SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.
Bachelor of Computer Applications

SEMESTER - I

S.No	COURSE CODE	PART	COURSE TITLE	HRS /WK	CREDITS	EXAM HRS	INT	EXT	TOT
1	20UGC1TA1	I	Tamil – I	6	3	2	50	50	100
2	20UGC1EN1	II	English – I	6	3	2	50	50	100
3	20UCA1C01	III	Core: Programming in C	5	4	2	50	50	100
4	20UCA1AL1	III	Allied - Mathematics - I	6	5	2	50	50	100
5	20UCA1CP1	III	Core Practical : Programming in C	5	3	2	50	50	100
6	20UCA1C02	III	Core: PC Software	2	2	2	50	-	50
			TOTAL	30	20				550

SEMESTER – II

S. No	COURSE CODE	PART	COURSE TITLE	HRS/ WK	CREDITS	EXAM HRS	EXT	INT	TOT
1	20UGC2TA2	I	Tamil – II	6	3	2	50	50	100
2	20UGC2EN2	II	English – II	6	3	2	50	50	100
3	20UCA2C03	III	Core: Object Oriented Programming with C++	5	4	2	50	50	100
4	20UCA2AL2	III	Allied - Mathematics - II	6	5	2	50	50	100
5	20UCA2CP2	III	Core Practical : Object Oriented Programming with C++	5	3	2	50	50	100
6	20UCA2C04	IV	Core: IT Essentials	2	2	2	50	-	50
7	20UGC2ENS	IV	Environmental Studies		2	2	-	50	50
			TOTAL	30	22				600

SEMESTER – III

S. No	COURSE CODE	PART	COURSE TITLE	HRS /WK	CRE DITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
1	20UCA3C05	III	Core: Java Programming	5	4	2	50	50	100
2	20UCA3C06	III	Core: Data Structures using C++	5	4	2	50	50	100
3	20UCA3C07	III	Core: Operating System	4	4	2	50	50	100
4	20UCA3AL3	III	Allied: Operations Research	6	5	2	50	50	100
5	20UCA3CP3	III	Core Practical : Java Programming Lab	4	3	2	50	50	100
6	20UCA3CP4	III	Core Practical: Data Structure using C++ Lab	4	3	2	50	50	100
7	20UCA3NM1	IV	NME - Grammar and Communication/ Basic Tamil-I	2	2	2	-	50	50
			TOTAL	30	25				650

SEMESTER – IV

S. No	COURSE CODE	PART	COURSE TITLE	HRS /WK	CRE DITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
1	20UCA4C08	III	Core: Visual Programming (C#.Net)	6	5	2	50	50	100
2	20UCA4C09	III	Core: Relational Database Management Systems	6	5	2	50	50	100
3	20UCA4AL4	III	Allied - Fundamentals of Accounting	6	5	2	50	50	100
4	20UCA4CP5	III	Core Practical : Visual Programming Lab (C#.Net)	5	3	2	50	50	100
5	20UCA4CP6	III	Core Practical : Relational Database Management Systems LAB	5	3	2	50	50	100
6	20UCA4NM2	IV	NME : Data Science and Big data Analytics	2	2	2	-	50	50
7	20UGC4VAE	IV	Value Education		2	2	-	50	50
8	20UGC4NSS/S PO/YRC	V	Extension Activities - NSS/SPORTS/YRC	-	1	2	25	25	50
			TOTAL	30	26				650

SEMESTER – V

S. No.	COURSE CODE	PART	COURSE TITLE	HRS /WK	CRE DITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
1	20UCA5C10	III	Core: Web Technology (HTML, Bootstrap. PHP and MySQL)	6	5	2	50	50	100
2	20UCA5C11	III	Core : Python Programming	6	5	2	50	50	100
3	20UCA5C12	III	Core: Computer Networks	5	5	2	50	50	100
4	*	III	Elective - From Group A*	5	4	2	50	50	100
5	20UCA5CP7	III	Core Practical: Web Technology (HTML, Bootstrap. PHP and MySQL)	4	3	2	50	50	100
6	20UCA5CP8	III	Core Practical : Python Programming Lab	4	3	2	50	50	100
			TOTAL	30	25				600

SEMESTER – VI

S. No	COURSE CODE	PART	COURSE TITLE	HRS/ WK	CRED ITS	EXAM HRS	MAX MARKS		
							INT	EXT	TOT
1	20UCA6C13	III	Core: Software Engineering	6	5	2	50	50	100
2	20UCA6C14	III	Core: Android Programming	5	5	2	50	50	100
3	*	III	Elective - From Group B *	5	4	2	50	50	100
4	20UCA6C15	III	Core: Cloud Computing	5	4	2	50	50	100
5	20UCA6CP9	III	Core Practical : Android Programming Lab	4	3	2	50	50	100
6	20UCA6CPR	III	Core: Project Work	5	5	-	50	50	100
			TOTAL	30	26				600

TOTAL CREDITS: 144
TOTAL MARKS: 3650

*Elective – Group A:
1. **Cyber Security** (20UCA5EA1)
2. Embedded Systems (20UCA5EB1)
3. Compiler Design (20UCA5EC1)
4. Graphics and Multimedia (20UCA5ED1)
5. Client / Server Computing (20UCA5EE1)

Elective – Group B:.
1. **Data Mining and Warehousing** (20UCA6EA2)
2. Advanced Networks (20UCA6EB2)
3. Distributed Computing Systems (20UCA6EC2)
4. Geographical Information System (20UCA6ED2)
5. Design and Analysis of Algorithm (20UCA6EE2)

NME-2

Information Security Lab
Data Science and Big Data Analytics Lab

Part	Subject Types	No. of Papers	Credits	Marks
I	Tamil	2	6	200
II	English	2	6	200
III	Core- Major	25	94	2400
	Allied	4	20	400
	Elective	2	9	200
IV	Non Major Elective	2	4	100
	Environmental Studies	1	2	50
	Value Education	1	2	50
V	NSS/NCC/Sports	1	1	50

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For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code:** 20UCA1C01

Course Title: Core: PROGRAMMING IN C   **5 Hours / week**

Year: I   **Semester: I**   **Credits: 4**

COURSE OBJECTIVES

1. To make the students to be aware of the basic concepts of C.
2. To make them to understand the benefits and applications of C.
3. To gain knowledge on user defined functions and reusability.
4. To get an insight into the concepts of structures, unions and pointers.
5. To acquire knowledge on file manipulation.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Learn the concepts of C programming	K1
CO2	Identify the logic behind the execution of various applications	K2
CO3	Learn &Analyse and discover bugs in the program	K1&K4
CO4	Develop an application using memory management functions, Pointers, Strings, Structures and Arrays.	K3
CO5	Apply the concepts to solve a real-time problem	K3

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	L	S	S	M	L	L
CO2	M	S	M	M	L	S	M	M	L	L
CO3	S	S	M	S	L	S	S	S	S	L
CO4	S	S	M	S	L	S	S	S	S	L
CO5	S	S	M	S	L	M	M	L	M	L

S- Strong; M-Medium; L-Low

UNIT I: **(15 Hrs)**

Overview of C – Introduction-Character set – C Tokens Keywords & identifiers - Constant –Variables - Data types- Declaration of Variables- Assigning values to variables- Defining Symbolic Constants. Operators and Expressions:- Arithmetic, Relational Logical, Assignment, Conditional

Bitwise, Special, Increment and Decrement operators – Arithmetic Expressions - Evaluation of expression - Precedence of arithmetic operators – Type conversion in expression- operator precedence & associative – mathematical functions. Managing Input and Output Operations:- *Reading & writing a character – formatted input and output*. (Page No : 1-36, 52-76, 84-107.)

UNIT II: (15 Hrs)

Decision making and Branching: – Decision making with IF Statement-simple IF Statement-The IF..ELSE statement-*Nesting of IF…ELSE statement*-Else if Ladder-Switch Statement- -Conditional operator. Decision Making and Looping:- The WHILE statement- *Do Statement*-FOR Statement.
Arrays: The One Dimensional Array-Declarations – Initialization-Two Dimensional Array-Initialization- *Multidimensional arrays.* Character Arrays and strings: Declaring and initializing string variables- Reading strings from terminals-writing strings to screen - Arithmetic operation on character-putting strings together-comparison of two strings- string handling functions- *table of Strings.*(Page No: 112-130, 153-168, 194-216, 238-261).

UNIT III (15 Hrs)

User defined functions:– Need for user Defined functions- A multi function program – Elements of User defined functions-Definition of functions--Return values and their types- Calling a function-Function declaration- Category of functions-No Arguments and no Return values-Arguments but no return values-Arguments with return values-*No Arguments but Return the value*-Functions that return multiple values- *nesting of functions*- Recursion- Passing arrays to functions-Passing strings to functions- The scope, visibility and lifetime of variables (Page No: 270-312)

UNIT IV (15 Hrs)

Structure and Union: Defining a structure-Declaring the structure variables – Accessing structure members-Structures initialization- Copying and comparing structure variables- *Arrays of Structures* - Arrays with in Structures- Structures within structures – Structures and functions-unions- Size of structures- Bit fields. Pointers:- Understanding pointers- Accessing the Address of a Variable – Declaring and initializing pointers- Accessing a variable through its pointers- pointers expressions pointer increments and scale factor - pointers and arrays – pointers and character strings-*pointers as functions arguments*.(Page No: 324-344, 357-363,366-372,375).

UNIT V (15 Hrs)

File management in C:- Defining and opening a file- closing file-I/O operations on files-Error handling during I/O operations-*Random Access to files*- Command line arguments – The Preprocessor: Macro substitution- File inclusion- *Compiler control directives* (Page No: 395-416,453-461)

Text Book
1. Balagurusamy .E, Programming in ANSI, 6th Edition, McGraw Hill 2012.

Reference Books
1. Yashavant Kanetkar, Let us C, 2nd Edition,Tata McGraw Hill.
2. Mullesh cooper, Sprit of C, 4th Edition, Tata McGraw Hill.
3. http://spoken-tutorial
Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

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Programme: BCA   **Course Code:** 20UCA1CP1

Course Title: Core Practical: Programming in C   **5 Hours / week**

Year: I   **Semester: I**   **Credits: 3**

COURSE OBJECTIVES
1. To develop simple programs using C.
2. To develop simple C programs for solving mathematical problems.
3. To develop C programs by incorporating Array, functions concepts.
4. To develop C programs using standard programming skills

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	
CO1	Recall the mathematical functions while creating a program	K1
CO	Understand the fundamental programming concepts	K2
CO3	Illustrate the programming technique to analyze software problems	K4
CO4	Apply the concepts to find solution for the problems	K3
CO5	Design and develop the simple application.	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	L	S	M	M	L	L
CO2	S	S	M	S	L	S	M	M	L	L
CO3	S	S	M	S	L	S	M	M	L	L
CO4	S	S	M	M	L	S	M	M	L	L
CO5	S	S	L	M	L	S	M	M	L	L

S- Strong; M-Medium; L-Low

LIST OF PRACTICALS

1. Write a program for quadratic equation to find different types of roots.

2. Write program to find prime numbers below 1000.

3. Write program to find maximum and minimum no with the set of numbers.

4. Write a program for two-dimensional matrix addition.

5. Write a program for two-dimensional matrix multiplication.

6. Write program to find a factorial value of given numbers.

7. Write program to find Fibonacci series for n numbers.

8. Write program to convert integer into words form range 1 to100.

9. Write program to find Armstrong no for 1 to 1000.

10. Conversion of decimal to binary.

11. Conversion of binary to decimal.

12. Sum of diagonals of the matrix.

13. Find ncr value using function.

14. To calculate biggest among n numbers using function.

15. To check given string is palindrome or not, without using string reverse function.

16. To sort a given set of numbers in ascending order.

17. To sort given set of strings using pointers.

18. To count no. of words, lines, characters in a given sentence.

19. To read one file & write it into another using command line arguments.

20. Write a program to count the occurrence of a character in a given string.

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Programme: BCA   **Course Code:** 20UCA1C02
Course Title: Core: PC Software   **2 Hours/Week**
Year: I   **Semester:** I   **Credits:** 2

COURSE OBJECTIVES
1. To understand about the basic computer skills and internet.
2. To gain knowledge on documentation
3. To attain knowledge on Spreadsheet
4. To develop the presentation Skills.

COURSE OUTCOMES
        On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Learn and Understanding the concepts of Basic Computer Skills, Internet	K1& K2
CO2	Ability to perform documentation skills	K2 &K3
CO3	Applying knowledge in Spreadsheet and Presentation Skills	K3& K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	L	M	L	L
CO2	S	M	S	S	S	S	L	M	L	L
CO3	S	M	S	S	S	S	L	M	L	L

S- Strong; M-Medium; L-Low
Unit I
Basic Computer Skills**:** Identifying Major Computer Components – How Computers Work – Turning on the computer and logging on – The keyboard and mouse – *Operating systems and standard components of a PC system*
Internet: Definition of the internet – The evaluation of the internet – Internet addresses – Advantages and disadvantages of internet – Search Engine: Google Search – *Creating Email ID.*

Unit II
Microsoft Word**:** Introduction – Getting familiar with Microsoft word for windows – Office button – Quick access toolbar – Title bar – Ribbon – Ruler – Text area – The vertical and horizontal scroll bars – Status bar – Understanding document views – Click – Understanding nonprinting characters – Type, Backspace and Delete – *Bold, Italic and underline* – Save a file and close word – More basic features – Copy paste – Create auto text – Use spell check – Find and replace – Changing the font and font size – Formatting paragraphs and working with styles – Changing line spacing – Indent and align paragraphs – *Adding bullets and numbers, undo and redo, adding page numbers* - setting page layouts and printing documents.

