keyboard – Virtual router – Virtual ATM – Virtual Box – Virtual Enterprise – Virtual Image – Virtual Library – Virtual Reality – Virtual Surgery – Virtual Server – Virtual Universities.

Text Book:

1. Virtualization – A Manager's Guide – Dan Kusnetzky-O'Reilly – June 2011 – First Edition.
2. Service Virtualization – John Michelsen & Jason English – CA Press – Fed ex Word – 2012

Reference Books:

1. "Mastering virtual Teams: Strategies, Tools, and techniques That Succeed"- by Deborah L.Durate, Nancy Tennant Snyder – John Wiley& Sons publishers - Third Edition- 2006.
2. "Virtualization Essentials" - by Matthew portnoy - John Wiley& Sons publishers – Sybex- 2012.
3. "Virtualization from the desktop to the Enterprise" – by Chris Wolf and Erick M.Halter –Apress-2005.
4. "Virtualization for Dummies" – by Bernard Golden – Wiley publishing Inc.,- 2008.
5. "Mastering Microsoft Virtualization" – by Tim Cerling, Jeff Buller, Chuck Enstall, Richard Ruiz – Wiley publishing Inc. – 2010.

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M.Sc., Computer Science – Semester – III
(For candidates admitted to the course under CBCS Pattern during 2015 - 2016)

Code	Elective- III	Hrs	Credits	Marks (CIA+ESE)
	3. Advanced computing technologies	4	4	25+75

Objectives:

- To acquire skills cloud computing and its concepts.
- To enable the student to learn grid computing, cloud computing and their techniques.

Unit – I: (12 Hours)

Introduction – Grid computing organization and their roles – The Grid computing anatomy – Merging Grid services architecture with the web service architecture.

Unit – II: (12 Hours)

Open Grid services architecture(OGSA) – Some sample use cases that driven the OGSA – OGSA platform components – Open Grid services infrastructure(OGSA) – OGSA services.

Unit – III: (12 Hours)

GLOBUS GT3 Toolkit: Architecture – GLOBUS GT3 toolkit: Programming model – OGSI.NET middleware solutions.

Unit – IV: (12 Hours)

Cloud computing basics – your organizations and cloud computing – cloud computing Hardware & infrastructure accessing the cloud – cloud storage – standards

Unit – V: (12 Hours)

Software as a service(Saas) – software plus services – Developing applications – Local clouds and thin clients – Migrating to the cloud

Text books:

1. "Grid computing" – Jashy Joseph, Craig Fellenstein – Pearson Education Limited-2004.
2. "Cloud computing – A practical approach" – Anthony T.Velte, Toby J.Velte, Robert Elsenpeter – Tata McGrawHill – New Delhi – 2010.

Reference Book:

1. Grid computing – Ahmar Abbes – Fire wall media – 2008 – New delhi.
2. The Grid core Technologies – Maozhen Li, Mark Baker – Wiley India edition – 2012.
3. Enterprise cloud computing – Gautam shroff – Cambridge University press – 2010.
4. Cloud computing – Nick Antonopoulos, Lee Gillam – Springer – 2012.

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DEPARTMENT OF COMPUTER SCIENCE

Students admitted from the academic year 2015 – 2016 onwards

B.C.A.

Sem	S.Code	Courses	Title of the paper	Hours	Credits	Total credits
I		LC I	Tamil I	6	3	20
		ELC I	English I	6	3	
		CC I – Theory	Programming in C	5	5	
		CC II – Practical	Practical I – C Programming Lab	2	2	
		AC I – Theory	Mathematics I	9	5	
		SBC I	Office Automation Lab	2	2	
II		LC II	Tamil II	6	3	20
		ELC II	English II	6	3	
		CC III – Theory	Web Design	5	5	
		CC IV – Practical	Practical II – Web Design Lab	2	2	
		AC II – Theory	Mathematics II	9	5	
		SBC II	Desktop Publishing Lab	2	2	
III		LC III	Tamil III	6	3	20
		ELC III	English III	6	3	
		CC V – Theory	C++ and Data Structures	5	5	
		CC VI – Practical	Practical III – C++ Lab	2	2	
		AC III – Theory	Accountancy I	9	5	
		SBC III	Animation Lab	2	2	
IV		LC IV	Tamil IV	6	3	20
		ELC IV	English IV	6	3	
		CC VII – Theory	Java Programming	5	5	
		CC VIII – Practical	Practical IV – Java Programming -Lab	2	2	
		AC IV – Theory	Accountancy II	9	5	
		NMEC I	Basic Electronics	2	2	
V		CC IX - Theory	Relational Database Management System	4	4	30
		CC X-Theory	Operating System	4	4	
		CC XI – Theory	Multimedia and Its Applications	4	4	
		CC XII – Practical	Practical V – RDBMS	5	5	
		EC I	Elective I – Computer System Architecture	4	4	
		EC II	Elective II – E-Commerce	4	4	
		NMEC II	Computer Electronics	2	2	
		SSD I	Soft skills course	2	2	
		EA I	Gender Studies	1	1	
VI		CC XIII – Theory	Dot Net Programming	5	5	29
		CC XIV – Theory	Data Communications and Networks	5	5	
		CC XV – Theory	Software Engineering	5	5	
		CC XVI – Practical	Practical VI – Dot Net Programming	6	5	
		EC III	Elective III – Network Security	5	5	
		VBC	Human Values & Professional Ethics	2	2	
		ES	Environmental Studies	2	2	
		EA II	Extension Activity	-	1	1
		TOTAL				**140**

Elective : I

1. **Computer System Architecture**
2. Data mining
3. Neural network and fuzzy logic

Elective : II

1. **E-Commerce**
2. Management Information System
3. Software communication and documentation

Elective : III

1. **Network Security**
2. Information Security
3. Object oriented analysis and design

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MANNAMPANDAL, MAYILADUTHURAI
B.C.A. – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course I	Hrs	Credits	Marks (CIA+ESE)
	Programming in 'C'	5	5	25+75

Objectives:

- To understand the basic concepts of computers.
- To acquire knowledge on programming skills using 'C' language.

Unit – I: **(15 Hours)**

Introduction to Computers, Classification of digital computer systems, Anatomy of a digital computer, Computer architecture - Number systems, Memory units, Auxiliary Storage devices, Input and output devices – Introduction to Computer software, Algorithm and Flowchart - Operating systems, Programming languages – Computer networks – Internet and WWW.

Unit – II: **(15 Hours)**

Introduction to C – History and Importance of C – Key words, identifiers, constant and variables, C tokens – declaring variables, Symbolic constant, data types – operators and expressions – I/O functions.

Unit – III: **(15 Hours)**

Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursions – Passing array to functions – Storage classes – Strings – String library functions.

Unit – IV: **(15 Hours)**

Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types – Union – Pointers – pointers and arrays – pointers and functions – pointers and strings – pointers and structures.

Unit – V: **(15 Hours)**

Files – operations on a file – Random access to files – Command line arguments – Introduction to preprocessor – Macro substitution directives – File inclusion directives – Conditional compilation directives – Miscellaneous Directives.

Text book:

1. "Fundamentals of Information Technology" Alexis Leon and Mathews Leon, Vikas Publishing, (For Unit I)

2. "Programming in ANSI C", Balagurusamy E –Tata McGraw Hill, 6th edition, 2012.

References:

1. "A Workbook on C", Vikas Verma, Cengage Learning, 2nd Edition, 2012
2. "Programming in ANSI C " – Kumar Agrawal,
3. "Computer Programming in C", V. Rajaraman.
4. "Computer Programming", Ashok N Kamthane, Pearson education, Second Impression, 2008.

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B.C.A. – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – II : Practical - I	Hrs	Credits	Marks (CIA+ESE)
	'C' Programming Lab	2	2	40+60

Objectives:

- To enable students to gain programming skills in 'C' language.

1. Temperature conversion
2. Quadratic equation
3. Sorting of numbers
4. String functions (user defined)
5. String sorting
6. Recursion (NCR)
7. Matrix multiplication
8. File creation (using command line arguments and structures)
9. File copy (using command line arguments)
10. File concatenation (using command line arguments)

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B.C.A. – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Skill Based Course - I	Hrs	Credits	Marks (CIA+ESE)
	Office Automation Lab	2	2	40+60

Objectives:

- To learn the important facilities, commands and menu options available in MS-Word, MS-Excel, MS-Power point and MS-Access.

