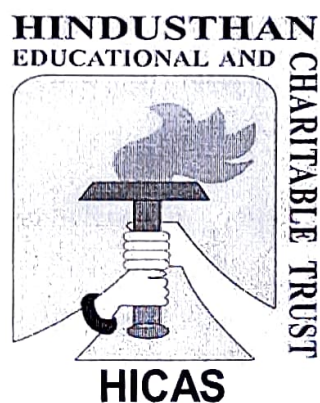


**CURRICULUM FRAMEWORK AND SYLLABUS FOR
OUTCOME BASED EDUCATION IN**

Bachelor of Science in Computer Science

**FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2019 - 2020**



HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

(Affiliated to Bharathiar University and Accredited by NAAC)

COIMBATORE-641028

TAMILNADU, INDIA.

Phone: 0422-4440555

Website: www.hindusthan.net/hicas/

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

VISION

- To provide quality education to meet the need of profession and society. Provide a learning ambience to enhance innovations, problem solving skills, leadership qualities, team spirit and ethical responsibilities. To provide value based insights towards moulding technocrats with social commitment and leadership.

MISSION

- To prepare students to be the leaders of research and development in computer science.
 - To provide leadership in high technology application to improve the educational experience.
 - To make students embark on a journey of intellectual transformation.
 - To discover, preserve and disseminate knowledge and promote a culture of broad inquiry throughout and beyond the Computer science Community.
-

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Under Graduates of Computer Science program will,

PEO1: Provide solutions to challenging problems in their profession by applying Computer Science Theory and Principles

PEO2: Engage in life-long learning and professional development to adapt to rapidly changing work environment

PROGRAM OUTCOME (PO):

PO1: Having ability to apply knowledge of computing and mathematics appropriate to the discipline.

PO2 : Recognition of the need for and ability to engage in continuing professional development.

PO3: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

PO4: Function effectively as a member or leader of a team engaged in activities appropriate to the Computer Science discipline

PROGRAM SPECIFIC OUTCOME (PSO):

PSO1: Ability to use current technologies, skills, and models for computing practices

PSO2: Recognize social and ethical responsibilities of a profession working in the discipline

PSO3: Develop ability to use Research and experiment contemporary issues to solve industrial experiences

HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

COIMBATORE-641028

B.Sc. COMPUTER SCIENCE

SCHEME OF EXAMINATIONS-CBCS PATTERN

(For the students admitted from the Academic year 2019-2020)

Course Code	Course Type	Course Title	Lecture Hours/Week	Exam Duration (Hrs.)	IE	EE	Total	Credit Point
Semester – I								
Part – I								
19LAT01/ 19LAH01/ 19LAM01/ 19LAF01	MIL	Tamil – I/ Hindi – I/ Malayalam - I/ French – I	6	3	30	70	100	3
Part – II								
19ENG01	AECC	English – I.	6	3	30	70	100	3
Part – III								
19CEU01	DSC	Fundamentals of Computing and C Programming	5	3	30	70	100	5
19CEU02	DSC	Computer System Architecture	4	3	30	70	100	4
19CEU03	GE	Allied: Mathematical Structures	5	3	30	70	100	4
19CEU04	DSC	Practical - I: Programming using C	4	3	40	60	100	2
Semester – II								
Part – I								
19LAT02/ 19LAH02/ 19LAM02/ 19LAF02	MIL	Tamil – II/ Hindi – II/ Malayalam – II/ French – II	6	3	30	70	100	3
Part – II								
19ENG02	AECC	English – II	6	3	30	70	100	3
Part – III								
19CEU05	DSC	Data Structures	4	3	30	70	100	3
19CEU06	DSC	Python Programming	3	3	30	70	100	3
19CEU07	GE	Allied: Discrete Mathematics	5	3	30	70	100	4
19CEU08	DSC	Practical - II: Programming using Python	4	3	40	60	100	2

Part – IV

19GSU01	AEE	Value Education - Human Rights	2	-	100	-	100	2
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Students Should Complete Value Added Courses, Communicative English And Soft Skills at the End of the First Year

Semester– III**Part – III**

19CEU09	DSC	Programming with Java	5	3	30	70	100	5
19CEU10	DSC	Computer Networks	5	3	30	70	100	5
19CEU11	DSC	Software Engineering	4	3	30	70	100	4
19CEU12	GE	Allied: Operations Research	5	3	30	70	100	4
19CEU13	DSC	Practical - III: Programming using JAVA	6	3	40	60	100	3
19CEU14	SEC	Practical – IV: Web Design	3	3	40	60	100	2

Part – IV

19GSU02	AEE	Environmental Studies	2	-	100	-	100	2
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Semester – IV**Part – III**

19CEU15	DSC	Relational Database Management System	6	3	30	70	100	5
19CEU16	DSC	Operating System	6	3	30	70	100	5
19CEU17	DSC	Practical -V: RDBMS Applications	6	3	40	60	100	3
19CEU18	GE	Allied: Business Accounting	5	3	30	70	100	4
19CEU19	SEC	Practical -VI: Software Testing	5	3	40	60	100	3