Unit III

Microsoft Excel: Entering text and numbers – Worksheets – The formula and status bar – Move around a worksheet – Entering excel formulas and formatting data – Merge and centre align – Alignment – Advanced calculations – *Cut, copy, paste and cell addressing* – Keyboard shortcuts – Move to a new worksheet – Creating excel functions, filling cells and printing – Page Layout, Creating Headers and footers – *Creating Charts in excel*.

Microsoft PowerPoint: The PowerPoint window – Slides, Placeholders and Notes – Status bar, tabs, view buttons and more – Normal view, Slide sorter view, Slide show – Create a title slide – Create new slides – *Apply a theme* – Animations, Transitions, Spell check, Outline tab, Slides tab, Sorter view, and printing.

Text Book

1. Computer Awareness Programme, Microsoft Digital Literacy, Department of MCA, srmvcas.org

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Programme: BCA   **Course Code:** 20UCA2C03

Course Title: Core: Object Oriented Programming with C++   **5 Hours / week**

Year: I   **Semester: II**   **Credits: 4**

COURSE OBJECTIVES
1. To learn the basic concepts of OOPS.
2. To understand the benefits and applications of OOPS.
3. To develop the programs using object oriented programming features.
4. To apply the features of the generic programming.
5. To learn the concepts of Exceptions and Templates

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Ability to understand the datatypes and control structures.	K2
CO2	Understanding and implementing the concepts.	K2& K3
CO3	Ability to demonstrate the use of overloading and inheritance	K3
CO4	Deploying polymorphism using pointers and virtual functions	K3
CO5	Ability to understand and implement the features of C++ including file handling and exception handling.	K2 &K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	L	S	S	M	L	L
CO2	M	S	M	M	L	S	M	M	L	L
CO3	S	S	M	S	L	S	S	S	S	L
CO4	S	S	M	S	L	S	S	S	S	L
CO5	S	S	M	S	L	M	M	L	M	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**

Basic concepts of Object oriented programming (Pg.No:10-21)- Basic program construction – Data types – Variables(Pg.No:38-47) – *Operators in C++* - Manipulators-Type cast operator (Pg.No:48-63) – Control Structures (Pg.No:75-121)

Unit II   **(15 Hrs)**

Functions: Function prototyping - call by reference – return by reference – inline functions – default arguments – Function overloading(Pg.No:162-197). Classes and objects: Specifying a class – Defining member functions – Arrays within a class – *memory allocation for objects* – Arrays of object – objects as function arguments – Constructors – Parameterized constructor – Copy constructor – *Dynamic constructor* – Destructors (Pg.No:215-238)

Unit III   **(15 Hrs)**

Operator Overloading- Defining operator overloading– Overloading unary operators – **Overloading Binary operators** - Type conversions(Pg.No:320-357). Inheritance: Defining derived class – Single inheritance – *Multilevel inheritance*- Multiple inheritance – Hierarchical inheritance – Hybrid inheritance – Constructors in derived class. (Pg.No:373-420)

Unit IV   **(15 Hrs)**

Pointers, Virtual functions and Polymorphism -Pointers to Objects – this Pointer – Virtual Functions – *Pure virtual functions*(Pg.No:429-481,503-550). Files: Opening and Closing a file – Detecting End-of-File – File pointers and their manipulations- *Command-Line Arguments*. (Pg.No:567-602)

Unit V   **(15 Hrs)**

Templates: Class templates – *Function templates* – Overloading of template function – Member function templates- .Exception Handling – *Exception handling mechanism* – Throwing mechanism – Catching mechanism – Specifying exceptions(Pg.No:681-718).

Text Book
1. Robert Lafore, Object Oriented Programming in Turbo C++, Galgotia Publications, 2006.

Reference Books
1. Balagurusamy. Balagurusamy.E, Object Oriented Programming with C++, Tata McGraw Hill, 2009
2. http://spoken-tutorial.org/.

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For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code:** 20UCA2CP2

Course Title: Core Practical: Object Oriented Programming with C++   **5 Hours / week**

Year: I   **Credits: 3**   **Semester: II**

Course Objectives:

1. To develop simple programs using class.
2. To develop simple C++ programs for solving mathematical problems.
3. To develop C++ programs by incorporating OOPS concepts.
4. To develop C++ programs using generic programing
5. To develop programs using templates

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Ability to write a simple program using class.	K2
CO2	Learn and Apply control Structure for mathematicalproblems	K1 & K3
CO3	Ability to develop programs to solve mathematical problems	K2 &K4
CO4	Capability of developing programs using OOP concepts.	K2&K3
CO5	Capable of developing programs using pointers and virtual functions.	K2&K3&K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	L	S	M	M	M	L
CO2	S	S	M	S	L	S	M	M	M	L
CO3	S	M	M	S	L	S	M	M	L	L
CO4	S	M	S	S	L	S	M	M	L	L
CO5	S	M	M	M	L	S	M	M	L	L

S- Strong; M-Medium; L-LowLIST OF PRACTICALS

1. Write a C++ program to read an integer and reverse it. Having reversed it check whether it is prime or not.

2. Write a C++ program to find the Largest and smallest value in 'n' numbers.

3. Write a C++ program to count the number of characters, words and lines in a given sentence without using string functions.

4. Write a C++ program to sort the given set of strings.

5. Write a C++ program to count inversion in an array.

6. Write a C++ program to find duplicate element in array

7. Write a C++ program for binary search.

8. Write a C++ program to implement Constructors and Destructors in factorial of 'n' numbers.

9. Write a C++ program to implement Copy Constructor.

Write a C++ program to implement unary operator overloading.

11. Write a C++ program to implement Binary Operator (+) Overloading for the addition of Complex numbers.

12. Write a C++ program to implement Multiple Inheritance for Student details.

13. Write a C++ program to implement Friend function for Employee details.

14. Write a C++ program to implement pure virtual function for Student details.

15. Write a C++ program on accessing the Data Members using "this" pointer.

16. Write a C++ program to create a binary file "mark.dat" and store student name, rollno and marks in three subjects using structure.

17. Write a C++ program to find maximum of two data using template function.

18. Write a C++ program to create two different types of objects using class template.

Programme: BCA   **Course Code:** 20UCA2C04
Course Title : Core: IT Essentials   **2 Hours / week**
Year: I   **Semester:** II   **Credits:** 2

COURSE OBJECTIVES
1. To understand the computer components and operating system installation.
2. To understand the importance of Device manager and software installation.
3. To Acquire knowledge of network oriented configuration and improve system performance.

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Understanding the concepts of Computer components and OS Installation	K2
CO2	Understanding the functionalities importance of Device manager and software installation	K2 & K3
CO3	Acquiring knowledge onnetwork configuration.	K3 & K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M	M	M	S	M	L
CO2	M	M	L	M	M	M	M	S	M	L
CO3	M	M	L	M	L	S	S	S	M	L

S- Strong; M-Medium; L-Low
UNIT – I

Introduction: Input Device – Output Device – Storage Device – *Adapters and expansion card*s – connectors- Computer Front View –Rear View – Inside View- Computer Assembling – Computer Bootup sequence- OS Installation: Windows Installation – Linux Installation -Driver Installation

UNIT - II
Device Manager –Disk Management – *Computer Service Configuration* – Sharing files & folders - printer configuration- Software Installation: TC- Wamp Server – IIS- Office – Open shot – OBS Studio - Google Meet – Google Class room – Any Desk – Skype – Remote Desktop Connection - etc.,

UNIT- III
Network Configuration – Wired Network – *Wireless Network* – Hotspot – Firewall configuration Troubleshooting: User account- Remove viruses and malware - Uninstall unnecessary programs - Adjust windows visual effects

Text Book

1. A complete illustrated Guide to the PC Hardware
   Last revised: 7 Jun 1998. Copyright (c) 1996, 1997, 1998 by Michael B. Karbo.
2. CCNA 1 and 2 Companion Guide, year 2003, Author: Cisco Networking Academy
   ,Publication S:Pearson Education
3. www.cisco.netacad.com

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For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code:** 20UCA3C05

Course Title: Core: Java Programming   **5 Hours / week**

Credits: 4   **Year: II**   **Semester: III**

COURSE OBJECTIVES
  1. To understand the basic concept of core java.
  2. To understand the concept of Multithread Program and String Handling.
  3. To gain knowledge in File handling and Network Programming.
  4. To enhance the knowledge in server-side programming
  5. To acquire knowledge on advanced features like Swing, JavaBeans, Sockets.

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Understanding the concepts of the core Java and apply in simple programs.	K1&K2
CO2	Identifying the logic behind process handling by using threads.	K2
CO3	Identifying the concept behind Network Programming.	K2
CO4	Developing an application for Server side Programming.	K3
CO5	Applying the concept to solve real-time problems.	K3&K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	L	S	S	M	M	L
CO2	S	S	L	M	L	S	S	M	M	L
CO3	S	S	L	M	L	S	S	M	M	L
CO4	S	S	M	M	L	S	S	S	M	L
CO5	S	S	M	M	L	S	S	S	S	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**
        Object Oriented Fundamentals and Java Revolution: Object Oriented Programming – Encapsulation – Inheritance – Polymorphism – Java Genesis – Characteristics – Java Programming Techniques – Lexical Issues – Variables – Types – Simple Types – Arrays - ***Operators.***
(Page Number: 17-87)

Unit II   **(15 Hrs)**
        Flow Control and Classes: Branching: If-else, Break, ***Switch,*** Return Statements –Looping: While, ***Do-while***, for, comma statements, Continue – Classes: Object References –

Instance Variables – New Operator – Dot Operator – Method Declaration – Method Calling – *This Operator* .

Constructors – *Method Overloading* – Inheritance – Super Class – Method overriding – Dynamic Method Dispatch – Final, Finalize, Static, Abstract Classes (Page Number: 89-127)

Unit III   (15 Hrs)

Packages and Inheritance: Packages: The Package Statement – Compiling Classes in Packages – The Import Statement – Access Protection – Interfaces: The Interface Statement – The Implements Statement – Variables in Interfaces – String Handling – Constructors – String Creation – *String Concatenation – Character Extraction.*

Exception Handling Fundamentals – *Exception Types* – Uncaught Exceptions – Nested Try Statements – The Java Thread Model – Thread Priorities, Synchronization, Messaging – Thread – Runnable – Synchronization – Inter Thread Communication – *Thread API summary*. (Page Number: 165-197)

Unit IV   (15 Hrs)

Utilities and Files: Simple Type Wrappers – Enumerations – Runtime – System – Date – *Math* – Random – Input and Output – File – Directory – Filename filter – Input Stream – *Output Stream* – *File Streams.*(Page Number: 201-230)

Unit V   (15 Hrs)

Applets: Basics of applets - Applet Architecture - Life cycle of an Applet – AWT: *Event Handling Delegation event Model*.

JDBC: JDBC Architecture - JDBC Drivers- Database connectivity in Java- *HTML basics* - JavaScript basics.

Servlets: Servlet Architecture - Life cycle of a Servlet - The Servlet API

Text Book
1. Patrick Naughton, The JAVA Hand Book, TATA McGraw Hill.
2. Cay S. Horstman and Gary Cornell, "Java: Core Java 2 Vol. 1: Fundamentals", Sun Microsystems Press, Seventh Edition.

Reference Books
1. Herbert Schildt, The Complete Reference- Java 2, 5th Edition, TATA McGraw Hill, 2002.
2. Harley Haim, The Internet Computer reference, 2nd Edition, TATA McGraw Hill, 1998.
3. http://spoken-tutorial.org/

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code:** 20UCA3C06

Course Title: Core: Data Structures using C++   **5 Hours / week**

Year: II   **Semester: III**   **Credits: 4**

COURSE OBJECTIVES
1. To understand the linear and non-linear data structures available in solving problems
2. Able to analyze the efficiency of algorithm
3. To get a clear idea about the various algorithm design techniques
4. Using the data structures and algorithms in real time applications
5. To know about the sorting and searching techniques and its efficiencies

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Ability to analyze algorithms and algorithm correctness	K1
CO2	Ability to apply in stack, queue and linked list in data structure	K2
CO3	Ability to have knowledge of tree and graphs concepts	K2
CO4	Ability to work with various searching and sorting techniques	K3
CO5	Able to understand the concept of Indexing and Hashing Techniques	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	L	M	L	S	S	M	M	L
CO2	S	S	L	M	L	S	S	M	M	L
CO3	S	S	L	M	L	S	S	M	M	L
CO4	S	S	L	M	L	S	S	M	M	L
CO3	S	S	L	M	L	S	S	S	M	L

S- Strong; M-Medium; L-Low

Unit-I   **(15 Hrs)**
Algorithm Specification(25-32)-Performance Analysis(38-61). Arrays: Array as an ADT Polynomial ADT- Polynomial Representation–Polynomial Addition –Sparse Matrices-Representation of Arrays(84-112). Stacks and Queues: Stacks ADT- *Queues ADT*. (134-147)

Unit-II   **(15 Hrs)**
Linked lists: Singly Linked Lists and Chains-Representing Chains in C++ (170-183)-Circular Lists-Available Space List-*Linked Stacks and Queues*-Polynomials-Equivalence Classes (194-215)-*Doubly Linked List*-Generalized Lists (224-240).

Unit-III   **(15 Hrs)**

Trees: Introduction – Binary Trees – Binary Tree Traversal and *Tree Iterators* (243-269) – Threaded binary trees (274-277) - Graphs: Graphs ADT – Elementary Graph Operation: Depth First Search – ***Breadth First Search*** – Connected components – Spanning Trees – Biconnected Components – Minimum Cost Spanning Tree - Shortest Path and Transitive Closure (324-372).

Unit-IV   **(15 Hrs)**
Internal Sorting: Insertion Sort – Quick Sort (399-405)-***Merge Sort***-Heap Sort (407-416). External Sorting: Introduction- k way Merging - ***Buffer Handling for Parallel Operation***-Run Generation-Optimal Merging of Runs (438-457).