Ms-Word:

1. Create a Word document in which perform the following operations:
    a. Create bookmarks
    b. Adding End notes and comments
    c. Find and Replace the text
    d. Entering the text with Autocorrect and Autotext
    e. Use Dropcaps to emphasize your text.
2. Create a Word document and perform the following operations on the text:
    a. Edit the document using cut, copy and paste
    b. Format the text with Bullets and Numbers
    c. Check for Spelling and Grammar
    d. Modifying Font, Line Spacing
    e. Protecting document by setting password.
3. Create a Word document and perform the following operations on it:
    a. Inserting and Deleting Manual Page Break
    b. Format the document using page setup
    c. Adding lines, borders, shading, background and watermarks, dates and page numbers to your document
    d. Creation and Deletion of Headers and Footers to your document
    e. Opening, Closing and Printing of a document.

4. Create a Table in the document and perform the following operations on it:
    a. Convert text to a table
    b. Convert a table to text
    c. Merging and Splitting cells, tables
    d. Applying Table formats
    e. Change case of typed text
5. Create a document which uses Advanced Mail-Merge techniques.

Ms-Excel:

6. Create a worksheet and perform various operations on it.
   (Apply different types of Formulas and Built-in functions)
7. Create a worksheet and prepare a Graph using :
    a. Possible types of charts with Gridlines, Data labels, Legends, Titles.
    b. Adding Background Colors and Pictures.
8. Create a Data-Entry form just like an Invoice of an organization and maintain the information in a database.
9. Modify the worksheet layout by,
    a. Changing column width and row height
    b. Inserting and deleting columns, rows and cell
    c. Moving and Copying cell contents.
10. Create a worksheet to do the following:
    a. Generate the series using File Series command
    b. Transferring data between worksheets.

Ms-PowerPoint:

11. Create a presentation using Auto content Wizard.
12. Create a Slide show which should use graphics, multimedia, transition, animation and Special effects.
13. Create presentation slides using Design Templates.
14. Method of using the different views of slides to create presentation: Normal, Outline, Slide, Slide sorter views.

MS-ACCESS:

15. Create a Student database using design view and generate a student report using Wizard.
16. Create an employee database and design a Form to maintain the database.

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B.C.A. – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2015- 2016)

Code	Core Course III	Hrs	Credits	Marks (CIA+ESE)
	Web Design	5	5	25+75

Objectives:

- To learn the method of creating web pages
- To understand the features of HTML and PHP
- To acquire knowledge on writing scripts

Unit – I: **(15 Hours)**

Introduction to HTML – Web server – Web Client/Browser – HTML – Commonly used HTML commands – Titles and footers – text formatting – emphasizing material in a web page – text styles – other text effects. Lists : types of lists – Adding graphics to HTML documents : Using the border attribute – using the width and height attribute – using the align attribute – using the ALT attribute.

Unit – II: **(15 Hours)**

Tables: Introduction – using the width and border attribute – using the cellpadding attribute - using the cellspacing attribute – using the background – color property – using the colspan and rowspan atributes. Linking Documents : Links – images as hyperlinks. Frames: Introduction to frames - <Frameset>, <Frame> tags.

Unit – III: **(15 Hours)**

PHP & HTML : PHP & HTML - Getting started – writing PHP – running the PHP script. The Basics of PHP : data types - variables – constants – HERE documents - operators – arrays – conditional statements – iterations.

Unit – IV: **(15 Hours)**

Functions : User Defined Functions – Built-in functions – PHP server variables – working with date and time – performing mathematical operations – working with string functions.

Unit – V: **(15 Hours)**

Working with forms: Introducing HTML form tags and elements – the main <FORM> tag – FORM elements – adding elements to a form - uploading files to the web server using PHP. Debugging and errors : Error handling in PHP : displaying errors – types of errors- error levels in PHP – acting on errors/exceptions.

Text Book:

"Web Enabled Commercial Application Development using HTML, JavaScript,DHTML and PHP", 4th Revised Edition, **Ivan Bayross**, BPB publications, 2010.

Reference Books:

1. "World Wide Web design with HTML", C. XAVIER, Tata McGraw Hill, 2008.
2. "HTML – A Beginners Guide", Wendy Willard, Tat McGraw Hill, Fifth Edition.
3. "PHP – A Beginners Guide", Vikram Vaswani, Tata McGraw Hill, 2009.
4. "The Complete Reference PHP", Steven Holzner, Tata McGraw-Hill Edition 2008
5. Programming PHP, Rasmus Lerdorf, Kevin Tatroe and Peter MacIntyre, O'Reilly, 3rd Edition.

A. V. C. COLLEGE (AUTONOMOUS)

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B.C.A. – Semester - II

(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course-IV: Practical II	Hrs	Credits	Marks (CIA+ESE)
	Web Design Lab	2	2	40+60

Objectives:

- To understand the method of creating web pages using different tags, lists, tables, frames, style sheets, images, links and buttons.
- To acquire knowledge on PHP features using MySQL

HTML:

1. Design a webpage to display your resume.
2. Design a webpage for your college admission application form.
3. Design a web site to display your department profile.
4. Create a web page to display your semester marksheet.
5. Create a web site to display the tourist attractions around your native place.
6. Create a site map for your college and display the information about each block using imagemap.
7. Design a website to display the menu card for a hotel.
8. Design an E-NewsPaper.

PHP:

9. Develop a PHP program for string functions.
10. Develop a PHP program to illustrate the array concepts.
11. Develop a PHP program to check message passing mechanism between web pages.
12. Develop a PHP application for student result processing using MYSQL table.
13. Design a web application for payroll processing using MYSQL table.

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B.C.A. – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Skill Based Course - II	Hrs	Credits	Marks (CIA+ESE)
	Desktop Publishing Lab	2	2	40+60

Objectives:

- To acquire knowledge on Desktop publishing
- To learn the method of preparation of document and manipulation of pictures

Coreldraw:

1. Draw straight lines in Bezier mode.
2. Draw curves in freehand mode.
3. Draw curves in Bezier mode.
4. Create an effective Coreldraw screen using the dimension line tools.
5. Create a drawing using lines, curves and polygon.

Photoshop:

1. Change the color modes, resize and rotate the picture.
2. Define the background pattern for a canvas
3. Apply stroking effects to the picture.
4. Merge a picture and a text into the single layer
5. Create a shadow of the image without using the in-built tool.
6. Create and manipulate text using text wrap, anti-aliasing, formatting text and paragraph
7. Create and modify the particular area of that picture using selection tools.
8. Create images pop with special effects.

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B.C.A. – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – V : Theory	Hrs	Credits	Marks (CIA+ESE)
	C++ and Data Structures	5	5	25 + 75

Objectives:

- To understand the difference between the Structured and Object oriented programming.
- To learn the Object oriented programming and Data Structures concepts.
- To acquire knowledge on C++ language features using Data Structures.

Unit – I: **(15 Hours)**

Principles of Object Oriented programming-Beginning with C++-Tokens, Expressions and control structures.

Unit – II: **(15 Hours)**

Functions in C++ - Classes and Objects - Constructors and Destructors.

Unit – III: **(15 Hours)**

Operator Overloading and Type Conversions - Inheritance: Extending Classes.

Unit – IV: **(15 Hours)**

Pointers, Virtual Functions and Polymorphism - Managing Console I/O Operations - Working with files.

Templates - Exception Handling – Manipulating Strings.

Unit - V: **(15 Hours)**

Linked List, Stacks and Queues: List: Linked list-Doubly Linked List - Insertion-Deletion. **Stack:** Representation, Operation and implementation of stack- **Queues:** Linear and Circular queues- Insertion and deletion.

Text Books:

1. ”Object Oriented Programming with C++’, E. Balagurusamy, Tata McGraw Hill Publishing Company Limited, Fourth Edition, 2009. (For Units I – IV).
2. “Object Oriented Programming Using C++”, B Chandra, Narosa Publications, Second Edition, 2009. (For Unit V – Chapter 13).

Reference Books:

1. “C++ and Object-Oriented Programming Paradigm”, Jana, 2nd Edition, 2005, PHI Learning Pvt. Ltd.
2. “C++ How to program”, Deitel & Deitel , 7th Edition,2010, PHI Learning Pvt. Ltd.
3. “The Essence of Data Structures Using C++”, Ken Brownsey, Pearson Education, 2000.
4. “Data Structures and Algorithm Analysis in C++”, Mark Allen Weiss, Third Edition, Pearson Education, 2008.

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B.C.A. – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – VI : Practical	Hrs	Credits	Marks (CIA+ESE)
	Practical III – C++	2	2	40 + 60

Objectives:

- To enable students to understand the Object oriented programming and Data Structures concepts.
- To gain programming skills in 'C++' language.