Part – IV

19GSU03	AEE	Skill Based: Internet Security	2	-	100	-	100	2
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Part – V

19GSU04	AECC	Extension Activity	-	-	100	-	100	2
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Students Should Complete Value Added courses, Online Courses (Or) Participation Certificates For Seminars, Workshops From Other Institutions For Each Semester And Women's Studies / Interdisciplinary at the end of Second Year

Extension Activity – means all those activities under NSS/NCC/sports/YRC Programme and other Co and extracurricular activities offered under part V of the programme. Every student shall participate compulsorily for a period of not less than two years (4 semesters) in any one of these programmes.

Semester– V**Part – III**

19CEU20	DSC	.NET Programming	6	3	30	70	100	5
19CEU21	DSC	Data Mining	6	3	30	70	100	5
19CEU22	DSC	Practical VII: Programming using .Net	6	3	40	60	100	3
19CEU23A	DSE.	Elective I:Internet of Things (OR)	6	3	30	70	100	5
19CEU23B		Elective I:Cloud Computing (OR)						
19CEU23C		Elective I:Big Data Analytics						

19CEU24	SEC	Practical VIII: PHP and R Programming	6	3	40	60	100	3
Part – IV								
19GSU05	AEE	Non Major Elective: General Awareness	-	-	100	-	100	2
Part – V								
19GSU06	AECC	Law of Ethics	-	-	100	-	100	2

Semester– VI

Part – III

19CEU25	DSC	Open Source Tools	6	3	30	70	100	5
19CEU26A	DSE	Elective II: Software Testing (OR)	6	3	30	70	100	5
19CEU26B		Elective II: Network Security and Cryptography (OR)						
19CEU26C		Elective II: Artificial Intelligence and Expert Systems						
19CEU27	DSC	Practical IX: Open Source Tools	6	3	40	60	100	3
19CEU28A	DSE	Elective III: Animation Techniques (OR)	6	3	30	70	100	5
19CEU28B		Elective III: Multimedia and its Applications (OR)						
19CEU28C		Elective III: E-Commerce						
19CEU29	SEC	Practical X: Animation Techniques in Multimedia	6	3	40	60	100	3
19CEU30	DSC	Project Work	-	-	40	60	100	4
TOTAL CREDIT POINTS								140

Students Should Complete Value Added Courses, Online Courses / Entrepreneurship/Startups/ Job Oriented Courses and Placement Training at the end of the Third Year

No of papers	Course Type	Total Credit Points
2	Modern Indian Language (MIL)	6
4	Ability Enhancement Compulsory course(AECC)	10
4	Ability Enhancement Elective (AEE)	8
19	Discipline Specific course (DSC)	74
3	Discipline Specific Elective (DSE)	15
4	Skill Enhancement Course (SEC)	11
4	Generic Elective (GE)	16
40	TOTAL	140

UG- REGULATION (2019-2020)

I. Internal Marks for all UG

Components	Marks
Test I	5
Test II	5
Model Exam	10
Assignment	5
Attendance*	5
TOTAL	30

*Split-up of Attendance Marks for UG

- ❖ 75-79 - 1 marks
- ❖ 80-84 - 2 marks
- ❖ 85-89 - 3 marks
- ❖ 90-94 - 4 marks
- ❖ 95-100 - 5 marks

QUESTION PAPER PATTERN FOR IE TEST I and II

Duration: Two Hours

Maximum: 50 Marks

SECTION - A (6 x 1 = 6 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

Multiple choice/Fill up the blanks /True or False questions

SECTION - B (4x 5 = 20 marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks Either or Type

SECTION - C (3x 8 = 24 marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks Either or Type

QUESTION PAPER PATTERN FOR IE Model Examination

Duration: Three Hours

Maximum: 70 Marks

SECTION - A (10x1=10 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

Q.No 1 to 10: (Multiple choice/Fill up the blanks /True or False questions).
(Two questions from each unit)

SECTION - B (5x4=20 Marks)

Answer ALL Question

ALL Questions Carry EQUAL Marks

Q.No 11 to 15: Either or type questions
(One question from each Unit)

SECTION- C (5x8=40 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

Q.No 16 to 20: Either or type questions (One question from each Unit)

2 a) Components for Practical I.E.

Components	Marks
Test -I	20
Test - II	20
Total	----- 40 =====

2 b) Components for Practical E.E.