Unit-V   **(15 Hrs)**
Hashing: Introduction-Static Hashing: Hash Table-***Hash Function*** (458-463)-Dynamic Hashing (477-482)-Efficient Binary Search Trees: Optimal Binary Search Tree- ***AVL Trees*** (553-577). Multiway Search Tree (606-635).

Text Book
1. Ellis Horowitz and SartajSahni, Fundamentals of Data Structures, Computer Science Press, 2002 (All Units).

Reference Books

1. Tanenbaum A. M. and Augestine M. J., Data Structures Using Pascal, Prentice hall, 2nd edition, 1996.
2. YashwantKanetkar, Data Structures through C, BPB publication, 2003.
3. SartajSahni, Data Structures, Algorithms & Applications in C++. McGraw-Hill, 1998.
4. Samuktha, Data and File Structures, Addison Wesley, 1999.
5. http://spoken-tutorial.org

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020

For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code:** 20UCA3C07

Course Title: Core: Operating System   **4 Hours / week**

Credits: 4   **Year: II**   **Semester: III**

COURSE OBJECTIVES

1. To understand basic concepts of Operating System, its functions and services.
2. To familiarize the management functions of Operating System.
3. To acquire knowledge about basic concepts of mass storage structure
4. To acquire knowledge in Linux Operating System.
5. To enrich the knowledge about OS like Unix , Linux and Windows XP is introduced as case study.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Ability to understand about basic concepts of Operating System, its functions and services.	K1& K2
CO2	Understanding about Process Management, CPU scheduling, File handling and I/O operations.	K2& K3
CO3	Ability to understand about memory management	K2 & K3
CO4	Understanding about of mass storage structure	K3
CO5	Acquiring basic knowledge about OS like Linux and Windows 7	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	L	M	L	S	M	M	L	L
CO2	S	S	L	M	L	S	M	M	L	L
CO3	S	S	L	M	L	S	M	M	L	L
CO4	S	S	L	M	L	S	M	M	L	L
CO3	S	S	L	M	L	S	M	M	L	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**

Introduction-Defining Operating System-Computer-System Organization- Computer-System Organization- Computer System Architecture- Operating- System Structure- Operating System Operations - Process Management- Memory Management- Storage Management- Protection and Security- Kernel Data Structures- *Computing Environments- Open-Source Operating Systems*.(Pages:28-71).

Unit II   **(16 Hrs)**

Processes Management: Process Concept- Process Scheduling- Operations on Processes- Interprocess Communication- Examples of IPC Systems- *Communication in Client–Server Systems*- (Pages:130-171)

Deadlocks: System Model- Deadlock Characterization- Methods for Handling Deadlocks- Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- *Recovery from Deadlock(*Pages:340-362)

Unit III (14 Hrs)

Main Memory: Background- Swapping- Contiguous Memory Allocation- Segmentation- Paging- *Structure of the Page Table*(Pages:375-402)

Virtual Memory: Background- Demand Paging- Page Replacement- Allocation of Frames - Thrashing- Memory Mapped Files- *Allocating Kernel Memory*(Pages:421-460)

Unit IV (15 Hrs)

Mass Storage Structure: Overview of Mass-Storage Structure- Disk Structure- Disk Attachment- Disk Scheduling- *Disk Management*- Swap-Space Management- RAID Structure- *Stable-Storage Implementation*(Pages:491-518)

File –System Interface: File Concept- Access Methods- Directory and Disk Structure- File- System Mounting- File Sharing- Protection(Pages:527-557)

Unit V (15 Hrs)

The Linux System: Linux History- Design Principles- Kernel Modules- Process Management- Scheduling- Memory Management- File Systems- Input and Output- *Interprocess Communication- Network Structure- Security*(Pages:405-445)

Windows 7: History- Design Principles- System Components- Terminal Services and Fast User Switching- File System- *Networking- Programmer Interface*(Pages:853-898)

Text Book
1. Silberschatz, Galvin Gagne, Operating System Concepts, 9th Edition, Wiley India Edition,2013

Reference Books

1. Deitel Deitel Choffnes, Operating Systems, 3rd Edition, Pearson Education, 2003.
2. Stuart E. Madnick, John J.Donovan. Operating Systems, 3rd Edition, Tata McGraw Hill,2003.
3. http://spoken-tutorial.org/

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   Course Code: 20UCA3AL3

Course: Allied: Operations Research   Hours / week: 6

Year: II   Semester: III   Credits: 5

COURSE OBJECTIVES
1. To understand the concepts of Linear Programming Problems.
2. To study and understand the concept of transportation and Assignment problems.
3. To use the knowledge of Inventory, Analyze to solve Replacement problems and real world problems.

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	remembering the formulation of Business Problems.	K1
CO2	understanding the methods of problem solving	K2
CO3	applying the mathematical calculations in Industrial Problems.	K3
CO4	analyzing mathematical methods and applications.	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L	L	L	L	L	L
CO2	M	M	M	L	L	M	M	L	L	L
CO3	M	M	M	M	L	L	L	L	L	L
CO4	M	M	M	M	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

UNIT I   (16 Hours)
Linear Programming Problem: Introduction – Mathematical formulation of L.P.P. - *Graphical solution method* – Simplex method – Method of penalties/ Big-M method – Two phase method.   (Chapter 2,3& 4, Page No. 39 - 113)

UNIT II   (14 Hours)
Transportation problem: Introduction - *finding initial basic feasible solution* – moving towards optimality – the transportation algorithm. (Chapter 10, Page No. 247-281)
Assignment problem: Method for solving an assignment problem –Variation of assignment problem – Traveling salesman problem – degeneracy. (Chapter 11, Page No. 295-324)

UNIT III   **(16 Hours)**

Queueing theory: Introduction - Queueing system – Characteristics of the Queueing system – Operating characteristics of a Queueing system - *Classification of queues* – Poisson queues- (M/M/1) : (∞/FIFO) , (M/M/1) : (N/FIFO) , (M/M/C) : (∞/FIFO) , (M/M/C) : (N/FIFO). (Chapter 21, Page No. 589-621)

UNIT IV   **(16 Hours)**

Inventory: Introduction – Inventory control– Cost associated with inventories – *Economic lot size problem* – Problems of EOQ with shortage allowed – Purchase inventory problem with price breaks. (Chapter 19, Page No. 507-538)

Replacement problem: replacement of items that deteriorates with time – replacement of items that fail completely. (Chapter 18, Page No. 477-494)

UNIT V   **(13 Hours)**

Networking scheduling by PERT/CPM: Introduction – Basic concepts - Critical path method – pert calculations – *pert algorithm* – construction of network – critical path analysis - *statistical considerations in PERT* . (Chapter 25, Page No. 763-784)

Book for study:

KantiSwarup, P.K. Gupta, Man Mohan, Operations Research, Sultan Chand & Sons, 2007, Thirteen Edition.

Books for reference:

Prof V.Sundaresan, K.S. Ganapathy Subramanian, K.Ganesan, Resource Management Techniques, A.R.Publications, 2004, Second Edition.

Handy A.Taha, Operations Research,CollierMacmillan,Third Edition.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020

For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA	**Subject Code:** 20UCA3CP3
Title: Core Practical : Core: Java Programming Lab	**Hours: 4 hrs/week**
Year: II **Semester : III**	**Credits: 3**

COURSE OBJECTIVES

1. To develop simple programs using Classes and object, Inheritance, packages, String handling and file handling.
2. To develop simple programs using Exception handling functions.
3. To develop network programs using concepts of Java.
4. To develop programs using to solve real-time problems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Understanding the fundamental programming concepts	K1
CO2	Ability to understand and applying process handling method by multithreading while developing a program.	K1 &K2
CO3	Applying the Concept of java to solve the network related problems.	K2 &K3
CO4	Ability to develop an application for Server side Programming.	K2 &K3
CO5	Able to apply the concept to solve real-time problems.	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	L	M	M	L	L	L	L	L	L
CO2	S	M	M	L	L	M	M	L	L	L
CO3	S	M	M	M	L	L	L	L	L	L
CO4	S	M	M	M	L	L	L	L	L	L
CO5	S	M	M	L	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

LIST OF PRACTICALS

1. Write a java program for an Inheritance Concept

2. Write a java program for using Interface

3. Write a java program for using 2 Packages

4. Write a java program for Constructor using method overloading

5. Write a java program to handle all Exceptions

a) Catch b) Try c) Throws and d) Finally.

6. Write a java program for all String handling methods

7. Write a java program for a) Single Multithreading b) Multiple multithreading

8. Write a java program to pass message between 2 clients using TCP/IP Protocol

9. Write a java program for finding the IP Addresses

10. Write a java Applet program for displaying the Human face

11. Write a java program using AWT events

12. Write a java program using Swing to create a MDI form

13. Write a java program to create Student Mark list using data base using Swing

14. Write a java program to create personal information

15. Write a java program to create calculator using Swing

16. Write a java program to connect 2 clients system using RMI concept

17. Write a java program using datagram with socket concept

18. Write a java program to retrieve IP address of the system using RMI concept (client side)

19. Write a java program to create the Basic Bean concept (text)

20. Write a java program to create a Bean tool

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020

For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Subject Code:** 20UCA3CP4

Title: Core Practical :Data Structure using C++ Lab   **Hours: 4 hrs/week**

Year : II   **Semester : III**   **Credits: 3**

COURSE OBJECTIVES
1. To impart the concept of linear data structure(Array, Stack and Queue)
2. To understand the concept of pointers for writing singly linked list and doubly linked list programs
3. To understand basics of searching and sorting techniques
4. To apply the file concepts
5. To implement the concept of data structure to solve real world applications

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Ability to analyze algorithms and algorithm correctness.	K1
CO2	Ability to perform searching and sorting techniques.	K1 &K2
CO3	Ability to accomplish stack, queue and linked list operation.	K2 &K3
CO4	Ability to have knowledge about file concepts.	K2 &K3
CO5	Apply the data structure concepts to solve real-time problems.	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L	L	L	L	L	L
CO2	M	M	M	L	L	M	M	L	L	L
CO3	M	M	M	M	L	L	L	L	L	L
CO4	M	M	M	M	L	L	L	L	L	L
CO5	M	M	M	M	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

LIST OF PRACTICALS

1. Write a C++ program to create a stack.

2. Write a C++ program to convert an Infix to Postfix Notation.

3. Write a C++ program to Evaluate of expression.

4. Write a C++ program to create a stack using Linked List

5. Write a C++ program to create a Queue.

6. Write a C++ program to create a circular queue.

7. Write a C++ program to create a Queue using Linked List

8. Write a C++ program to construct a Binary Tree Traversal.

9. Write a C++ program for Depth First Search

10. Write a C++ program to Breath First Search.

11. Write a C++ program for Warshall's Algorithm.

12. Write a C++ program for Dijkstra's Algorithm.

13. Write a C++ program to Huffman's Algorithm.

14. Write a C++ program to make an Insertion Sort.

15. Write a C++ program to make a Merge Sort.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE

(AUTONOMOUS) COIMBATORE – 641 020

For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Subject Code:** 20UCA4C08

Title: Core: Visual Programming (C#.Net)   **Hours: 6 hrs/week**

Year : II   **Semester : IV**   **Credits: 5**

COURSE OBJECTIVES
1. To understand basic concepts of C sharp Console Applications
2. To understand the Working Environment of C Sharp Windows Applications and its controls, tools, and Components for develop the new c sharp windows application
3. To understand basic concepts of ADO.Net and its Applications
4. To understand the Database Connectivity and Report Generation using C sharp .net
5. To understand the Working Environment of ASP.Net and Basic Programs.

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Ability to work with the basic C sharp console Program to Create Console Applications	K1
CO2	Ability to make familiar to develop C sharp windows application	K1 &K2
CO3	Ability to work with ADO.Net and its Application	K2 &K3
CO4	Ability to have knowledge of Database Connectivity and Report Generation using C Sharp.	K2 &K3
CO5	Ability to working with ASP.Net and its Basic Programs.	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	L	L	L		M	L	M	L	L
CO2	M	S	L	M	L		M	M	M	L	L
CO3	S	M	M	M	L		S	M	M	L	L
CO4	M	S	M	S	L		M	S	S	M	L
CO5	S	S	L	M	L		S	M	M	L	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**

Console Application

Introduction to C# (1-5) – Understanding .Net: The C# Environment (11-16) – Overview of C# (18-21) – Adding Comments – Command Line Arguments (21-25) – Literals, Variables and Data Types(34-49) – *Operators and Expressions*(55-73) - Decision Making and Branching (80-96) –

Decision Making and Looping(102-118) – Methods in C# (125-137) –Handling Arrays (145-160) – Manipulating Strings (168-181) – Classes and Objects (212-233).