C++ :

1. Write a C++ Program to Perform Complex Arithmetic Operations which passes objects from functions.
2. Write a class to represent a vector. Include member functions to perform the following tasks:
    d. To create the vector
    e. To modify the value of a given element
    f. To multiply by a scalar value
    g. To display the vector in the form (10,20,….)
3. Write a C++ Program for matrix manipulation using constructor with dynamic allocation of memory.
4. Write a C++ Program to overload any 5 operation using unary operator overloading.
5. Write a C++ Program to prepare mark sheet using Inheritance and Manipulator functions
6. Write a C++ Program to perform Runtime Polymorphism.
7. Write a C++ Program to perform the following Conversion Operations:
    a. From Built-in type to class type
    b. From Class type to Built-in type.
    c. From one class type to another class type.
8. Write a C++ program to create a data file for storing student's data and print mark list for a particular student.
9. Write a C++ program to create and manipulate employee data file.
10. Write a C++ program to implement Stack.
11. Write a C++ program to implement Queue.
12. Write a C++ program to implement List.

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B.C.A. – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Skill Based Course – III	Hrs	Credits	Marks (CIA+ESE)
	Animation	2	2	40 + 60

Objectives:

- To understand the concepts of animation.
- To enable students to creating animations.

Using Flash:

1. Move an animated object in path using GUIDE LAYER.
2. Dynamic Masking in the Text.
3. Perform Motion / Shape Tweening operation using Flash.
4. Design Drag Masking application using Movie Clip.
5. Design the Arithmetic Calculator using BUTTON and get the user input through Mouse.
6. Create a changing shape motion: Change the shape of drawn image or text to another Shape of image or text.
8. Design Pay bill format and calculate allowances from basic pay and get the Employee number, name and basic pay from the keyboard.
9. Create a Spider man with animation.
10. Create an animation to represent the growing Moon using Flash.
11. Create a simple paint program using Flash.

Using Photoshop:

11. Create Image morphing using Photoshop.
12. Create Animated Buttons which is used for Web design using Photoshop.
13. Create animated GIF for use as Banners, Titles and Buttons using Photoshop.

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B.C.A. – Semester – IV
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – VII : Theory	Hrs	Credits	Marks (CIA+ESE)
	Java Programming	5	5	25 + 75

Objectives:

- To understand the features of Java language.
- To acquire knowledge on Java programming.

Unit – I: **(15 Hours)**

Java Evolution – Overview of Java language – Constants, variables and data types.

Unit – II: **(15 Hours)**

Operators and Expressions – Decision making and branching – Decision making and looping.

Unit – III: **(15 Hours)**

Classes, objects and methods – Arrays, Strings and Vectors.

Unit – IV: **(15 Hours)**

Interfaces:Multiple Inheritance – Packages: Putting classes together – Multithreaded programming – Managing errors and exceptions

Unit – V: **(15 Hours)**

Applet programming – Graphics programming: The Graphics class – Lines & Rectangles – Circles & Eclipses – Drawing Arcs & Polygons – Managing Input/Output files in Java: Introduction – concept of streams – stream classes – byte stream classes – character stream classes – using streams – other useful I/O classes – using the File class – Input/Output Exceptions – Creation of files – Reading/Writing characters – Reading/Writing bytes – Random access files.

Text Book:

"Programming with JAVA – A Primer", 4th Edition, 2011, E. Balagurusamy, Tata McGraw Hill Publishing Company Limited.

Reference Books:

1. "Java2 – The Complete Reference", 5th Edition,2002, Herbert Schildt, Tata McGraw Hill.
2. "Java and Object oriented programming Paradigm", Jana, PHI Leaning Pvt. Ltd.,2005.
3. "Java programming for absolute beginner", Russell, PHI Leaning Pvt. Ltd.,2001.
4. "Java : How to program", 8th Edition,2010, Deitel & Deitel, PHI Learning Pvt. Ltd.

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B.C.A. – Semester – IV
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – VIII : Practical	Hrs	Credits	Marks (CIA+ESE)
	Practical IV : Java Programming	2	2	40 + 60

Objectives:

- To enable students to learn programming in Java.
- To understand the features like packages, multithreading, exception handling and applets.

Java:

1. Write a program to compute the NCR value.
2. Write a program to generate the Fibonacci series for the given number.
3. Write a program to handle the various Mathematical functions.
4. Write a program to demonstrate the usage of Class and Object.
5. Write a program to demonstrate the usage of Constructor inside the class.
6. Write a program to handle the various String functions.
7. Write a program to demonstrate the usage of Vector class.
8. Write a program to create and import the Package.
9. Write a program to handle the Multi-threading processes.
10. Write a program to demonstrate the usage of the Exception handling processes.
11. Write a program to create and use your Own Exception.
12. Write an applet program to display your Personal details.
13. Write an applet program to draw the various Geometric figures.

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B.C.A – Semester –V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – IX : Theory	Hrs	Credits	Marks (CIA+ESE)
	Relational Database Management System	4	4	25+75

Objectives:

- To enable students to learn the database concepts, DBMS, relational databases and Normal forms.
- To understand the usage of SQL commands.

Unit – I: **(15 Hours)**

An overview of Database Management: What is the Database System – What is database – Why Database – Database Independence.

Database System Architecture: Introduction – Three Levels of Architecture – The External Level – Conceptual Level – The Internal Level – Mappings – The Database Administrator – The Database Management System – Client server architecture – Distributed processing.

An Introduction to Relational databases: Introduction – An Informal Look relational model – The catalog – Base Tables and Views - Transactions - Suppliers and parts database.

Unit – II: **(15 Hours)**

An Introduction to SQL: Introduction – overview - The catalog – Views –Transactions - Embedded SQL – Dynamic SQL and SQL/CLI. **Relations:** Introduction – Tuples - Relation types – Relation values - Relation variables.

Relational Algebra: Introduction- Closure revisited – Relational Operators - Examples.

Unit – III: **(15 Hours)**

Relational Calculus: Introduction – Tuple Calculus –Examples – Calculus Vs Algebra – Domain Calculus - Query-by-Example.

Integrity: Introduction –Internal vs External predicates – Correctness vs consistency – Integrity and views – Constraints classifications scheme – keys.

Views: Introduction – What are views for – View Retrieval – View Updates.

Unit – IV: **(15 Hours)**

Functional Dependencies: Introduction – Basic Definitions – Trivial and Non-trivial Dependencies.

Further Normalization I: 1NF, 2NF, 3NF,BCNF : Introduction – Non loss decomposition and functional dependencies – First, Second and Third Normal forms – Dependency preservation – Boyce/Codd Normal form.

Further Normalization II: Higher Normal Form: Introduction – Multi valued Dependencies and fourth normal form – Join dependencies and fifth normal form.

Unit – V: **(15 Hours)**

SQL: Interactive SQL Part-I: Table Fundamentals – Viewing data in the Tables – Eliminating duplicate rows when using a select statement – Sorting data in a table – Creating a table from a table –Inserting data into a table from another table – Delete operations – Updating the contents of a table – Modifying the structure of tables – Renaming tables – Truncating tables – Destroying tables- Creating synonyms – Examining objects created by a user.

Interactive SQL Part II : I/O constraints: primary key constraint, Foreign key constraint, Unique key constraint – Business rule constraints – Null value concepts – NOT NULL constraint defined at the column level – The check constraint.

Interactive SQL PART III: ORACLE FUNCTIONS - Aggregate functions – Numeric functions – String functions – Conversion functions- Manipulating dates in SQL using the Date()

Interactive SQL PART IV: Grouping data from tables in SQL – Subqueries – Joins.

Text Books:

1. **"**An Introduction to Database Systems", C. J. Date, A.Kannan, S. Swamynathan, 8th Edition, Pearson Publication, 2012.

2. "SQL, PL/SQL The Programming Language of Oracle", Ivan Bay Ross, BPB Publications, Fourth Revised edition, 2013.

Reference Books :

1. "Database system concepts", Silberchartz Korth, Sudarashan, Tata McGraw Hill, 4th Edition, 2002.
2. "Database management systems", Raghu Ramakrishnan, Johannes Gehrke McGraw-Hill Higher Education, Second Edition, 2000.
3. "Database system using Oracle a simplified guide to SQL & PL/SQL", Shah, 2nd Edition, PHI Learning Pvt. Ltd., 2005.
4. "Introduction to SQL & PL/SQL", Sharad Maheswari and Ruchin Jain, 2nd Edition, Laxmi Publications Pvt. Ltd., 2007.
5. "DBMS – Complete Practical approach", 2nd Edition, Laxmi Publications Pvt. Ltd., 2006.