Unit II   (15 Hrs)
Graphical User Interfaces with Windows Forms: Part I
Introduction – Windows Forms – Event Handling (399-409) – Control Properties and Layout – Labels, TextBoxes and Buttons – GroupBoxes and Panels – *CheckBoxes and RadioButtons* – PictureBoxes – Tooltips – NumericUpDown Control – Mouse-Event Handling – Keyboard-Event Handling (410-440)

Unit III   (15 Hrs)
Graphical User Interfaces with Windows Forms: Part 2
Introduction – Menus – MonthCalendar Control – DateTimePicker Control – LinkLabel Control – ListBox Control – CheckedListBox Control (441-465) – ComboBox Control –TreeView Control – *ListView Control* – TabControl – Multiple Document Interface (MDI) Windows – *Visual Inheritance* (466-501)

Unit IV   (15 Hrs)

Data Access with .NET
ADO.NET Overview(685-687) – Using Database Connections(688-692) – Fast Data Access:
The Data Reader – Managing Data and Relationships: The DataSet Class (701-714)-*Populating a DataSet* – Persisting DataSet Changes – Working with ADO.NET (721-733) –*The DataGrid Control* (735-749) – Data Binding – Visual Studio.Net and Data Access (750-769)

Unit V   (15 Hrs)

ASP.Net
Web forms – Buttons, Text boxes, Labels, Literals, Place holders, Check boxes, Radio buttons, Tables, Panels, Images, Image buttons, List boxes, Drop down lists, *Hyperlinks and link buttons*, *HTML controls.(*643-646, 677-706, 711-738, 781-820)

Text Book
1. E.Balagurusamy, Programming in C#, 3rd Edition, Tata McGraw-Hill, 2011. (UNIT I)
2. Paul Deitel and Harvey Deitel, C# 2010 for Programmers, 4th Edition, Pearson, 2011.
   (UNIT II - III)
3. Simon Robinson, Christian Nagel, Karli Watson, Jay Glynn, Professional C#, 3rd Edition,
   Wrox Publisher, 2007. (UNIT IV)
4. Steven Holzner, Visual Basic.NET Black Book, Platinum Edition, Dream Tech,2011
   (UNIT V)

Reference Books
1. Geetanjali Arora ,Balasubramaniam Aiswamy ,and Nitin Pandey, Microsoft C#
    Professional Projects,Prentice Hall of India Private Limited, 2002.
2. Herbert Schildt, C# 4.0 Complete References, 1st Edition, Tata McGraw-Hill, 2010.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020

For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code:** 20UCA4C09

Course Title: Core: Relational Database Management Systems   **6 Hours /**

week

Year : II   **Semester : IV**   **Credits: 5**

COURSE OBJECTIVES
1. To understand database systems and its structure
2. To apply normalization techniques to normalize the database
3. To understand the use of Structured Query Language (SQL).
4. To understand and learn the PL/SQL programming language for database processing

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1.	know and practice the data models and schemas in DBMS	K1
CO2.	develop the database designs and apply normalization techniques to normalize the database	K1 &K2
CO3.	use SQL to structure the database to handle data	K2 &K3
CO4.	use the PL/SQL to create, secure, populate, maintain, and query a database.	K2 &K3
CO5	get an opportunity in various positions of database administration	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L	L	L	L	L	L
CO2	M	M	M	L	L	M	M	L	L	L
CO3	M	M	M	M	L	L	L	L	L	L
CO4	M	M	M	M	L	L	L	L	L	L
CO5	M	M	M	M	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

UNIT I

Introduction: – Database System Applications – purpose of database systems - View of Data – Data Models – Database Languages – Relational databases – data storage and querying – Database architecture - Database Users and Administrators – *Structure of Relational databases* – keys.

UNIT II

The Entity – Relationship model – Entity Relationship Diagram – Relational Database Design: Atomic Domains and First Normal Form – Decomposition using Functional Dependencies (Second Normal Form) – Boyce-Codd Normal Form – Third Normal Form – Decomposition using Multivalued Dependencies - *Fourth Normal Form* - *More Normal Forms.*

UNIT III

Interactive SQL: Table fundamentals: Oracle Data types – DDL,DML Commands-create table – *viewing data in the tables* – Eliminating duplicate rows when using a select statement – 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* - Aggregate Functions, Join Relations. Data constraints – types of data constraints *- defining different constraints on a table*

UNIT IV

Introduction to PL/SQL Data base objects: *Advantages of PL/SQL* – The generic PL/SQL block – the PL/SQL execution environment - PL/SQL - *The character set – Literals* - PL/SQL data types – variables – constants – LOB types – logical comparisons - displaying user messages on the VDU Screen – comments – Control structures – What is a cursor? – Types of Cursor- Implicit and Explicit cursor.

UNIT V

PL/SQL database objects: what are procedures/ functions? *Advantages of using procedure or function*- procedures versus function – deleting a stored procedures or functions – oracle packages – database triggers – *types of triggers.*

Text Books
1. A.Silberschatz, H.Korth and S.Sudarsan, Database System Concepts, TATA McGraw Hill Inc, Sixth Edition, 2011.
2. Ivan Bayross, SQL, PL/SQL the programming language of ORACLE, BPB Publications, 4th revised edition, 2009

Reference Books

1. Bipin.C.Desai, An Introduction to Database System,West Publishing Company, 2004.
2. C.J.Date, An Introduction to Database Systems, 8th Edition, Addition – Wesley, 2007.
3. http://spoken-tutorial.org/

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA

Course Title: Core Practical : Visual Programming Lab (C#.Net)

Subject code: 20UCA4CP5

5 Hours / week

Year : II   **Semester : IV**   **Credits: 3**

COURSE OBJECTIVES
1. To impart the basic concepts of C sharp Console Applications
2. To understand concepts of Arrays and Strings functions in C sharp console application
3. To understand basic concepts about C sharp windows application with programs
4. To understand about ADO.Net using Database Connectivity Programs
5. To understand about Web application with programs

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	work with the basic concepts of C sharp console applications	K1
CO2	have knowledge about Array and String Function in c sharp console	K1 &K2
CO3	understand basic concepts about c sharp windows application with programs	K2 &K3
CO4	understand about ADO.Net using Database Connectivity Programs	K2 &K3
CO5	have knowledge to do some real time projects	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	M	L	S	M	M	L	L
CO2	S	S	L	M	L	S	S	L	L	L
CO3	S	M	M	M	L	S	M	S	M	L
CO4	S	M	S	S	L	S	S	S	S	L
CO5	S	S	M	M	L	S	S	S	M	L

S- Strong; M-Medium; L-Low

LIST OF PRACTICALS

1. Write a C# Console Program to perform palindrome.
2. Write a C# Console Program to perform command line argument.
3. Write a C# Console Program to perform simple calculator.

4. Write a C# Console Program to perform string functions.

5. Write a C# Console Program to find second largest number.

6. Write a C# Console Program to jagged array.

7. Write a C# Console Program to perform Simple Math Calculator with Memory

8. Write a C# Console Program to perform Simple Dictionary and Spell Check

9. Write a C# Console Program to Create a MS Windows Notepad Application with Menus and ToolBar

10. Write a C# Console Program Create a MS Windows Word Pad Application

11. Write a C# Console Program Creating a Windows Explorer

12. Write a C# Console Program Creating an Image List View based Album

13. Write a C# Console Program to create web browser application.

14. Write a C# Console Program a Sample Inventory Application for a Hostel Store with Transactions

15. Write a C# Console Program a Sample Application for Student Progress Card.

Programme: BCA
Course Title: Core Practical : Relational Database Management Systems Lab
Subject Code: 20UCA4CP6

Year: II	Semester: IV
5 Hours / week	Credits: 3

COURSE OBJECTIVES
1. To impart the basic concepts of DDL, DML commands
2. To understand concepts of set operations, relational and logical operations
3. To understand the inbuilt functions
4. To understand about PL/SQL structure and operations
5. To apply PL/SQL concepts to solve real time problems

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Ability to perform DDL, DML commands in a database	K1
CO2	Ability to have knowledge about various operations like set operations, relational and logical operations	K1 &K2
CO3	Ability to understand the inbuilt functions like number functions, character functions, date functions	K2 &K3
CO4	Ability to understand the PL/SQL structure and operations	K2 &K3
CO5	Ability to apply PL/SQL concepts to solve real time problems.	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L		L	L	L	L	L
CO2	M	M	M	L	L		M	M	L	L	L
CO3	M	M	M	M	L		L	L	L	L	L
CO4	M	M	M	M	L		L	L	L	L	L
CO5	M	M	M	M	L		L	L	L	L	L

S- Strong; M-Medium; L-Low

LIST OF PRACTICALS

1. Exploring the Simple queries with DDL Commands using SQL.

2. Exploring the Simple queries with DML Commands using SQL.

3. Exploring the Comparison (Relational) operator and Logical operator using SQL.

4. Exploring the Set operations and sorting and grouping operator using SQL.

5. Exploring the built-in functions i) Count Function ii) Character Function using SQL.

6. Exploring the built-in functions i) Number Function ii) Date function using SQL.

7. Create a student table contains reg-no, stud-name, class, subjects to perform an Aggregate operations using SQL.

8. Create a table PASSENGER with the fields Ticket no (Primary Key), name, age, gender and fare. Write a PL/SQL procedure to print the details of all the passenger, name, age, gender and fare.

9. Write PL/SQL statements to perform arithmetic operations.

10. Write a PL/SQL statements to print "n" numbers using while loop / For loop.

11. Write a PL/SQL code to calculate the area of a circle.

12. Create a function to return a fare from tickets booking table which contains bus_code, origin, fare, destinations, time of departure, data of travelling.

13. Create a function to return a current stock value for a given product.

14. Write a PL/SQL program to perform Trigger

Programme: BCA   **Course Code: 18UCA4NM2**
Course Title: NME : Data Science and Big data Analytics   2 **Hours / week**
Year: II   **Semester: III**   **Credits: 2**

Course Objectives:

- To impart the basic concepts of data mining
- To understand concepts of OLAP tools and k-nearest Neighbor algorithm
- To understand the Basic concepts of R Programming
- To understand about the Reading data into R
- To understand the concept ofClustering algorithms

Course Outcome:

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Ability to understand basic concepts of Data Mining	K1
CO2.	Ability to have knowledge about OLAP tools and k-nearest Neighbor algorithm	K1 &K2
CO3.	Ability to understand Basic concepts of R Programming	K2 &K3
CO4.	Ability to understand the Reading data into R	K2 &K3
CO5.	Ability to understand about the Clustering algorithms	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze
MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L	L	L	L	L	L
CO2	M	M	M	L	L	M	M	L	M	L
CO3	M	M	M	M	M	L	L	L	L	L
CO4	M	M	M	L	L	L	L	L	M	L
CO5	M	M	M	M	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

Unit-I

Expanding universe of data – production factor – computer systems that can learn – data mining – data mining versus query tools – data mining in marketing – practical application. (Chapter:1, Page No.:1-10). Learning – Self Learning Computer Systems – machine learning and the methodology of science – concept learning. (Chapter:2, Page No.:11-22)

Unit- II

Knowledge discovery process – data selection – cleaning – enrichment – coding – data mining – preliminary analysis of the data set using traditional query tools – visualization techniques – likelihood and distance – OLAP tools – K-nearest neighbor – Decision trees – Association rules – Neural networks – Genetic algorithms – Reporting. (Chapter:4, Page No.:37-78)

Basis of R: Basic Math – Variables – Data Types – Calling Functions – Function Documentation – Missing Data – Pipes. (Page No: 39 – 54) **Advanced Data Structures:**data.frames – Lists – Matrices – Arrays. (Page No: 57 -74)

Unit - III

Reading Data into R : Reading CSVs – Excel Data – Reading from Databases –Data from Other Statistical Tools – R Binary Files – Extract Data from Web Sites. (Page No: 75 – 90). **Statistical Graphics:** Base Graphics – ggplot2 (Page No: 93 – 110).

Writing R Functions : Hello, World! – Function Arguments – Return Values – do.call(Page No: 111 – 115).**Clustering:** K-means – PAM – Hierarchical Clustering (Page No: 389 – 407)

TEXT BOOK

1. Peter Adrians and DOLF Zantinge, Data Mining, 4th Edition, Addition Wesley, 2002(unit I,II)

2. Jared P. Lander "R for Everyone Advanced Analytics and Graphics", Second Edition, 2018(unit III, IV & V)

REFERENCE BOOKS

1. Vipin Kumar, Data Mining with R Learning with Case Studies, Chapman & Hall/CRC, Data Mining and Knowledge Discovery Series, SERIES EDITOR, CRC Press
2. Nina Zumel John Mount, "Practical Data Science with R", Dreamtech Press, 2018

Program List

1. To Write a R Program on adding two matrixes using array
2. To Write a R Program on simple Calculator.
3. To Write a R Program on Multiplication Table.
4. To write a R Program on Find Sum, Mean and Product of Vector.
5. To write a R Program to convert Decimal into Binary using Recursion.

6. To write a R Program to implement k-means clustering technique.
7. To write a R program to implement any one Hierarchal Clustering.
8. To write a R program to implement any one Partitioning around Medoid(PAM) Clustering.
9. To write a R program to implement the Linear Regression.
10. To write a R program to Visualize the data using histogram.
11. To write a R program to Visualize the data using Box plot.
12. To write a R program to Visualize the Scatter plot

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020

For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code:** 20UCA5C10

Course Title: Core: Web Technology (HTML, Bootstrap. PHP and MySQL)

6 Hours / week

Credits: 5   **Year: III**   **Semester: V**

COURSE OBJECTIVES
1. To Learn and practice HTML5 web design for constructing webpage's.
2. To Understand and apply CSS and Bootstrap CSS in the webpage's.
3. To Understand about Server Sided Scripting language in PHP &MySql.
4. To Understand the needs of Java Script in web programming.
5. To Understand the needs of AJAX script in web programming languages in PHP.

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1	Ability to design web page using HTML5.	K1
CO2	Understanding the Features of CSS and Bootstrap CSS and how to apply this in the web page.	K1 &K2
CO3	Understanding the concept of Server Side Scripting language PHP and MySql. Ability to write code in PHP and save the data into the MySql database Table.	K2 &K3
CO4	Understanding the concept of Java Script in web programming.	K2 &K3
CO5	Ability to understand the functional dependencies of AJAX in PHP	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L	L	L	L	L	L
CO2	M	M	M	L	L	M	M	L	L	L
CO3	M	M	M	M	L	L	L	L	L	L
CO4	M	M	M	M	L	L	L	L	L	L
CO5	M	M	M	M	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**
        Overview of HTML5 – HTML5 and its Essentials – Exploring New Features of HTML5 – Fundamentals of HTML (1-59) – *Working with Text* (77-94) – Organizing Text in HTML (113-117) – Working with Links and URLs (129-135) – Creating Tables (145-151) – Working with Forms (189-205) – Working with Multimedia (245-252).

Unit II   **(15 Hrs)**
        Overview of CSS – Exploring CSS Selectors – *Inserting CSS in an HTML Document* (465-476) – Background and Color Gradients in CSS (487-504) – Fonts and Text Styles (521-530) – Creating Boxes and Columns Using CSS (545-566) – Displaying, Positioning and Floating an

Element (597-603)

Bootstrap Overview – Bootstrap Environment Setup – Bootstrap Grid System – Bootstrap CSS Overview – Bootstrap Typography – Bootstrap Tables – Bootstrap Forms – Bootstrap Images – Bootstrap Dropdowns – Bootstrap Navigation Elements – Bootstrap Jumpotron – Bootstrap Alerts

Unit III   **(15 Hrs)**
Introducing PHP (1-18) – Using Variables and Operators (21-45) – *Controlling program flow* (49-82) – Working with cookies, sessions and headers (293 – 308).Working with arrays (85-118) – Using functions and classes (121-148) – Working with files and directories (159-180) – Working with databases and SQL (185-246)

Unit IV   **(15 Hrs)**
JavaScript Introduction – Comments – Variables – Operators – *Control Statements – Functions* – Events – Arrays – Number – Strings – *Date – Math* – Forms and Validations.

Unit V   **(15 Hrs)**
Getting started with Ajax (433-435) – Writing Ajax (435) – Creating and Opening XMLHttpRequest object (436-440) – Handling & Starting the Downloaded data (441-447) – Ajax with Some PHP (448) – Passing Data to the Server with GET & POST (449-455).

Text Book
1. VikramVaswani, A Beginner's Guide PHP,1st Edition, Tata McGraw Hill, 2008.
2. Steven Holzner, PHP Complete Reference, Tata McGraw Hill Edition, 2008.
3. Jen Kramer, Joomla! Start to Finish, John Wiley & Sons, 2010.

Reference Books
1. Kogent Learning Solutions Inc., HTML5 Black Book Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery, 2012
2. http://spoken-tutorial.org/
3. http://tutorialspoint.com – Bootstrap Tutorial

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE

(AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code:** 20UCA5C11

Course Title: Core: Python Programming   **6 Hours / week**

Credits: 5   **Year: III**   **Semester: V**

COURSE OBJECTIVES
1. To understand the basic concepts of Python and packages.
1. To develop the skill of designing Graphical User Interface in Python.
2. To learn problem solving and programming capability.
3. To learn the different types of plotting skills.
4. To learn the Scikit-learn programming skill in python.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1.	understanding the methodologies and essentials of Python programming.	K2
CO2.	understanding the basic concepts of python modules and packages.	K2
CO3.	create simple prediction programs using Python.	K1
CO4.	interpret and analyse the real time datasets with python packages.	K3 & K4
CO5.	understand the concept of Scikit Learn	K2

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	M	L	S	M	S	M	L
CO2	M	M	L	M	L	S	M	S	S	L
CO3	L	M	M	L	L	M	L	S	S	L
CO4	S	S	M	M	L	S	M	M	M	L
CO5	L	M	M	L	L	S	M	S	L	L

S- Strong; M-Medium; L-Low

Unit – I   **(15 Hrs)**
Shell or Notebook: Launching - **Launching the Jupyter Notebook** - Help and Documentation in
IPython - Exploring Modules with Tab Completion - Keyboard Shortcuts in the IPython Shell -
IPython Magic Commands.

Unit – II   **(15 Hrs)**
NumPy: Introduction to NumPy – *The Basics of NumPy arrays*–Computation on NumPy Arrays–
Aggregations: Min. Max, and Everything in Between – Computation on Arrays.

Unit – III (15 Hrs)

Pandas: Introduction to pandas - Data manipulation with pandas–*Operating on null values*, hierarchical indexing – Combining Datasets – Aggregation and Grouping.

Unit – IV (15 Hrs)

Matplotlib: Introduction to Matplotlib– Visualization with Matplotlib – *Simple line plots* – scatter plots – visualizing errors – Histograms, binnings and density – Customizing plots – Multiple sub plots – Text annotation.

Unit – V (15 Hrs)

Sci-kit Learn: Introduction to Scikit Learn: Data representation – Hyper parameters &Validation: *Selecting the best model – Learning Curves*. – Correlation - Linear Regression: Simple Linear Regression – Basis function regression – Regularization.

Text Book

1. Jake VanderPlas, "Python for Data Science Hand Book", 1st Edition, O'Reilly, 2016.

Reference Books

1. William McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython", 2nd Edition, Shroff/O'Reilly, 2017.
2. Prateek Gupta, "Data Science with Jupiter: Master Data Science skills with easy-to-follow Python examples", 1st Edition, BPB Publications, 2019.
3. http://spoken-tutorial.org/
4. http://tutorialspoint.com/
5. https://www.netacad.com/courses/networking/ccna-switching-routing-wireless-essentials

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA5C12**
Course Title : Core: Computer Networks   **5 Hours / week**
Year: III   **Semester: V**   **Credits: 5**

COURSE OBJECTIVES
1. To understand the structure, functions, components, and models of the computer networks.
2. To describe the importance of IP addressing and design, calculate, and apply subnet masks and addresses to fulfil given requirements in IPv4 and IPv6 networks
3. To Compare the different types of routing protocols and metrics
4. To understand design a scalable hierarchical network, Configure and troubleshooting, VLAN and inter-VLAN routing
5. To Acquire knowledge of various protocol STP, LACP, PAgP and Access Control List

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	understanding the concepts of functions, components, and models of the computer networks	K2
CO2	understanding the concepts of IP addressing and subnetting calculation	K2 & K3
CO3	identifying the different types of routing protocols and metrics	K3 & K4
CO4	understanding the functionalities of VLAN and inter-VLAN routing	K3 & K4
CO5	apply Packet Tracer tool to implement advanced Networking Concept	K3 & K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	L	L	M	S	M	M	L
CO2	S	S	M	L	L	S	S	S	M	L
CO3	S	S	M	L	L	S	S	S	M	L
CO4	S	S	M	L	L	S	S	S	M	L
CO5	S	M	M	L	L	S	S	M	M	L

S- Strong; M-Medium; L-Low

Unit – I   **(15 Hrs)**

Introduction: The use of computer networks - Network architectures -Components of the Network - Types of Networks - Transmission Media: Classification of transmission media -Overview of TCP / IP & OSI: *benefits of a Layered Model* – TCP/IP Model – OSI Model – Comparing the TCP/IP & OSI Model- Application layer Services and Protocols Function- Transport Layer Protocols: TCP and UDP – *Port Addressing.*

Unit – II   **(15 Hrs)**

OSI Network Layer: process and Protocols –address management - Types of Address in IPv4 -NAT - Public and Private Address –ISP -Overview of IPv6 – Subnet Mask – *Subnetting* -OSI Data link layer: service - Data Link Sublayers - Ethernet Frame Size and Fields - *MAC Address Structure*

Unit III   **(15 Hrs)**
Routing : Static Routing- Configuring Static routes - Modifying Static Routes - *Summarizing Routes* - Configuring a Summary Route and Troubleshooting- Dynamic routing : purpose - advantage - Metric -Types -RIP configuration -EIGRP configuration-EIGRP Tuning - Single Area OSPF configuration - Multi Area OSPF configuration - *OSPF Tuning*

Unit IV   **(15 Hrs)**
Introduction : LAN Design - VTP: purpose- configuration -VLAN: types - benefits - Configuration -Inter-VLAN: features- types - traditional -router on a stick - *Using multilayer switch*

Unit V   **(15 Hrs)**
STP: Uses - configuration - Ether channel: Advantage- LACP configuration -PAgP Configuration - ACL: Purpose - types -Standard ACL Configuration - *Extended ACL configuration*

TEXTBOOK:
1. Cisco Networking Academy, CCNA 1 and 2 Companion Guide, Pearson Education, Third Edition, 2003.
2. Cisco Networking Academy, CCNA 3 and 4 Companion Guide, Pearson Education, Third Edition, 2003. (Unit-5)
3. Todd Lammle -CCNA Routing and Switching Complete Study Guide 2nd Edition - John Wiley & Sons, 2016

REFERENCE BOOK:
1. https://www.netacad.com/group/resources/ccna-rs-scaling/6.0
2. https://www.netacad.com/group/resources/ccna-rs-connect/6.0
3. Andrew S Tanenbaum - Computer Networks 3rd Edition - Prentice Hall of India, 2003

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For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA5EA1**

Course Title: Elective : Cyber Security   **5 Hours / week**

Credits: 4   **Year: III**   **Semester: V**

COURSE OBJECTIVES

1. To understand of the basic Mathematical tools for cryptography concepts.
2. To learn the concept of AES, Blowfish algorithm and its applications.
3. To recognize the concept of public key cryptosystems.
4. To understand the concept of Digital Signature Algorithms
5. To learn about Firewall and its applications

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1	Understanding basic Mathematical tools for cryptography concepts	K1 & K2
CO2	Understanding the concept of AES, Blowfish algorithm and its applications.	K1 & K2
CO3	Analyzing the concept of public key cryptosystems.	K4
CO4	Understanding the concept of Digital Signature Algorithms	K2 & K3
CO5	Understanding the concept of and Firewall and its applications	K2&K3

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	L	M	S	M	L	L	L	L	L
CO2	M	S	M	L	L	M	M	M	L	L
CO3	S	M	S	S	S	L	M	M	M	M
CO4	M	L	M	S	M	S	L	M	S	M
CO5	S	L	M	S	M	L	L	L	L	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**
Introduction and Data Encryption Standards:

Introduction(1-10) – Data Encryption Techniques(10-15) – Substitution Ciphers(15-26) – Transposition Ciphers(26-28) – Steganography(28-30) –Data Encryption Standards: Block ciphers, Block Cipher Modes of Operation(32-40) – Feistel Ciphers(40-41) – Data Encryption Stand(42-67) - Triple DES(67-69) – DES Design Criteria(69-71).

Unit II (15 Hrs)
Advanced Encryption Standard and Symmetric Ciphers

Introduction, Advanced Encryption Standard(74-75) – Overview of Rijndael(75-83) – Advantages and Limitations of Rijndael, Comparison of AES with other ciphers(84-85) – Blowfish Encryption Algorithm(87-92) - RC5(92-95) – RC4(95-98) – RC6(98-100) – Comparison Between RC6 and RC5(100-101) – IDEA(101-104).

Unit III (15 Hrs)
Public Key Cryptosystems, Key Management and Authentication

Introduction, Public key Cryptosystems(118-125) – The RSA algorithm(125-130) – Timing Attacks(130-134) – Key Distribution, Diffie-Hellman Key Exchange(138-145) – Elliptic Curve Arithmetic(145-154) – Elliptic Curve Cryptography(154-155) – Elliptic Curve Security and Efficiency, Zero Knowledge Proof(155-157) – Authentication: Introduction, authentication methods(162-172) – Message Digest(172-184) – Kerberos(184-199) – X.509 Authenticaiton Service(199-200).

Unit IV (15 Hrs)
Digital Signatures, Electronic Mail Security and Web Security

Introduction, Digital Signature Algorithms(204-213) – Digital Signature Standards(DSS)(213-214) – Authentication Protocols(214) – Pretty Good Privacy(PGP)(216-
– S/MIME(223-224) – MIME(224-232) – History of S/MIME(232-236) – Comparison PGP and S/MIME(237) – Secure Socket Layer(SSL)(267-269) – SSL session and connection(269-270) – SSL Record Protocol(270-275) – SSL in practice(275-277) – Secure electronic Transactions(277-279)

Unit V (15 Hrs)
Malicious Software and Firewall

Malicious Code, viruses(306-313) – Worms(313-316) –Trojans(316-317) – Spyware(317)
Best Practices(317-318) – Digital Immune System(318-319) – Attacks(319 -327) – Introduction, Packet Filters(329-331) – Application level gateways(331-333) – Circuit level gateways(333-334) – Firewall Architectures(334-341) – Trusted System(341-342) – Access Control(342-344)

TEXT BOOKS:
1. V. K. Pachghare, Cryptography and Information Security, PHI.

REFERENCE BOOKS:
1. William Stalling, Cryptography and Network Security, 4th Edition, PHI.
2. Schneierand Bruce, Applied Cryptography: Protocols & Algorithms, 1st Edition, MGH.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA5CP7**

Course Title: Core Practical : Web Technology (HTML, Bootstrap. PHP and MySql)

4 Hours / week

Credits: 3   **Year: III**   **Semester: V**

COURSE OBJECTIVES:
1. To develop simple HTML5 programs for developing web design.
2. To develop simple CSS and Bootstrap CSS in the webpage's.
3. To develop Server Sided Scripting language in PHP &MySql.
4. To develop and use JavaScript in HTML forms for validation.
5. To develop and use AJAX script in web programming languages in PHP.

COURSE OUTCOMES:

CO No.	CO Statement	Knowledge Level
CO1	ability to design web page using HTML5.	K1
CO2	understanding the Features of CSS and Bootstrap CSS and how to apply this in the web page.	K2 &K3
CO3	apply the concept of Server Side Scripting language PHP and MySql.	K3
CO4	understand the JavaScript basics and apply the validation in HTML forms.	K2 &K3
CO5	ability to understand the functional dependencies of AJAX in PHP.	K2

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L	L	L	L	L	L
CO2	M	M	M	L	L	M	M	L	L	L
CO3	M	M	M	M	L	L	L	L	L	L
CO4	M	M	M	M	L	L	L	L	L	L
CO5	M	M	M	M	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

LIST OF PRACTICALS

1. Write a HTML5 Program to create student information form with following details (Reg No, Student Name,Date of Birth,Age,Course)
2. Write a HTML with Bootstrap program to create employee information form with following details (EmpNo , Employee Name , Employee Age, Designation , Department)
3. Write a JavaScript validation for employee information form with following details (EmpNo , Employee Name , Employee Age, Designation , Department)
4. Write a HTML with Bootstrap program to create your college website as responsive website by using Bootstrap nav, Bootstrap Jumpotron, …. etc.
5. Using PHP program read and print a file character by character, until the end of file reached.