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B.C.A – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – X : Theory	Hrs	Credits	Marks (CIA+ESE)
	Operating System	4	4	25+75

Objectives:

- To understand the history, concepts and structure of Operating Systems.
- To gain knowledge on scheduling, deadlocks, storage and I/O management.
- To know the concept of File systems, Process management, Security and Protection.

Unit – I: **(15 Hours)**

Introduction : What is Operating System? Computer system organization – computer system architecture – operating systems structure – operating system operations – process management – memory management – storage management – protection and security – distributed system.

System structures: Operating System Services – user operating system interface - System calls – types of system calls - System Programs – operating system design and Implementation – operating system structure – virtual machines.

Unit – II: **(15 Hours)**

Process concept: Process concept - process scheduling – operation on processes – Inter process communication .

Process Scheduling: Basic concepts - scheduling criteria - scheduling algorithms – thread scheduling - multiple - processor scheduling – Algorithm Evaluation.

Synchronization: The critical section problem – Synchronization hardware – Semaphores.

Unit – III : **(15 Hours)**

Deadlocks: System model – Deadlock characterization – Methods of handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

Memory Management strategies: Background – swapping - Continuous memory allocation – Paging – structure of page table – segmentation.

Virtual Memory management : Background – Demand Paging – page replacement - allocation of frames .

Unit – IV: **(15 Hours)**

File system : file concept – access methods – directory and disk structure – protection.

Secondary Storage Structure: Disk structure – Disk scheduling – Disk management – Swap Space management – RAID structure.

I/O systems : overview – I/O hardware – application I/O interface – kernel I/O system – transforming I/O request to hardware operations.

Unit – V :

Case study **(15 Hours)**

The Linux System: History - Design Principles – kernel models - Process management – scheduling - Memory management – File System – I/O system – Inter Process Communication.

Windows 2000: History - Design principles – System Components – Environment Subsystems – File System – Networking – Programmer Interface.

Text Book:

"Operating System concepts", Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Wiley India Edition, 8th Edition, 2011.

Reference Books :

1. "Advanced Concepts in Operating Systems", Mukesh Singhal and Nirajan G. Shivaratri, Tata McGraw Hill Publications, New Delhi, 2001.
2. "Operating System: Design and Implementation", Tenenbaum & Woodhull, PHI Learning Pvt. Ltd. 2006.
3. "Operating system fundamentals", D. Irtegov, Laxmi Publications Pvt. Ltd., 2004.
4 "Operating system concepts", PS.Gill, 1st Edition, Laxmi Publications Pvt. Ltd., 2006.
6. "Operating Systems" by Stuart E. Madnick and John J. Donovan – Tata McGraw Hill Publishing Company Ltd. 2008.
7.. "Operating systems" by Achyut S. Godbole and Atul Kahate, Mc Graw Hill Publishing, Third Edition, 2011.

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B.C.A – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XI : Theory	Hrs	Credits	Marks (CIA+ESE)
	Multimedia and its Applications	4	4	25+75

Objectives:

- To enable students to learn the introduction of multimedia, Setting up a Multimedia Studio and Multimedia Elements
- To acquire knowledge on Multimedia Text, Audio, Animation and Multimedia Projects

Unit – I:

Multimedia-An overview: Introduction – Multimedia Presentation and Production – Characteristics of multimedia presentation – Hardware and Software requirements – Uses of Multimedia – Analog and Digital Representations – Digitization.

Text : Introduction – Types of Text – Unicode standard – Font – Insertion of Text – Text Compression – Text File Formats.

Unit – II :

Image : Introduction - Image Data Representation – Image Acquisition – Image Processing – Binary Image processing – Gray Scale Image Processing – Color Image Processing – Image output on monitors.

Unit – III:

Graphics : Introduction – Advantages of Graphics – Uses of Graphics – Components of a Graphics System – 2D co-ordinate systems – 2D Transformations – Line Drawing Algorithms – Circle Drawing Algorithms – Filling Algorithms – Clipping Algorithms.

Audio: Introduction – Acoustics – Sound waves – Types and Properties of Sounds – Psycho-Acoustics – Components of an Audio Systems – Digital Audio – Synthesizers – Musical Instrument Digital Interface – Digital Audio Processing – Speech – Sound Card.

Unit – IV:

Video: Introduction – Motion Video – Analog Video Camera – Analog Video Signal Representation – Television Systems – Video Color Spaces – Digital Video – Digital Video Processing – Video Recording and Storage Formats.

Animation : Introduction – Historical Background – Uses of Animation – Traditional Animation – Principles of Animation – Computer Based Animation – Animation on the Web – 3D Animation – Rendering Algorithms.

Unit – V:

Compression : Introduction – Basic Concepts – Lossless compression Techniques – Lossy compression Techniques.

Multimedia Application Development : Introduction - Software Life Cycle Overview – ADDIE Model – Multimedia Production Steps – Case Study – Authoring Software.

Text Book:

Principles of Multimedia – Ranjan Parekh, Second Edition, TMH publication, 2013. (Relevant portions only)

Reference Books:

1. ”Multimedia making it work”, Tay Vaughan, 8th Edition, TataMcGraw-Hill, 2011.
2. “Multimedia communication systems – Techniques , Standards and Networks “, Rao, Bojkovic & Milovanovic, 1st edition, PHI Learning Pvt. Ltd, 2007.
3. “Multimedia fundamentals: Vol – 1: Media coding and content processing”, Steinmetz & Nahrstedt, PHI Learning Pvt. Ltd, 2003.
4. “Multimedia information networking “, Sharadha, PHI Learning Pvt. Ltd., 2009.
5. “Multimedia basis – Technologies (Vol-1), Andreas, Holzinger, Laximi Publication Pvt. Ltd., 2004.

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B.C.A – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XII : Practical – V	Hrs	Credits	Marks (CIA+ESE)
	RDBMS	5	5	40+60

Objectives:

- To acquire knowledge on DDL, DML and DCL commands.
- To understand the usage of SQL queries.
- To learn the features on PL/SQL programming and Oracle forms.

SQL:

1. Table creation with various data types and constraints.
2. DDL statements (CREATE, ALTER, DROP)
3. DML statements (Retrieval, Update, Delete, Insertion)
4. Arithmetic Functions
5. Character and String Functions.
6. Group functions
7. Conversion functions Date functions
8. JOINS (Self, Equi and Outer)
9. Sub queries and correlated sub queries.

PL/SQL:

10. Control structures
11. Simple and multiple loop structures.
12. Exception handling
13. Explicit and Implicit cursors

FORMS:

14. Design a Form in oracle for student detail using default form.
15. Design a Form in oracle for Employee detail using controls**.**

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B.C.A – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – I	Hrs	Credits	Marks (CIA+ESE)
	1. Computer System Architecture	4	4	25+75

Objectives:

- To learn functions of digital logic circuits
- To understand basic computer organization and design
- To gain knowledge on CPU, Memory and I/O organization, and Multiprocessors

Unit – I: **(9 Hours)**

Data Representation: Data Types – Complements – Fixed and Floating Point Representation – Other Binary Codes – Error Detection Codes.

Register Transfer and Microoperations: Register Transfer Language – Register Transfer – Arithmetic Microoperations – Logic Microoperations – Shift Microoperations – Arithmetic Logic Shift Unit.

Unit – II: **(9 Hours)**

Basic Computer Organization and Design: Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input/Output and Interrupt .

Central Processing Unit : General Register Organization – Stack Organization – Instruction Formats – Addressing Modes.

Unit – III: **(9 Hours)**

Central Processing Unit : Data Transfer and Manipulation – Program Control – Reduced Instruction Set Computer.

Computer Arithmetic: Addition and Subtraction - Multiplication Algorithms – Division Algorithms.

Unit – IV: **(9 Hours)**

Memory Organization: Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory – Memory Management Hardware.

Unit – V: **(9 Hours)**

Input-Output Organization: Peripheral Devices – Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer.

Multiprocessors: Characteristics of Multiprocessors – Interconnection Structures – Interprocessor Arbitration – Interprocessor communication and synchronization.

Text Book:

"Computer System Architecture" – 3rd Edition - M. Morris Mano - PHI Pvt. Ltd., 2013.

Reference Books:

1. "Computer Architecture & Parallel Processing", Bharat Bhushan Agarwal, Sumit Prakash Tayal, 1st Edition, Laxmi publication Pvt. Ltd. 2009.
2. "Computer System Architecture", Rao, PHI Learning Pvt. Ltd., 2009.
3. "Computer Organization and Architecture", Rajaraman & Radhakrishnan, PHI Learning Pvt. Ltd., 2007.
4. "Advanced Computer Architecture: A System Design Approach", Kain, PHI Learning Pvt. Ltd. 2003.