6. Using PHP string function to convert lower case, upper case, string length, string compare string reverse, and string shuffle.
7. Using PHP connect MySql and save the following data into the respective MySql table.
    (Student Name , Student Reg No , Age , Department)
8. Using PHP connect MySql and view contents of the previous program saved details.
9. Using PHP connect MySql and view contents and made delete operation in it.
10. Using PHP connect MySql and view contents and made edit operation in it.
11. Using PHP with MySql develop one small application in online job portal.
12. Using PHP with MySql develop online exam.
13. Using PHP with MySql develop an alumni registration form with image uploading.
14. Using PHP, AJAX and MySql create your class profile using add, view, edit and delete modes with image and music file uploading

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020

For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA5CP8**

Course Title: Core Practical : Python Programming Lab   **4 Hours / week**

Year: III   **Semester: V**   **Credits : 3**

COURSE OBJECTIVES:
1. To develop simple programs using Python and packages.
2. To develop python programs to solve mathematical and statistical problems
3. To develop python visualization techniques using packages.
4. To develop python program datasets

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	understand the essentials of Python programming	K2
CO2	do basic programs using python modules and packages	K1 & K2
CO3	create simple algorithms with and without using packages	K3
CO4	interpret algorithm and visualize the results with real time datasets	K3 & K4

K1 – Recall, remember; K2 – Understand; K3 – Apply; K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L	M	L	M	L	L
CO2	M	M	L	M	L	S	M	S	S	L
CO3	L	M	M	L	L	M	L	S	S	L
CO4	S	S	M	M	L	S	M	M	M	L

S- Strong; M-Medium; L-LowPractical List

1. Expressions, conditionals, loops, list, dictionary, and strings.

2. Functions: scope, parameter passing

3. Data objects, pass arrays to functions, return values

4. Functions using libraries: mathematical, and string functions.

5. File handling: open and close a file, read, write,

6. File processing: append to a file, standard input, output, and error streams, relative and absolute paths.

7. Using Python libraries: create and import Python libraries

8. Recursion: simple algorithms with recursion: factorial, Fibonacci numbers;

9. Recursion on arrays: binary search

10. Pandas: Importing package and Arrays

11. Data visualization Pyplot: line chart, pie chart, and bar chart.

12. NumPy: Structured array and Sorting array

13. Matplotlib: draw different charts for a data set

Programme: BCA   **Course Code: 20UCA6C13**

Course Title : Core: Software Engineering   **6 Hours / week**

Year: III   **Semester: VI**   **Credits: 5**

COURSE OBJECTIVES

1. To understand about software process models.

2. To understand about software requirements.

3. To understand about different software architectural styles.

4. To understand about software testing techniques.

5. To acquire knowledge about software risks and software quality.

COURSE OUTCOMES

   On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	apply software engineering techniques.	K3
CO2	develop, maintain and evaluate software systems.	K3& K4
CO3	produce efficient, reliable, robust and cost-effective software solutions.	K4
CO4	perform independent research and analysis.	K3& K4
CO5	work as an effective member of software engineering team.	K3& K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	L	M	L	M	S	L
CO2	S	S	L	S	L	S	M	M	L	L
CO3	S	S	L	S	L	S	L	S	L	L
CO4	M	M	L	M	L	S	S	S	M	L
CO5	M	S	M	M	L	S	S	S	S	L

S- Strong; M-Medium; L-Low

Unit I   **(15 hrs)**

Defining Software - Software Application Domain - Legacy Software (3-9) Process Model - Waterfall Model - Incremental Process Models - Spiral Model - *Specialized Process Models - The Unified Process*(39-56)

Unit II   **(15 hrs)**

Requirements Engineering: Establishing The Groundwork - Eliciting Requirements - Developing Use Cases - Building The Requirements Model - ***Negotiating Requirements - Validating Requirements***(120-145)

Unit III   **(15 hrs)**

Design Concepts: The Design Process - Design concepts - Design Model(215- 238) Architectural Design: Software Architecture - Architectural Genres - Architectural Styles - Architectural Design - ***Assessing Alternative Architectural Designs - Architectural Mapping Using Data Flow*** (243-273)

Unit IV   **(15 hrs)**

Software Testing: Software Testing Fundamentals - White Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing - Graph based testing method- Equivalence Partitioning - ***Boundary value analysis - Orthogonal Array Testing***.(482 - 502)

Web Application Testing: Testing Concepts for Web Apps - Content Testing - User Interface Testing - Configuration Testing - Component Level Testing - ***Navigation Testing - Performance Testing***.(529 - 553)

Unit V   **(15 hrs)**

Risk Management: Software Risks - Risk Identification - Risk Projection - ***Risk Refinement - RMMM*** (745-759).

Software Quality Assurance - Background Issues - Elements of SQA - SQA Tasks - Formal Approaches to SQA - Statistical Software Quality Assurance - ***Software Reliability -The SQA Plan***(432 - 446).

Text Book

1. ROGER S.PRESSMAN, SOFTWARE ENGINEERING A practitioner's Approach, 7th Edition,McGRAW-HILL,2014.

Reference Books
1.   Richard fairly, Software Engineering concepts, TATA McGRAW HILL, 1965.
2.   http://spoken-tutorial.org/

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA6C14**

Course Title: Core: Android Programming   **5 Hours / week**

Year: III   **Semester: VI**   **Credits: 5**

COURSE OBJECTIVES
1. To understand the basic concept of Android.
2. To acquire knowledge about creating android applications.
3. To understand the concept of user interface design.
4. To gain knowledge about performing user interface events.
5. To understand about foundations of Flutter Programming

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1	Understanding the basic concept of Android .	K2
CO2	Understanding the basic idea to create android application	K2&K3
CO3	Understand the concept of user interface design.	K3
CO4	Understand the concept of performing user interface events	K2& K3
CO5	Understanding about foundations of Flutter Programming	K2

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze
MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	L	S	S	M	S	L
CO2	S	S	M	L	L	M	M	L	M	L
CO3	S	S	M	M	L	M	M	L	L	L
CO4	S	S	M	M	L	M	M	L	M	L
CO5	S	S	M	M	L	M	M	L	L	L

S- Strong; M-Medium; L-Low
Unit I   **(15 Hrs)**
Introducing Android: Before we get started – Advantages of android – Preparing SDK tools to download – Android development IDE – Java, XML and how android works – Android application framework – *Screen layout design* – User Interface Design – Graphics and animation Design – Interactivity – Content providers – Intent and intent filters. (1-19)

Unit II   **(15 Hrs)**
Setting up your android development environment – Installing Java, Eclipse and Android – Setting up AVDs and Smart Phone – Understanding Java SE and the Dalvik Virtual Machine – The directory structure of an android project – Leveraging android XML – Using your android application resources – The AndroidManifest.xml file – ***Creating your first android application.*** (21-85)

Android application components – Android Intent Objects: Messaging for Components – Android Manifest XML: Declaring Your Components – *Android View Hierarchies* – Defining Screen Layouts: Using XML. (115-160)

Unit III   **(15 Hrs)**
UI Design: Buttons, Menus and Dialogs – Using Android UI Elements (Widgets) – Adding an Image Button to Your Layout – *Adding a TextView Widget to Your Layout* – Adding an Image – Using Menus in Android – Creating the Menu Structure with XML – Defining Menu Item Strings – Inflating the Menu Structure via Java – Running the Application in the Android Emulator – *Making the Menu Work* – Adding Dialogs – Using Custom Dialog Subclasses – Displaying an Alert Dialog. (163-207)

Unit IV   **(15 Hrs)**
Adding Interactivity: Handling UI Events – An Overview of UI Events in Android – *HandlineonClick Events* – Android Touchscreen Events: onTouch – Android Right-click Equivalent:onLongClick – Key Event Listeners:onKeyUp and onKeyDown – Context Menus in Android: onCreateContextMenu. (235-266)

Understanding Content Providers: An Overview of Android Content Providers – Defining a Content Provider – Working with a Database.

Unit V   **(15 Hrs)**

The Foundations of Flutter Programming: Introducing Flutter – Understanding Widget Lifecycle Events – Installing the Flutter SDK. *Creating a Hello World App*: Setting Up the Project – Using Themes to Style Your App – Using External Packages. Using Common Widgets: Using Basic Widgets – Using Images and Icons – Using Decorators. Adding Animation to an APP: Using Animated Container – Using Animated CrossFade – *Using Animations.*

Text Book
1. Wallace Jackson, Android Apps for Absolute Beginners, 2nd Edition, APress, 2013. **(Unit I to IV)**
2. Beginning Flutter A Hands On Guide to App Development, Marco L. Napoli, Wrox Programmer to Programmer(**Unit V**)

Reference Books
1. Shawn Van Every "Pro Android Media: Developing Graphics, Music, Video, and Rich Media Apps for Smartphones and Tablets"
2. http://spoken-tutorial.org/

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020

For candidates admitted from academic year 2020 - 2021onwards under New CBCS.

Programme: BCA

Course Title: Core: Cloud Computing   **Subject Code: 20UCA6C15**

Year: III   **Semester: VI**

5 Hours / week   **Credits: 4**

COURSE OBJECTIVES
1. To understand the basic concepts of Cloud Computing.
2. To develop the skill of Web Services in Cloud Computing.
3. To understand about building Cloud Networks
4. To acquire knowledge on federation in the cloud
5. To learn about security in the Cloud

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1	Aware of the basic concepts of Cloud Computing	K1
CO2	Understanding the basic concepts of Web Services in Cloud Computing..	K2
CO3	Creating simple Cloud Data Center and Service oriented Architecture in cloud computing.	K3
CO4	Interpret and analyse the Protecting and controlling federation and Future of Federation.	K4
CO5	Understanding about security in Cloud and Virtual Machine Security	K2

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	S	M	S	L	S	S	M	M	L
CO2	M	S	M	M	L	M	M	M	M	L
CO3	S	S	M	S	L	M	M	M	M	L
CO4	S	M	M	M	L	M	M	S	M	L
CO5	M	M	M	S	L	S	M	M	S	L

Unit I

Introduction to Cloud – Emergence of Cloud Computing – Types of cloud- Cloud-Based Service Offerings – Grid Computing or Cloud Computing – Benefits of using a Cloud Model —*Key Characteristics – Cloud Models* – Challenges for the Cloud. (Page no. xxiv - xxxviii)

Unit II

Web Services from the Cloud: Communication-as-a-Service(CaaS) –Advantages of CaaS–Infrastructure-as-a-Service(IaaS)–Monitoring-as-a-Service(MaaS) – Platform-as-a-Service(PaaS) – *Software-as-a-Service(SaaS)* - SaaS Implementation Issues-characteristics – ***Benefits.***(Page no.29-54).

Unit III

Building Cloud Networks: Evolution from the MSP Model to Cloud Computing and Software-as-a-Service –Cloud Data Center (CDC) – Collaboration – Service-Oriented Architectures as a step toward Cloud Computing- Basic Approach to a Data Center-Based SOA –***Role of Open Source Software in Data Centers***.(Page no.57-77).

Unit IV

Federation in the cloud-Levels of Federation-Federated services and Applications-Protecting and controlling federation- Future of Federation- Presence in the cloud- ***privacy and its relation to cloud-based Information system.***(Page no.129-151).

Unit V

Security in the Cloud: Cloud Security Challenges- Software-as-a- service security- Third party risk management-Security Architecture Design- Secure software Development Life Cycle- Data security-***Application security- Virtual Machine Security.***(Page no.153-181)

Text Book
1. John W.Rittinhhouse, James F.Ransome, Cloud Computing: Implementation, management and security, 1st Edition, CRC Press, 2009.

Reference Books
Anthony T.Velte, Toby J.Velte and Robert Elsenpeter, Cloud Computing A Practical Approach, 1st Edition, Tata McGraw Hill, 2009.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA6CP9**

Course Title: Core Practical : Android Programming Lab   **4 Hours / week**

Credits: 3   **Year: III**   **Semester: VI**

COURSE OBJECTIVES
1. To perform basic applications in Android
2. To implement android content providers
3. To execute API controls and onclick events
4. To develop the mobile application using android event controls.
5. To implement the SQLite Database connectivity

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1	Understanding the basic android application.	K2
CO2	Implement simple applications with Notifications and alarms.	K2
CO3	Analyze the android locations with map.	K4
CO4	Apply the android concepts to solve real time problems	K3
CO5	Implementing the SQLite Database connectivity	K3

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	S	M	M	M
CO2	S	S	S	M	M	S	M	L	L	L
CO3	S	S	M	M	M	S	L	L	M	M
CO4	S	S	M	M	M	M	S	M	L	L
CO5	M	M	M	M	M	M	L	L	M	L

S- Strong; M-Medium; L-Low
LIST OF PRACTICALS

1. Write the steps for installation and configuration of android in Windows OS.
2. Write a program to demonstrate usage of two textbox (Edit Text), Label (Text view) and Button widgets in android and perform addition of two numbers.
3. Write a program and demonstrate the graphical layout orientation.
4. Write a program and fetch the IMEI number of your mobile phone.
5. Write a program to demonstrate usage of DateTimePicker with Toast(Message Box).
6. Write a program to demonstrate usage of List Box, Combo Box, Snippers with Toast(Message Box).
7. Write a program to demonstrate AutoCompleteTextView.
8. Write a program, create and send notification message in your mobile phone.
9. Write a program to demonstrate usage of Text Area, Checkbox, and Radio Button with Toast (Message Box).
10. Write a program and calculate the simple interest and compound interest using its API controls.

11. Write a program and create phone call activity using android.
12. Write a program for sending SMS using android.
13. Write a simple program to demonstrate the contact manager using Contacts ContractAPI (Insert, Delete, Edit, View).
14. Write a simple program to demonstrate connecting with SQLite Database.
15. Write a program and save employee details with SQLite Database.
16. Write a program and view employee details from SQLite Database.

Programme: BCA   **Course Code: 20UCA6EA2**

Course Title: Elective : Data Mining and warehousing   **5 Hours / week**

Credits: 4   **Year: III**   **Semester: VI**

COURSE OBJECTIVES
1. To expose the students to the concepts of Data warehousing Architecture and Implementation.
2. To learn to use association rule mining for handling large data.
3. To understand the concept of classification for the retrieval purposes.
4. To know the clustering techniques in details for better organization and retrieval of data.
5. To understand compression of Data and mining techniques.

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1	Preprocess the data for mining applications.	K1
CO2	Apply the association rules for mining the data.	K2
CO3	Design and deploy appropriate classification techniques.	K2 & K3
CO4	Cluster the high dimensional data for better organization of the data	K3 & K4
CO5	Evaluate various mining techniques on complex data objects.	K4

K1 – Recall, remember;   **K2 – Understand;**   **K3 – Apply;**   **K4 – Analyze**

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	L	M	M	M	S	L	M	L	M
CO2	M	M	M	S	M	M	M	L	L	M
CO3	M	M	S	M	M	M	L	M	L	L
CO4	S	M	M	M	L	M	L	M	L	M
CO5	M	L	M	L	L	S	M	L	M	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**

         Expanding universe of data – Production factor – Computer systems that can learn – Data mining – *Data mining versus query tools* – Data mining in marketing – Practical application. (Chapter:1, Page No.:1-10). Learning – Self Learning Computer Systems – Machine learning and the methodology of science – Concept learning.(Chapter:2, Page No.:11-22).

Unit II   **(15 Hrs)**

Data warehouse – Need- Designing decision support systems – *Integration with data mining*-Client/Server and data warehousing – Multi-processing machines – Cost justification. (Chapter:3, Page No.:25-36).

Unit III   (15 Hrs)

Knowledge discovery process – Data selection – Cleaning – Enrichment – Coding – Data mining – *preliminary analysis of the data set using traditional query tools* – Visualization techniques – Likelihood and distance – OLAP tools – K-nearest neighbor – Decision trees – Association rules – Neural networks – Genetic algorithms – Reporting. (Chapter:4, Page No.:37-78).

Unit IV   (15 Hrs)

Different forms of knowledge – Getting started – Data Selection – *Cleaning* – Enrichment – Coding – Data mining - *Reporting* – KDD environment – Ten golden rules. (Chapter:5, Page No.:79-93).

Unit V   (15 Hrs)

Customer Profiling – *Predicting bid behavior of pilots* – Discovering foreign key relationships-Results. (Chapter:6, Page No.:95-110) Learning as compression of data sets – The information content of message – Noise and redundancy – significance of noise – Fuzzy databases – The traditional theory of the relational database – from relations to tables – from keys to statistical development Dependencies – Denormalization – *Data Mining Primitives*. (Chapter:7, Page No.:111-126).

Text Book

1. Peter Adrians and DOLF Zantinge, Data Mining, Addition Wesley, 2002, Fourth Edition (All Units).

Reference Book
1. K.P.Soman, Shyam Divakar, V.Ajay, Insight into Data Mining (Theory and Practice), Prentice Hall of India, 2006, Second Edition.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA6CPR**

Course Title: Core: Project Work   **5 Hours / week**

Credits: 5   **Year: III**   **Semester: VI**

COURSE OBJECTIVES

Enable the Students to

1. Understand the importance of experimental analysis, scientific approach in solving problems of information Technology.

2. Educate and train the students on how to design the system and develop the system and prepare the reports.

COURSE OUTCOMES

After learning the course, the students will be able to

CO1	Identify a problem and select suitable software for implementation	K3 & K 4
CO2	Apply the problem-solving skill to solve the problem	K3 & K 4
CO3	Able to analyze and interpret the data to arrive at the expected results	K3 & K 4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	S	S	S	S
CO2	S	S	M	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S

S-Strong; M-Medium; L-Low

The Final Year Students are assigned to the project Supervisor and they are asked to submit an individual project report at the end semester.

The Broader areas of the project are website creation, order processing, Billing Software, Multimedia, Artificial Intelligence, and Machine Learning based projects.

The student has to approach the nearby companies to get approval from the company to undergo his project work for the period of 8 to 9 months.

The students have to submit the project Completion Letter from the organization.

The project work done by the student is periodically reviewed.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.
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Programme: BCA   **Course Code: 20UCA5EB1**

Course Title :Elective :Embedded Systems   5 **Hours / week**

Year: III   **Semester: V**   **Credits: 4**

COURSE OBJECTIVES
1. To introduce the modern embedded system and to show how to understand and program such systems.
2. To understand hardware fundamentals, microprocessor and its architecture.
3. To understand the interrupt, architecture.
4. To understand inter-process communication, memory management.
5. To understand embedded system tools and linker locators.
    Describing the debugging techniques.

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Ability to describe the differences between the general computing system and embedded system.	K2
CO2	Become aware of the architecture of processor and its programming aspects.	K2
CO3	Become aware of interrupts.	K1&K2
CO4	Design real time embedded system using the concepts of RTOS.	K3
CO5	Analyze various examples of embedded system based on processor.	K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	S	M	L	L	L	L	L	L
CO2	S	M	M	L	L	M	M	L	L	L
CO3	S	M	L	M	L	L	L	L	L	L
CO4	S	M	M	L	L	L	M	M	M	L
CO5	S	M	M	M	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**

Hardware Fundamentals: Terminology - Gates - Timing Diagrams - *Memory Advance Hardware*

Fundamentals: Microprocessors- Microprocessor architecture - Direct Memory Access - Conventions used on Schematics.

Unit II   **(15 Hrs)**

Interrupts: Interrupt Basics - *Interrupt Service Routines*. Survey of Software: Architectures: Round Robin with Interrupts- Function- Queue-Scheduling Architecture-Real Time Operating System Architecture.

Introduction to Real Time Operating Systems - Selecting an RTOS - Tasks and Task States - Tasks and Data - Semaphores and Shared Data

Unit III   **(15 Hrs)**

More Operating System Services: Interrupt PROCESS Communication – *Message Queues, Mailboxes and Pipes* - Timer Functions - Events - Memory Management -Interrupt Routines in an RTOS Environment. Basic Design Using a Real Time Operating Systems: Principles - Encapsulating Semaphores and Queues-Hard Real Time Scheduling Considerations - Saving Memory Space and Power - Introduction to RTL & QNX

Unit IV   **(15 Hrs)**

Embedded Software Development Tools: Hosts and Target Machines - *Linker/Locators for Embedded Software* - Getting Embedded Software into Target Systems.

Unit V   **(15 Hrs)**

Debugging Techniques: Testing on your Host Machines - *Instruction Set Simulators* - The Asset Macro - Using Laboratory Tools - Case Studies

Text Book
1. David.E.Simson, An Embedded Software Primer, Addision Wesley, 2001.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA5EC1**

Course Title: Elective : Compiler Design   **5 Hours / week**
Year: III   **Semester: V**   **Credits: 4**

COURSE OBJECTIVES
1. To understand the basic concepts of compilers and Lexical Analysis.
2. To identify the benefits of Symbol tables and parsing.
3. To analyse the concepts of S&L attributes and type checking.
4. To understand about run generation and code generation
5. To understand basic blocks and code optimization

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	understanding the concepts of Compilers and lexical analysis.	K2
CO2	identifying the logics of symbol tables and parsing, top down translation.	K1
CO3	analyzing the concepts of S&L attribute and type checking	K4
CO4	analyzing the run generation and code generation.	K4
CO5	applying the concepts to solve the problem for Code optimization.	K2 & K3

K1 – Recall, remember;   **K2 – Understand;**   **K3 – Apply;**   **K4 – Analyze**

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	L	M	S	M	L	L	M
CO2	M	M	L	M	L	M	L	M	L	L
CO3	S	M	S	L	M	S	L	L	L	M
CO4	M	M	M	L	M	S	M	L	M	L
CO5	S	S	L	M	L	M	L	S	M	M

S- Strong; M-Medium; L-Low
Unit I   **(15 Hrs)**
Introduction: Compliers: Analysis of source program – Phases of compiler- cousins of compiler – grouping of phases. Simple one – pass compiler: Overview – Syntax definition – syntax – directed translation – parsing – *translator for simple expressions*.

Lexical Analysis: removal of white space and comments – constant – recognizing identifiers and keyboards – a lexical analyzer – role of lexical analyzer – input buffering – specification of tokens – recognition of tokens (section 1.1 to 1.5, 2.5, 2.6, 3.1 to 3.4)

Unit II   **(15 Hrs)**
Symbol tables – incorporating a symbol table – symbol tables – entries – list data structures for

symbol table – hash tables – scope information – ***Parsing*** – Principles topdown parsing – predictive parsing, left recursion – role of parser – context-free grammars – writing a grammar – top down parsing – simple bottom up parsing – shift reduce parsing. (section 2.7 to 7.6, 2.4 and 4.1 to 4.5)

Unit III **(15 Hrs)**

Syntax – directed translation – A translator for simple expressions – abstract and concrete syntax, adapting translations scheme, optimizing translator – syntax – ***directed definitions*** – construction of syntax trees – bottom up evaluation of S- attributed definitions – L-attributed definitions – top-down translation. Type checking: type system, ***specifications of simple type checker***.(section 2.5, 5.1 to 5.5 & 6.1)

Unit IV **(15 Hrs)**

Runtime Organization: Source language issues – storage organization – storage allocation strategies. Intermediate code generation: ***Intermediate languages*** – declarations – ***assignment statements***. (section 7.1 to 7.3, 8.1 to 8.3)

Unit V **(15 Hrs)**

Code generation – issues in design of code generator – target machine – run-time storage management – basic blocks and flow graphs. Code optimization introduction – ***Principle sources of optimization.*** (section 9.1 to 9.4, 10.1,10.2)

Text Book

A.V. Aho, R. Sethi, and J. D. Uliman, Compilers, Principles, Techniques and Tools, Addison Wesley Publishing Company

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020
For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA5ED1**

Course Title: Elective : Graphics and Multimedia   **5 Hours / week**

Year: III   **Semester: V**   **Credits: 4**

COURSE OBJECTIVES
1. To understand the basic concepts of Multimedia.
2. To identify the benefits of Graphical Techniques.
3. To analyse the concepts of Multimedia Techniques.
4. To understand the concepts of audio and video file techniques.
5. To understand basic photoshop Tool Techniques

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	
CO1	understanding the concepts of concepts of Multimedia.	K1
CO2	identifying the logics of Graphical Techniques.	K2
CO3	aAnalysing the concepts of audio and video file usage Techniques	K3
CO4	understanding the concepts of Multimedia Techniques	K4
CO5	applying the concepts to understand basic photoshop tool techniques.	K3& K2

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	L	S	L	M	M	L
CO2	S	S	S	M	L	S	M	L	S	L
CO3	S	S	M	M	L	S	M	L	M	L
CO4	S	M	S	M	L	M	S	L	M	L
CO5	S	M	S	M	L	M	M	S	M	L

S- Strong; M-Medium; L-Low
Unit I   **(15 Hrs)**

 Point-Plotting techniques - r Line   drawing   displays – Two dimensional Transformations: Transformation principles – Concatenation – Matrix representation – *Clipping and Windowing*: A Line clipping algorithm – Midpoint subdivision – Polygon clipping – Viewing transformation – Windowing transformations.

Unit II   **(15 Hrs)**

Graphical Input Devices – Graphical Input Techniques Positioning techniques – Pointing and selection – Inking and painting – *On Line character recognition* – Raster graphics fundamentals : Representing a Raster Image – Scan converting line drawings – Displaying characters

Three dimensional transformations and Perspective: Transformations – Three dimensional clipping – *Homogeneous coordinate representations projective transformations.*

Unit III   (15 Hrs)

Definition – Multimedia Hardware – Multimedia Software – Multimedia Networking - Multimedia Applications – Multimedia Standards – *Text Elements of text* –technology Fonts – Graphics Elements of graphics – Pictures and images – Raster images – Vector images – Images and Color – Bitmap, Vector, Compressed Formats – hypertext – Hyper picture – *Various CD Formats.*

Unit IV   (15 Hrs)

Audio: Natural sound – Digital audio – Calculating the digital audio data size – Digital audio systems – Digital Representation of Sound – *Time domain representation of sound* – Transformation of digital sound – Video : Analog video – Digital video – *Calculating the digital video data size* – video file formats.

Unit V   (15 Hrs)

Digital video and Image Compression: Video compression techniques –JPEG image compression standard – *MPEG video compression standard*. Photoshop: File types – Tool box – Importing and Exporting images – Image mode Rotate canvas – Extract – Layers – Feather – Extract –Layers – Feather – Filters – *Zooming images* – Navigator – Color – Styles - *Channels*.

Text Books
1. William M. Newman and Robert F Sproull, Principles of Computer Graphics, Tata McGraw Hill Company Ltd.
2. Multimedia Making it work, Toy Vaughon. 2002.
3. John F Koegel Buford, Multimedia Systems, Addison Wesley, 2002.
4. Mastering in Photoshop, 2002.