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B.C.A – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – I	Hrs	Credits	Marks (CIA+ESE)
	2. Data Mining	4	4	25+75

Objectives:

- To understand the basic concepts of Data mining and Data warehouse.
- To acquire knowledge on Learning concepts, Knowledge discovery process and Learning algorithms.

Unit – I : **(9 Hours)**

Introduction to Data mining - An expanding universe of data - Information as production factor - Computer systems that can learn - Data mining – Data mining versus Query tools- Data mining in Marketing – Practical applications of Data mining.

Unit – II : **(9 Hours)**

Introduction to Learning – Self-learning Computer systems - Machine learning and the Methodology of Science - Concept Learning - a Kangaroo in Mist.

Data mining and data warehouse: Introduction – the need of Data warehouse - Integration with Data mining – Client-server and Data warehousing - Multiprocessing machines - Cost justification.

Unit – III : **(9 Hours)**

Introduction to Knowledge discovery process - Data selection – Cleaning – Enrichment – Coding - Data mining - Preliminary analysis of the Data set using Traditional Query tool- Visualizations techniques - Likelihood and Distance – OLAP tools - k-Nearest neighbor - Decision trees - Association tools - Neural network - Genetic algorithms - reporting.

Unit – IV : **(9 Hours)**

Introduction to KDD environment – different forms of Knowledge - getting started - Data selection – Cleaning – Enrichment – Coding - Data mining – Reporting - The KDD environment - The golden rules.

Real-life applications: Introduction - Customer profiling - Predicting bid behaviour of pilots - Discovering foreign key relationships – results.

Unit – V : **(9 Hours)**

Introduction to formal aspects of Learning algorithms- Learning as compression of Data sets - The information content of a Message - Noise and Redundancy - the significance of Noise - Fuzzy databases - the traditional theory of Relational database - from Relations to Tables- from Keys to Statistical dependencies – Denormalization - Data mining primitives.

Text book:

"Data mining" by Pieter Adriaans & Dolf Zantinge, Pearson education, Fourth impression, 2003.

Reference books:

1. "Data mining: Next generation challenges and future directions", Kargupta, et al , PHI Learning Pvt. Ltd., 2004.
2. "Data mining : Techniques and trends", Gopalan and Siva selvan , PHI Learning Pvt. Ltd., 2009.
3. "Introduction to Data mining with case studies", Gupta, PHI Learning Pvt. Ltd., 2014.
4. "Data mining and Data warehousing", Bharat Bhushan Agarwal and Sumit prakash Tayal, Laxmi Publications Pvt. Ltd., 2009.

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B.C.A – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – I	Hrs	Credits	Marks (CIA+ESE)
	3. Neural Network and Fuzzy Logic	4	4	25+75

Objectives:

- To learn basic concepts of Neural networks and Fuzzy logic.
- To understand the functional units of ANN, types of ANN and Fuzzy sets.

Unit – I : **(9 Hours)**

Basics of Artificial Neural Networks: Characteristics of Neural Networks – Historical development of Neural Network - Principles – Artificial Neural Networks: Terminology. Models of Neuron – Topology – Basic Learning Laws – Learning Models – Learning Methods.

Unit – II : **(9 Hours)**

Functional Units of ANN for Pattern Recognition Tasks: Pattern Recognition Problem – Basic Functional Units – Pattern Recognition Tasks by the Functional Units.

Unit – III : **(9 Hours)**

Feedback Neural Networks: Introduction – Analysis of Linear Auto Associative FF Networks – Analysis of Pattern Storage Networks: Pattern storage networks – Hopfield Model. Competitive Learning Neural Networks: Introduction – Components of a Competitive Learning Network.

Unit – IV : **(9 Hours)**

Architectures for complex pattern recognition tasks: Introduction –Pattern Mapping – Temporal Patterns. Applications of ANN: Introduction – Direct Applications – Application Areas.

Unit – V : **(9 Hours)**

Set Theory : Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations –

Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

Text Books:

1. "Artificial Neural Networks", B.Yegnanarayana, Prentice Hall of India, 2001.
2. "Neuro-Fuzzy and Soft Computing", J.S.R.Jang, C.T.Sun and E.Mizutani, Pearson Education, 2004.
3. "Neural networks : A Comprehensive Foundation", Simon Haykin, Second edition, Pearson education, 2005.

Reference Books:

1. "Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications", S. Rajasekaran and G.A.V.Pai, PHI Learning Pvt. Ltd., 2003.
2. "Neural Networks and Fuzzy Systems: A Dynamical Systems approach to Machine Intelligence", Kosko , PHI Learning Pvt. Ltd.,1996.
3. "An Introduction to Neural Networks", Anderson, PHI Learning Pvt. Ltd., 2015.

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B.C.A – Semester – V
(Students admitted from the academic year 2015 - 2016 onwards)

Code	Elective Course – II	Hrs	Credits	Marks (CIA+ESE)
	1. E–Commerce	4	4	25+75

Objectives:

- To understand the fundamentals of E-Commerce, Software agents and Internet technologies essential for E-commerce.
- To learn the Network security and Firewalls, E-payment systems – E-marketing and E-business portals.

Unit – I : **(9 Hours)**

History of E-Commerce: Electronic commerce – early business information interchange effort – emergence of the internet – emergence of the world wide web – advantages and disadvantages of E-commerce- E-transaction challenges for Indian Corporates**. Business models for E-Commerce:** Social networking and Facebook – business model – E-Business models – examples. Enabling technologies of the World wide web – Akshaya project – world wide web – internet client server applications – networks and internet – software agents – internet standards and specifications – internet service providers – hypertext – Javascript – XML.

Unit – II : **(9 Hours)**

E-Marketing : Google – Traditional marketing – identifying web presence goals – the browsing behaviour model – online marketing – E-advertising – internet marketing trends – E-branding – marketing strategies – Examples**. E-Security** : Security breach – information system security – security on the internet – E-business risk management issues – information security environment in India

Unit – III : **(9 Hours)**

E-Payment systems: Digital Payment requirements – Digital Token based e-payment systems – Classification of New Payment systems – e-Cash – Risk and e-Payment Systems – Designing of e-Payment Systems – Digital Signature – On-line Stock trading. **E-customer relationship management** : CRM – Business Touch points **- e-Supply chain management** : Supply chain.

Unit – IV : **(9 Hours)**

E-Strategy and Knowledge management : Knowledge as a key business aspect – Changes in Global business Economy, in Technology – Definitions of Knowledge – Knowledge management – Need for a Strategic approach – Stages in Developing Knowledge Management system – Applications – Knowledge management in DM & DW – Importance of DW – DM – Seven dimensions of e-Commerce strategy – Value chain and e-Strategy – Planning the e-Commerce Project. **Information systems for mobile commerce**: Mobile Commerce - Mobile Payments – Cellular Networks – Wireless Spectrum – Generations in Wireless communication – Technologies of Mobile Commerce – WAP programming model – Security issues of Cellular technology – Mobile Commerce in India.

Unit – V: **(9 Hours)**

Portals for E-Business: Portals – requirements of intelligent websites – setting website goals and objectives – portals for mass collaboration – portals for enterprise resource planning – What is ERP? – SAP – Intranet portals – human resource management – various HRIS modules. **Legal and ethical issues:** Ethical issues in a digital economy – Computers as targets for crime – computers as storage devices – computers as communication tools – Cyberstalking – Cybersquatting – Privacy is at risk in the internet age – phishing – skimming – internet gambling – threats to children – the special nature of computer ethics.

Text Book:

"E-Commerce: An Indian Perspective**",** P.T. Joseph S.J**.,** 5th Edition, PHI Learning Pvt. Ltd **(Chapters 1 – 12 only)**, 2015.

Reference Books:

1. **"**Cyber laws intellectual property & E-commerce security", Edi, Dominant publishers and distributors, 2003.
2. "Frontiers of Electronic Commerce", Kalakota Whinston, Pearson Education, Sixth Impression, 2008.
3. "E-Commerce – From Vision to Fulfillment", Award, Third Edition, PHI Learning Pvt. Ltd., 2006.
4. "Essentials of E-Commerce Technology", Rajaraman, PHI Learning Pvt. Ltd., 2009.
5. "E-Commerce - a Management Guide", Parag Diwan & Sunil Shavana, Excel Books, Reprint, 2005.

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B.C.A – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – II	Hrs	Credits	Marks (CIA+ESE)
	2. Management Information Systems	4	4	25+75

Objectives:

- To enable students to learn the Information system concepts.
- To understand the need of IT in MIS, Business applications, stages in development and challenges for the Management.

Unit – I : Foundation Concepts **(9 Hours)**

Information system in Business – Components of information systems – Fundamentals of strategic advantages – using information technology for strategic advantages.