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For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA5EE1**

Course Title: Elective : Client / Server Computing   **5 Hours / week**

Year: III   **Semester: V**   **Credits: 4**

COURSE OBJECTIVES
1. To learn about concepts related to client server network
2. To understand about anatomy of a client and server program
3. To understand the concept of Middleware and Distributed security
4. To learn the concept of SQL databases servers
5. To learn the concepts of Group Ware component, distributed objects and CORBA

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1	Ability to understand the concepts of client server network	K1 & K2
CO2	Ability to understand the anatomy of a client and server program	K1 & K2
CO3	Understanding the concept of Middleware and Distributed security	K2 & K3
CO4	Ability to understand SQL databases servers	K2 & K3
CO5	Understand the concept of Group Ware component, distributed objects and CORBA	K2

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze
MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	L	M	L	S	S	S	L	L
CO2	M	S	L	S	L	S	S	S	M	L
CO3	L	M	L	M	L	S	S	M	L	L
CO4	S	L	L	M	L	M	S	L	L	L
CO5	S	S	M	M	L	S	S	S	M	L

S- Strong; M-Medium; L-Low

UNIT I   **(15 Hrs)**

    Introduction: - Client/Server computing era – File server – database server – transaction sever – GroupWare server – *object server – web server*. (Page no. 7 – 15). Client/Server Building blocks: - Intergalactic client/server – 2-tier-Client/server building blocks. (Page no. 20 – 32)

UNIT II   **(15 Hrs)**

    Operating Systems: - Anatomy of a sever program – base service – *extended service* – scalability. (Page no.57 – 65). Clients: - Clients anatomy – non-GUI clients – *GUI clients - 00121*

Clients – GUI versus OOUI – OOUI's on steroids.(Page no. 66 – 74)

UNIT III   **(15 Hrs)**

NOS: - NOS Middleware – extending the local OS's reach – Global directory services, distributed time services – *Distributed security* (page no. 99 – 112). RPC: peer-to-peer communications – sockets – Names – pipes-RPC-MOM middleware –*MOM versus RPC* (Page no. 115 – 130)

UNIT IV   **(15 Hrs)**

SQL databases servers: - *Fundamentals of SQL & relational databases* – ISO standards – stored procedure triggers and rules. (Page no. 150 – 170). Data Warehousing: - *OLTP data warehouse* – data mining – *TP monitors* (Page no. 200 – 234, 276 – 282)

UNIT V   **(15 Hrs)**

Client/Server Group Ware: - Group Ware – components of Group Ware (Page no. 319 - 352). Client server with distributed objects: - *Distributed objects to components* – CORBA OMG's object management architecture client/server and the Internet (Page no. 376 – 426)

Text Book

1. Robert Orali Dan Harkey and Jeri Edwards, The Essential Client/Server Survival Guide, 2nd Edition, Galgotia Publications Pvt. Ltd.,

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For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA6EB2**

Course Title: Elective : Advanced Networks   **5 Hours / week**

Credits:4   **Year: III**   **Semester: VI**

COURSE OBJECTIVES
1. To Acquire knowledge of various protocol DNS, HTTP,SMTP/PO, FTP and DHCP.
2. Describe the importance of MAC,IP address and port address, to design, calculate, and given requirements in networks.
3. Compare the different types of routing protocols configuration for IPv4 and IPv6 network.
4. To make aware about configure and troubleshoot wireless communication and VPN.
5. To understand the functions of QoS and network security

COURSE OUTCOMES
On the successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1.	understand configuration of application and transport layer protocol	K1 & K2
CO2.	understanding the concepts of MAC, Port address and IP addressing, calculation of subnetting.	K2 & K1
CO3.	understand the concepts and configuration of static, dynamic routing	K2 & K3
CO4.	understand the working principles of VPN and wireless communication	K2 & K3
CO5.	understand the concepts of QoS and network security	K3 & K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	L	L	M	S	M	M	L
CO2	S	S	M	L	L	S	S	S	M	L
CO3	S	S	M	L	L	S	S	S	M	L
CO4	S	S	M	L	L	S	S	S	M	L
CO5	S	M	M	L	L	S	S	M	M	L

S- Strong; M-Medium; L-Low

Unit – I   **(15 Hrs)**

Introduction: computer networks - Classification of transmission media - benefits of a Layered Model – TCP/IP Model – *OSI Model* –Application layer Protocols configuration : DNS - HTTP –SMTP/POP – FTP – DHCP.

Unit – II   **(15 Hrs)**

Addressing the Network- Types of IP Address – IPv4 address structure- NAT - Public and Private Address –Subnetting – Ipv6 address structure – *MAC Address structure* –Port Address.

Unit – III   (15 Hrs)

Routing fundamentals : Basic Router Configuration - Static Routing: Configuring Static routes - Modifying Static Routes - Summarizing Routes - Configuring a Summary Route and Troubleshooting. Dynamic Routing Protocols: *RIP configuration for IPv4 network and IPv6 network* – EIGRP configuration for IPv4 network and IPv6 network – OSPF configuration for IPv4 network and IPv6 network.

Unit – IV   (15 Hrs)

Wireless Concepts and Configuration: Wireless LANs - Comparing a WLAN to a LAN - Wireless LAN Standards -Wireless NICs - Wireless AP - Wireless Routers - *Client and Access Point Association* - Configuring Basic Wireless Settings - Configuring Security - WLAN Troubleshooting- VPN technology: Purpose -Types-GRE tunnels Configuration

Unit V   (15 Hrs)
Network Security and Monitoring: LAN security attacks-SNMP operates- *Quality of Service-purpose* - characteristics of QoS-different QoS models- Cisco IoT System -Network Troubleshooting - *Case Study: Network Programming*

Text Book
1. Cisco Networking Academy, CCNA 1 and 2 Companion Guide, Pearson Education, Third Edition, 2003.
2. Cisco Networking Academy, CCNA 3 and 4 Companion Guide, Pearson Education, Third Edition, 2003. (Unit-5)
3. Todd Lammle -CCNA Routing and Switching Complete Study Guide 2nd Edition - John Wiley & Sons, 2016

Reference Book
1. https://www.netacad.com/group/resources/ccna-rs-scaling/6.0
2. https://www.netacad.com/group/resources/ccna-rs-connect/6.0
3. Andrew S Tanenbaum - Computer Networks 3rd Edition - Prentice Hall of India, 2003

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For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA6EC2**

Course Title: Elective: Distributed Computing Systems   **5 Hours / week**

Credits: 4   **Year: III**   **Semester: VI**

COURSE OBJECTIVES
1. To expose the students to understand about the concepts of Distributed Computing Systems.
2. To learn about uses of Distributed Computing Systems.
3. To understand the implementation of Distributed Computing Systems.
4. To know about Programming language design and algorithm for distributed computing
5. To know about algorithm and distribute process.

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1.	Understanding the concepts of Distributed Computing Systems	K1 & K2
CO2.	Implementation of Distributed Systems	K2 & K1
CO3.	Distributed system modeling	K2 & K3
CO4.	Applications of Distributed Computing in Databases	K2 & K3
CO5.	Programming language design and algorithm for distributed computing	K3 & K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	M	M	M	M	L	L
CO2	S	S	M	M	M	S	M	S	M	L
CO3	M	M	M	M	L	M	M	M	M	L
CO4	M	M	M	M	L	M	M	M	M	L
CO5	M	L	M	M	L	M	M	M	L	L

S- Strong; M-Medium; L-LowUnit I
(15 Hrs)

Introduction: Introduction to distributed computing system – Ensley's models of distributed system. *Computer networks and operating system requirements for distributed computing systems*. – Computing organization for distributed computing:

Pipeline and vector processors – multiprocessors and multicomputer – massively parallel processor.

Unit II   **(15 Hrs)**

Computer networks and communications for distributed system – computer network architecture-network topology. OS for distributed computing: *Network operating system* – distributed operating

systems – inter-process communications resource sharing.

Unit III **(15 Hrs)**

Distributed System Modeling: Graphs – *finite state automata* – pettiness – formal methods – examples – system- Distributed database systems. Basic concepts, the client server model, the case for distribution, the distribution – problem and pattern.

Unit IV **(15 Hrs)**

Queries and Updates in DDBS: Queries, update and integrity issue – updates with replication and without replication – example systems. Distributed and Multidatabase design: *The general data allocation problem* – fragmentation – *data allocation strategies practical allocation.*

Unit V **(15 Hrs)**

Programming language design and algorithm for distributed computing – distributed processes – examples. *Software and Hardware Environment for MPP's: EXPESS* – PVM-LINDA – OCCAM – Case studies.

Text Book

1. Joel M.Chichiow, An Introduction to Distributed and Parallel Computing, Prentice Hall of India, 2000.

Programme: BCA   **Course Code: 20UCA6ED2**

Course Title: Elective: Geographical Information System   **5 Hours / week**

Credits: 4   **Year: III**   **Semester: VI**

COURSE OBJECTIVES
1. To learn the concepts of GIS and its spatial data.
2. To learn and how to use GIS in this modern world.
3. To understand the concept of handling GIS database or datasets.
4. To know the usage of GIS analytics, classification and modelling.
5. To Understand the spatial processed output .

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1	Apply the concept of GIS and spatial data.	K1 & K2
CO2	Apply the usage of GIS in this current world.	K2 & K1
CO3	Handling GIS spatial data, database and datasets.	K2 & K3
CO4	Understanding the measurement in GIS, Queries, Reclassification, analysis ..etc.	K2 & K3
CO5	Understanding physical and environmental, spatial, cartographic processed output.	K3 & K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L	L	L	L	L	L
CO2	M	M	M	L	L	M	M	L	L	L
CO3	M	M	M	M	L	L	L	L	L	L
CO4	M	M	M	M	L	L	L	L	L	L
CO5	M	M	M	M	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**
        Introduction – Defining GIS – Component of GIS – Spatial Data – Maps and their influence on the characteristic of spatial data – *Thematic characteristic of spatial data* – Other sources of spatial data.

Unit II   **(15 Hrs)**
        Spatial data Modeling – Entity definition – Spatial data model – Spatial data structures – Modeling surfaces – Modeling networks – *Building computer worlds* – Modeling the third dimension – *Modeling the fourth dimension.*

Unit III   **(15 Hrs)**
        Introduction – Database data models – Creating a database – GIS database applications – developments in databases – *Methods of data input* – Data editing – Towards an integrated database.

Unit IV (15 Hrs)

Measurements in GIS – lengths perimeters and areas – Queries – Reclassification – Buffering and neighborhood functions – ***Integrating data map overlay*** – spatial interpolation – Analysis of surfaces – ***Network analysis.***

Unit V (15 Hrs)

Analytical modeling in GIS – Process Models – Modeling physical and environmental process – Modeling human process – ***modeling the decision making process*** – Problems with using GIS to model spatial process – Maps as output – Non-cartographic output **– *GIS and spatial decision support.***

Text Book

1. Ian Heywood, Sarah Cornelius, An introduction to GIS, 2nd Edition, Pearson Education, 2003.

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For candidates admitted from academic year 2020 - 2021 onwards under New CBCS.

Programme: BCA   **Course Code: 20UCA6EE2**

Course Title: Elective : Design and Analysis of Algorithm   **5 Hours / week**

Credits: 4   **Year: III**   **Semester: VI**

COURSE OBJECTIVES
1. To learn the concepts of Divide and Conquer, Finding Maximum and minimum.
2. To learn and how to use Greedy method, Knapsack problem.
3. To understand the concept of Back tracking methods.
4. To know the usage of Branch and bound methods.
5. To make aware of Lower bound Theory

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO1	Apply the concept of Divide and Conquer, Finding Maximum and minimum.	K1 & K2
CO2	Apply the usage of Greedy method, Knapsack problem.	K2 & K1
CO3	Handling concept of Back tracking methods.	K2 & K3
CO4	Understanding the usage of Branch and bound methods.	K2 & K3
CO5	Understanding physical Lower bound Theory	K3 & K4

K1 – Recall, remember;   K2 – Understand;   K3 – Apply;   K4 – Analyze

MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L	L	L	L	L	L
CO2	M	M	M	L	L	M	M	L	L	L
CO3	M	M	M	M	L	L	L	L	L	L
CO4	M	M	M	M	L	L	L	L	L	L
CO5	M	M	M	M	L	L	L	L	L	L

S- Strong; M-Medium; L-Low

Unit I   **(15 Hrs)**

Introduction – overview – how to create programs and analyze them. Divide and Conquer: Algorithm - Complexity analysis - introduction to random algorithms - General Method - Finding maximum and minimum - *Strassen's matrix multiplication* - Quick sort - Selection sort.

Unit II   **(15 Hrs)**

Greedy Method: General Method - Tree vertex splitting - job sequencing with dead lines - shortest

Path - Knapsack01. Dynamic Programming: General Method - multistage graphs - string Editing - *Travelling Salesman Problem*.

Unit III   **(15 Hrs)**

Back Tracking: *General Method* - sum of subsets - Graph Coloring - Depth First Search - Breadth First Search.

Unit IV   **(15 Hrs)**

Branch and Bound: General Method - I/O knapsack Problem - Travelling Salesperson - Algebraic manipulation - *Fourier Transformation*

Unit V   **(15 Hrs)**

Lower Bound Theory: Comparison trees - *Oracles and advisory arguments* - Lower bounds through reduction - *Basic Concepts of Np-Hard and Np-Complete.*

Text Book

1. E.Horowitz, S,Sahni and S.Rajasekaran, Computer Algorithms , Galgotia Publications, 2003

Reference Books

1.   G.Brassard and P.Bratley, Fundamentals of Algorithmic, PHI, 2003.

2.   Kunth, Fundamentals of Algorithms.

3.   http://spoken-tutorial.org/