Unit – II : Information Technology **(9 Hours)**

Computer Hardware: Computer systems – computer peripherals. **Computer software:** Application software – system software. Data resource management: Managing data resources.

Unit – III : Business Applications **(9 Hours)**

Enterprise Business systems – Functional business systems – customer relationship management (CRM) – Enterprise Resource Planning (ERP) – supply chain management (SCM) – E-Commerce fundamentals.

Unit – IV : Development Process **(9 Hours)**

Planning fundamentals – Implementation challenges – Developing business system – implementing business systems.

Unit – V : Management Challenges **(9 Hours)**

Security, Ethical and Societal challenges of IT – Security management of Information technology – Managing information technology.

Text Book:

"Management Information Systems" by James A O'Brien, George M. Marakas,, Ramesh Behl Special India 9th Edition, Tata McGraw Hill Publications, 2012. **Chapters (1 to 14)**

Reference Books:

1. "Management Information Systems", Gupta, S.Chand company Ltd., New Delhi., 2014.
2. "Management Information Systems", Sadagopan, PHI Learning Pvt. Ltd, 2014.
3. "Management Information Systems", Chatterjee, PHI Learning Pvt. Ltd., 2010.
4. "Management Information Systems: A Concise Study", Kelkar, 2nd Edition, PHI Learning Pvt. Ltd., 2008.
5. "Management Information System in Knowledge Economy", Joseph & Mohapatra, PHI Learning Pvt. Ltd., 2014.

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B.C.A – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course - II	Hrs	Credits	Marks (CIA+ESE)
	3. Software Communication and Documentation	4	4	25+75

Objectives:

- To understand the importance of Communication and Documentation.
- To acquire knowledge on Individual and Group Communications, types of written Communications and Standards.

Unit – I : Basic Concepts **(9 Hours)**

Importance of Communication and Documentation; Different types of Communications; Spoken communication; Written communication; Different types of Documentation.

Unit – II : Spoken Communication **(9 Hours)**

Elements of good individual communication - getting over nervousness - organizing one self-characteristic of effective communication-augmenting spoken words by actions and other means - other aspects of spoken communication like speeches; presentation; use of visual aids.

Unit – III : Group Communication **(9 Hours)**

Meeting - Effective participation - effective management of meetings - preparing minutes - "virtual" meetings - audio conference - use of collaboration tools.

Unit – IV : Different Types Of Written Communication **(9 Hours)**

Principles of effective written communication –differences between written communication and spoken communication-resume writing-email techniques-proposals-contracts-user guides-external technical documentation for software-internal software technical documentation-users guides-letters and different types of letters-legal issue.

Unit – V : Technology And Standards **(9 Hours)**

Use of various tools and technologies - need for standardization - role of processes and standards in documentation - on-line help - Impact of internet on documentation - common challenges in the harnessing of technology; course summary.

Text Books:

1. "Technical Writing and Professional Communication", Huckin, et al., McGraw Hill, 1991.
2. "The Essence of Effective Communication", Ron Ludlow and Fergus Panton, PHI Learning Pvt. Ltd., 1992.
3. "Illustrated World of DTP", Bennet, Dreamland Publications, New Delhi, 1998.

Reference Books:

1. "The Art of Speaking Made Simple", W.R.Gordin and Edward W. Mammen: Rupa & Co., 1982.
2. "Business Communication Today", Sushil Bahl: Response Books, New Delhi, 1996.
3. "Effective Communication Made Simple", Eyre, W.H. Allen, London, 1979.
4. "Learning Media Design (Text and CD ROM)", Gloria Wilson and Garry Bitter, PHI Learning Pvt. Ltd., New Delhi, 1998.
5. "Multimedia Made Simple", Simmon Collin, Asian books (P) Ltd., New Delhi, 1996.

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B.C.A – Semester – V
(Students admitted from the academic year 2015 - 2016 onwards)

Code	NMEC – II	Hrs	Credits	Marks (CIA+ESE)
	Computer Electronics	2	2	25+75

Department of Electronic Science

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B.C.A – Semester – V
(Students admitted from the academic year 2015 - 2016 onwards)

Code	SSD – I	Hrs	Credits	Marks (CIA+ESE)
	Soft skills course	2	2	25+75

Common paper for all UG courses.

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B.C.A – Semester – V
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	EA – I	Hrs	Credits	Marks (CIA+ESE)
	Gender Studies	1	1	25+75

Common paper for all UG courses.

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B.C.A – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XIII : Theory	Hrs	Credits	Marks (CIA+ESE)
	Dot Net Programming	5	5	25+75

Objectives:

- To enable students to learn IDE of Microsoft Visual studio .Net.
- To understand the Control structures, Procedures and Arrays.
- To gain skills on Graphical User Interface Controls and Databases.

Unit – I: **(15 Hours)**

Essential Visual Basic .NET: Putting Visual Basic to Work – What's new in VB.NET – The .NET Framework and the common language runtime – Building VB.NET Applications – The Visual Basic Integrated Development Environment. **Visual Basic Language: operators, conditionals, and Loops:** keywords – statements – syntax – options and imports statements. ***Immediate Solutions:*** declaring constants – creating enumerations – declaring variables – data types, converting between data types, checking data types – declaring arrays and dynamic arrays – handling strings, converting string to number, characters and character codes – operators and operators precedence – commenting your code – if..else, select case, switch and choose, do loop, for, for each..next, while, with statement.

Unit –II: **(15 Hours)**

Windows Forms: All about windows forms – window MDI forms – creating windows applications – Adding Controls to Forms – Handling Events – A Windows Forms in Code. ***Immediate Solutions:*** setting title bar text – adding/removing min/max buttons and setting a form's border – setting control tab order – setting forms initial positions – moving and sizing forms and controls in code, showing and hiding controls and forms – using MsgBox function – using the MessageBox..Show method – using InputBox function – working with multiple forms – using properties to communicate between forms – setting the startup form – creating MDI applications – creating dialog boxes – creating owned forms – passing forms to procedures – minimizing/maximizing and enabling/disabling forms – adding and removing controls at run time – handling mouse events – handling keyboard events.

Windows Forms: Text boxes – Rich Text Boxes – Labels and Link Labels:

Immediate Solutions: **Text boxes:** creating multiline, word-wrap, accessing text, adding scroll bar, align text, read-only, select and replace text, copying or getting selected to or from the clipboard, creating a password control, controlling input, creating a text box in code – **Rich Text Boxes:** accessing text, creating bold, .italic, underlined and strikeout text, indent text, adding bullet, setting text color, save and load RTF file, align text, creating rich text box in code – **Labels:** labels, formatting and aligning text, access keys to controls without captions – **Link Labels:** creation, using code, link to another form and web.

Unit – III: **(15 Hours)**

Windows Forms: Buttons, Checkboxes, Radio buttons, Panels and group boxes. ***Immediate Solutions:*** **Buttons:** about buttons, setting buttons caption, foreground and background color, fonts, handling button clicks, Imitating control arrays, resetting the focus after the button click, button tab order, disabling buttons, show/hide, resizing and moving buttons from code, adding pictures to a button, adding button at run time, passing button to procedure, handling button releases – **Checkbox:** using its class, creation, getting state, setting state, creating three-state checkbox – **Radio button:** Class , creation, getting state, setting state, creating toggle buttons – **Panel:** class, creation, adding controls to panels in code – **Groupbox:** class, creation, adding controls.

Unit – IV: **(15 Hours)**

Windows Forms: List Boxes, Checked List Boxes, Combo Boxes and Picture Boxes, Scrollbar and Timer. ***Immediate Solutions:*** **ListBox:** class, adding items, referring items, responding to event, removing items, sorting, determining how many items, items are selected, making list boxes scroll horizontally, multi select, clearing – **CheckedList Box:** class adding items, determining checked items, unchecked items, handling events – **ComboBox:** class, creating simple, drop-down and drop-down list comboboxes, adding item, responding to selection, removing items, getting current selection, sorting, clearing, getting number of items, sorting and clearing a combobox – **Picture box:** class, setting or getting images, adjusting size, handling events. **– Scroll bar:** HScrollBar and VScrollBar classes**,** setting scroll bar minimum and maximum value, setting up scroll bar clicks and arrow clicks –**Timer:** class, setting interval, turning on/off timer, handling events.

Menus, Built-in dialog boxes and printing: Menus, Menu Items, Context menus – Built-in dialog boxes, **dialogs:** open file, save file, font, color, print dialogs. ***Immediate Solutions:*** using MainMenus class, using MenuItems class, creating menu and sub menus, adding checkmarks to menu item, creating menu access keys, shortcut, changing caption at run time, creating menu separator, using popup event, show and hide the menu items, disabling menu items, drawing menu items yourself, creating menus in code – merging MDI menus, creating MDI window menus, using context menu class, creating context menu, open dialog class, creating open file dialogs, using the

save file dialog class, creating save file dialogs, using font dialog class, creating font dialogs, using color dialog class, creating color dialogs – printing.

Unit – V: **(15 Hours)**

Data Access with ADO.NET: What are databases?, accessing data with server explorer – accessing data with data adapters and dataset – working with ADO.NET –overview of ADO.NET objects. ***Immediate Solutions:*** using basic SQL – using the server explorer – creating new data connection – dragging tables from the server explorer to a form – creating a dataset – populating a dataset – display data in a data grid – selecting a data provider – data access using the data adapter controls – previewing data from the data adapters – examining dataset properties – examining dataset schema – connecting to an MS Jet database – using RDBMS – adding multiple tables to a dataset – using data views.

Building controls to Database: simple binding – complex binding – binding data to control – navigating in datasets – using the display members and value member properties – creating data forms with the data form wizard – using SQL parameters.

Immediate Solutions: using the data binding's property for data binding – creating simple and complex data binding – binding**:** text boxes, check boxes, combo boxes, list boxes, checked list boxes. Using the display and value member properties – using the data grid class – binding data grid – using binding context class – navigating in datasets – creating data forms automatically – using parameterized SQL queries – using master/detail relationships and data relation objects – using the error provider class – performing data validation in controls**.**

Text Book:

"Visual Basic **.**NET programming", [Black Book] by Steven Holzner, Dreamtech, Reprint edition 2011.

Reference Books:

1. "VB.Net programming in easy steps" by Tim Anderson, DreamTech, 2002.
2. "Programming and problem solving with VB.NET" by Nell Dale, Michael McMillan, Chip Weems, Mark Headington, Narosa Publishing house, 2003.
3. "VB.Net Complete Reference" by Jeffrey R. Shapiro, Tata Mc Graw Hill Publication, 2002.
4. "Programming Microsoft Visual Basic .NET (Core Reference)" by Francesco Balena, First Edition, 2002.

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B.C.A – Semester – VI
(Students admitted from the academic year 2015 - 2016 onwards)

Code	Core Course – XIV	Hrs	Credits	Marks (CIA+ESE)
	Data Communications and Networks	5	5	25+75

Objectives:

- To learn the concepts of Communications, Networks and Transmission Errors, Topologies and Routing Algorithms.
- To understand the Classification of Networks and Internetworking concepts.
- To acquire knowledge on TCP/IP, DNS, FTP and UDP.

Unit – I: **(15 Hours)**

Introduction to data communications and networks: Fundamental concepts, Data communications, Protocols, Standards, Standards organizations, Signal propagation, Analog and Digital signals, Bandwidth of a signal and a medium – Fourier analysis and the concept of Bandwidth of a signal, Data Transmission Rate and Bandwidth- **Analog and digital transmission methods:** Analog signal, analog transmission, Digitasl signal and Digital transmission, Digital signal and analog transmission, Baud rate and bits per second, Analog signal and digital transmission, Nyquist Theorem - **Modes of data transmission and multiplexing:** Introduction, parallel and serial communications, asynchronous, synchronous and isochronous communication, simplex, half duplex and full duplex communication - multiplexing and demultiplexing - types of multiplexing.

Unit – II: **(15 Hours)**

Transmission errors: Deduction and correction: Error Classification, Types of Errors, Error Detection - **Network topologies, switching and routing algorithm:** Mesh Topology, star Topology, Tree Topology, Ring Topology, Bus Topology, Hybrid Topology, Basics of switching, Router and routing, Routing algorithms - **networking protocols and OSI model:** Protocols in computer communications, The OSI Model, OSI layer functions, Queuing theory and M/M/1 queues**.**

Unit – III: **(15 Hours)**

LAN, MAN, WAN Networks- **Medium Access sublayer and ISDN:** Static and dynamic channel allocation, Medium Access Control sublayer, MAC in LAN and WAN, Classification and study of MAC sublayer protocols/collisions, ISDN and Its background, ISDN Architecture, ISDN

Interfaces, Functional grouping, Reference points, ISDN protocol Architecture, Narrowband-ISDN and Broadband ISDN – **X.25 protocol:** Understanding How X.25 works, Characteristics of X.25, Packet Format, X.25 Operation, CCITT X.21 **- Frame relay and congestion control:** The need for frame relay, How frame relay frame format, congestion control, congestion control algorithms, traffic control, frame relay assembler/disassembler, other features**.**

Unit – IV: **(15 Hours)**

Internetworking Concepts, Devices, Internet basics, History and Architecture: Repeaters, bridges, routers, gateways **TCP/IP Part I:**TCP/IP basics , IP addresses, ARP, RARP, ICMP.

Unit – V: **(15 Hours)**

TCP/IP –Part 2 : TCP and UDP : TCP Basics, Feature of TCP – Relationship between TCP and IP –Ports And sockets – TCP Connections –TCP Packet Format - UDP Packet - Differences between UDP and TCP. **TCP/IP –Part 3 :** DNS – Email – FTP – TFTP . **TCP/IP –Part 4 :** Web Browser Architecture-Telnet.

Text Book :

"Data communications and networks", Achyut and Godbole, Tata McGraw Hill Publishing company limited, 2nd edition 2011 (Relevant portions only).

Reference Books:

1. "Data communications and Networking", Behrouz A.Forouzan, Tata McGraw Hill Publications Company Limited, 2nd Edition, 2009.
2. "Data Communication and Computer Networks", Gupta, 6th edition PHI Learning Pvt. Ltd., 2012.
3. "Data Communication and Computer Networks", Singh, 2nd Edition, PHI Learning Pvt. Ltd., 2004.
4. "Data Communication and Distributed Networks", Black, 3rd Edition, PHI Learning Pvt. Ltd., 1997.
5. "Elements of Data Communications Networks", S.A. Amutha, Jeevakumari, 1st Edition, PHI Learning Pvt. Ltd., 2008.

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B.C.A – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XV	Hrs	Credits	Marks (CIA+ESE)
	Software Engineering	5	5	25+75

Objectives:

- To understand the basic concepts of Software engineering.
- To learn the methods of planning a Software project, Software cost estimation, Requirements definition, Software design implementation, Testing and maintenance.

Unit – I : **(15 Hours)**

Introduction to Software Engineering: Definitions – Size factors – Quality and Productivity factors – Managerial Issues.

Planning a Software Project: Defining the problem – Developing a solution strategy – Planning the development Process – Planning an organization structure – other planning activities.

Unit – II : **(15 Hours)**

Software cost estimation: Software cost factors – Software cost estimation techniques – staffing level estimation – estimating software maintenance cost.

Software requirement definition: Software requirement specification – Formal specification techniques.

Unit – III : **(15 Hours)**

Software Design: Fundamental design concepts – Modules and modularization criteria – Design notations – Design techniques.

Unit – IV : **(15 Hours)**

Implementation issues: Structured coding techniques – Coding style – standards and guide lines – Documentation guidelines.

Modern programming Language features: Type checking – User defined data types – Exception handling.

Unit – V : **(15 Hours)**

Verification and Validation techniques: Quality assurance – Walkthroughs and inspections – Static analysis – Symbolic execution – Unit Testing and debugging – System Testing.

Software maintenance: Enhancing maintainability during development – Managerial Aspects of Software maintenance – Configuration management – Source code metrics.

Text Book :

"Software Engineering concepts", Richard Fairly, Tata McGraw Hill Publishing Company Limited, 33rd reprint 2010.

Reference Books :

1. "Software Engineering Applications approach", 3rd edition, Roger S Pressman, Tata McGraw Hill, 1992.
2. "Software Engineering", James, PHI Learning Pvt. Ltd., 2016.
3. "Software Engineering: A Concise study", Kelkhar, PHI Learning Pvt. Ltd.,3rd edition, 2012.
4. "Human aspects of Software Engineering", James E.Tomayko and Orit Hazzan, Laxmi Publications Pvt. Ltd., 2005.
5. "Software Engineering", Bharat, Bhushan, Agarwal, Sumit, Prakash Tayal, 1st Edition, Laxmi Publications Pvt. Ltd., 2007.

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B.C.A – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Core Course – XVI : Practical – VI	Hrs	Credits	Marks (CIA+ESE)
	Dot Net Programming	6	5	40+60

Objectives:

- To Enable The Student To Learn Application Designing And Handling Events.
- To Acquire Knowledge On Developing Database Programs.

Dot Net Programming :

1. Design an application to change background color of forms using scroll bars.
2. Write a .NET application to design a simple calculator.
3. Design a file browser using vb.net
4. Using menus develop a notepad.
5. Write a .NET program to demonstrate the usage of checkbox and radio button.
6. Write a .NET program to demonstrate the usage of Listbox and Checked List box controls.
7. Create a web page with all validations.
8. Design a web page with dynamic advertisements.
9. Develop a vb.net program for implement mouse handling events.
10. Prepare a student mark sheet using database.
11. Develop a database program to do all manipulations in a table.
12. Write a database program to display details of an employee if his/her number is the input using crystal report.

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B.C.A – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – III	Hrs	Credits	Marks (CIA+ESE)
	1. Network Security	5	5	25+75

Objectives:

- To enable students to learn Information security, Policies and Process.
- To understand the Security Monitoring technologies and Risk management.
- To acquire knowledge on Internet Security.

Unit – I : **(15 Hours)**

Information Security basics: What is Information Security? – Define Security as a process, Not point products – Types of Attacks – Hacker techniques.

Unit – II : **(15 Hours)**

Information Security Service: Confidentiality service- Integrity service – Availability service – Accountability service. **Policy:** Why policy is important? –various policies used by organization – Creating appropriate policy – Deploying Policy – Using policy effectively.

Unit – III : **(15 Hours)**

Managing Risk: Define Risk – Measuring risk. **The Information security process:** Conducting an assessment – Developing Policy – Implementing security – Awareness training – Audits – Policy adherence audits.

Unit – IV : **(15 Hours)**

Information security Best practices: Administrative security practices – Technical security practices. **Network Security technology:** Perimeter technology: Perimeters and perimeter policy basics – perimeter controls – creating perimeter architecture.

Unit – V : **(15 Hours)**

Monitoring technology: Purpose of monitoring – Monitoring technologies – creating a Monitoring architecture – Correlating events – Separation of duties. **Encryption technology:** Basic encryption concepts – Encryption terms – Symmetric key encryption – Public key encryption – Digital signature – Key management.

Text Book :

"Network security - A Beginners Guide" by Eric Maiwald, 3rd edition, Mc-Graw Hill publisher, 2013.

Reference Books :

1. "Cryptography and Network Security"-William Stallings, 1st edition, Delhi: Pearson Education, 1998.
2. "Network Security"- Ankit Fadia, 1st edition, Delhi, McMillan Publications, 1998.
3. "Network security & Management", Singh, 2nd Edition, PHI Learning Pvt. Ltd., 2011.
4. "Networks Security: Private Communication in a public world", Kaufman, Perlman & Speciner, 2nd Edition, PHI Learning Pvt. Ltd.,2002.
5. "Networking", Balvir Singh, 2nd Edition, Laxmi Publications Pvt. Ltd., 2009.

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B.C.A – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course – III	Hrs	Credits	Marks (CIA+ESE)
	2. Information Security	5	5	25+75

Objectives:

- To understand the importance of information security.
- To acquire knowledge on Threats, Attacks, security analysis, logical and physical designs.

Unit – 1: Introduction **(15 Hours)**

History – What is Security? – Critical Characteristics of Information – NSTISSC Security Model – Components of an Information System – Securing the Components – Balancing Security and Access – The SDLC – The Security SDLC.

Unit – II : Security Investigation **(15 Hours)**

Need for Security – Business Needs – Threats – Attacks.

Unit – III : Security Analysis **(15 Hours)**

Risk Management: Introduction – Overview – Identification and Assessment Risk – Risk control strategies.

Unit – IV : Logical Design **(15 Hours)**

Planning for Security: Introduction – Information Security Policy, Standards and Practices, Information security Blueprint: ISO 17799/BS 7799 – NIST security models – VISA International Security Model – Design of Security Architecture – Security training and awareness' program.

Unit – V : Physical Design **(15 Hours)**

Security Technology: Intrusion Detections – Scanning and Analysis Tools – Access Control Devices, Cryptography: Principles of cryptography – Tools. **Physical Security**: Physical access controls – File Security & Safety – Failure of supporting utilities & Structural collapse.

Text Book :

"Principles of Information Security", Michael E Whitman and Herbert J Mattord, Fifth edition, Cengage learning India edition, 2015.

Reference Books :

1. "Handbook of Information Security Management", Micki Krause, Harold F. Tipton, Vol 1-3, CRC Press LLC, 2004.
2. "Hacking Exposed", Stuart Mc Clure, Joel Scrambray, George Kurtz, Tata McGraw-Hill, 2003.
3. "Computer Security Art and Science", Matt Bishop, Pearson PHI, 2002.
4. "Information Security Theory and Practice", Patel, PHI Learning Pvt. Ltd, 2008.
5. "Information Security – Policy, Processes & Practices", Straub, Et-Al(Eds), PHI Learning Pvt. Ltd., 2008.

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B.C.A – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Elective Course - III	Hrs	Credits	Marks (CIA+ESE)
	3. Object Oriented Analysis and Design	5	5	25+75

Objectives:

- To learn the basics of object, object-oriented systems development methodologies.
- To understand the usage of UML and the process involved in object-oriented analysis.
- To enable students to learn the procedure of ensuring software quality assurance.

Unit – I : **(15 Hours)**

Object Basics: Introduction – An Object-Oriented Philosophy – Objects – Object are grouped in classes – Attributes: Object state and properties – Object Behavior and methods – Object respond to message – Encapsulation and Information hiding – class hierarchy – polymorphism – Object relationship and associations – Aggregations and object containment.

Object-Oriented systems development life cycle: Introduction – The software development process – Building high-quality software – Object-Oriented system development: A use-case driven approach- Reusability.

Unit – II : **(15 Hours)**

Object-Oriented Methodologies: Introduction – Survey of some of the object-oriented methodologies – Rumbaugh et al.'s object modeling technique – the Booch methodology – the Jacobson et al. methodologies – Patterns – Frameworks – The Unified Approach.

Unified Modeling Language: Introduction – static and dynamic models – why modeling? – Introduction to the Unified modeling language – UML Diagrams – UML Class Diagram – Use-case Diagram – UML Dynamic modeling – Model Management: packages and model Organization – UML Extensibility – UML Meta-model.

Unit – III : **(15 Hours)**

Object-Oriented analysis process: Identifying use cases – Introduction – why analysis is a difficult activity – 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 – common class patterns approach – **Use-case driven approach:** Identifying classes and their behavior through sequence / collaboration modeling – Classes, Responsibilities, and Collaborations- Naming classes.

Unit – IV : **(15 Hours)**

Identifying object relationships, attributes, and methods: Introduction – Associations – Super-sub class relationships – A-part-of relationships-Aggregation- Class Responsibility: Identifying attributes and methods – Class Responsibility: Defining attributes by analyzing use case and other UML Diagrams – Defining attributes for ViaNet Bank objects – Object Responsibility: methods and messages – Defining methods for via net bank objects.

The object-oriented design process and design axioms: Introduction – the object-oriented design process – object-oriented design axioms – corollaries – design patterns.

Unit – V : **(15 Hours)**

Software quality assurance: Introduction – Quality assurance tests – testing strategies – impact of object orientation on testing – test cases – test plan – continuous testing – Myers's debugging principles.

System usability and measuring user satisfaction: Introduction – usability testing – user satisfaction test – A tool for a analyzing user satisfaction: the user satisfaction test template.

Text Book :

"Object Oriented Systems Development", Ali Bahrami, Tata McGraw Hill, New Delhi, International edition, 2010.

Reference Books :

1. "Object Oriented Analysis and Design with applications", Gredy Booch, 3rd edition, Addision Wesley, 2006.
2. "Object Oriented Analysis and Design", Andrew Haigh, Tata McGraw Hill, 2002.
3. "Structured Analysis and Design", J.B.Dixit, Raj Kumar, Laxmi Publications Pvt. Ltd, 1st Edition, 2007.
4. "Structured Analysis and Design", Preeti Gupta, Laxmi Publications Pvt. Ltd, 1st Edition, 2005.
5. "Object Oriented Analysis and Design using UML: An Introduction to Unified Process and Design patterns", Matha, PHI, 2008.

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B.C.A – Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	Value Based Course	Hrs	Credits	Marks (CIA+ESE)
	Human Values and Professional Ethics	2	2	25+75

Common paper for all UG courses.

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B.C.A – Semester – VI

(For candidates admitted to the course under CBCS Pattern from 2015-2016)

Code	ES	Hrs	Credits	Marks (CIA+ESE)
	Environmental Studies	2	2	25+75

Common paper for all UG courses.