Components	Marks
Completion of Experiments	50
Record	5
Viva	5
Total	----- 60 =====

3. Institutional/ Industrial Training, Mini Project and Major Project Work

<u>Institutional/Industrial Training</u>		<u>Mini Project</u>	<u>Major Project Work</u>	
Components	Marks	Marks	Components	Marks
I.E Work Diary Report Viva –voce Examination	25 50 25	- 50 50	I. E a) Attendance 10 Marks b) Review / Work Diary*1 30 Marks	40
Total	----- 100 =====	----- 100 =====	E.E*2 a) Final Report 40 Marks b)Viva-voce 20 Marks	60
			Total	----- 100 =====

*1 Review is for Individual Project and Work Diary is for Group Projects (group consisting of minimum 3 and maximum 5 members)

*2 Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

4. Components for Value Education (Part IV):

S.No.	Components	Marks
a)	Attendance 96% and above - 30 marks 91% to 95% - 25 marks 86% to 90% - 20 marks 76% to 85% - 10 marks	30 marks
b)	Participation in group activity	30 marks
c)	Assignment (2 x 10)	20 marks
d)	Test (1 hr for 20 marks) 2 out of three questions, 10 marks each	20 marks
	Total	100 marks

On completion of the above components students will be remarked as follows:

Range of marks	Equivalent remarks
80 and above	Exemplary
70 – 79	Very good
60 – 69	Good
50-59	Fair
40-49	Satisfactory
Below 39	Not Satisfactory = Not Completed

The passing minimum for this paper is 40%

In case, the candidate fails to secure 40% passing minimum, he / she may have to reappear for the same in the subsequent semesters.

5. Guidelines for Environmental Studies (Part IV)

The paper Environmental Studies is to be treated as 100% IE course which is offered in III Semester for II year students. The classes will be handled for two hours per week till the end of the Semester. At least one field trip should be arranged.

Total Marks for the subject = 100

Components	Marks
Two Tests (2 x 30)	60
Field visit and report (10 + 10)	20
Two assignments (2 x 10)	20
Total	<u><u>100</u></u>

The question paper pattern is as follows:

Test I – 2 hours [3 out of 5 essay type questions]

3 x 10 = 30 Marks

Test II – 2 hours [3 out of 5 essay type questions]

3 x 10 = 30 Marks

Total 60 Marks

The passing minimum for this paper is 40%

In case, the candidate fails to secure 40% passing minimum, he / she may have to reappear for the same in the subsequent semesters.

6. Guidelines for Skill based subject - Internet Security (Part IV)

Components	Marks
Two Tests (2 x 40)	80
Two assignments (2 x 10)	20
Total	----- 100 =====

The question paper pattern is as follows:

Test I – 2 hours [4 out of 7 essay type questions]

4 x 10 = 40 Marks

Test II – 2 hours [4 out of 7 essay type questions]

4 x 10 = 40 Marks

Total 80 Marks

The passing minimum for this paper is 40%

In case, the candidate fails to secure 40% passing minimum, he / she may have to reappear for the same in the subsequent semesters

7. Guidelines for General Awareness (Part IV)

Components	Marks
Two Tests (2 x 50)	100

The question paper pattern is as follows:

Test I – 2 hours [50 multiple choice questions]

50 x 1 = 50 Marks

Test II – 2 hours [50 multiple choice questions]

50 x 1 = 50 Marks

Total 100 Marks

The passing minimum for this paper is 40%

In case, the candidate fails to secure 40% passing minimum, he / she may have to reappear for the same in the subsequent semesters

8. Guidelines for Law of Ethics (Part V)

Components	Marks
Two Tests (2 x 50)	100

The question paper pattern is as follows:

Test I – 2 hours [5 out of 8 essay type questions]

5 x 10 = 50Marks

Test II – 2 hours [5 out of 8 essay type questions]

5 x 10 = 50 Marks

Total 100 Marks

The passing minimum for this paper is 40%

In case, the candidate fails to secure 40% passing minimum, he / she may have to reappear for the same in the subsequent semesters

9. Guidelines for Extension Activity (Part V)

At least two activities should be conducted within this semester (IV) consisting of two days each. The activities may be Educating Rural Children, Unemployed Graduates, Self Help Group etc.

The marks may be awarded as follows

No of Activities	Marks
2 x 50 (Each Activity for two days)	100

10. QUESTION PAPER PATTERN FOR EE (Part III Theory Papers)

Duration: Three Hours

Maximum: 70 Marks

SECTION - A (10x1=10 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

Q.No 1 to 10: (Multiple choice/Fill up the blanks /True or False questions).

(Two questions from each unit)

SECTION - B (5x4=20 Marks)

Answer **ALL** Question

ALL Questions Carry **EQUAL** Marks

Q.No 11 to 15: Either or type questions

(One question from each Unit)

SECTION- C (5x8=40 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

Q.No 16 to 20: Either or type questions

(One question from each Unit)

Programme Code:	BSC	Bachelor of Science (Computer Science)		
Course Code:	19CEU01	Course Title	Batch:	2019 and Onwards
		FUNDAMENTALS OF COMPUTING AND C PROGRAMMING	Semester:	I
Hrs/Week:	5		Credits:	5

Course Objective

- Learn the fundamentals of computing techniques.
- Develop the simple applications in 'C' language.

Course Outcomes (CO)

K1	CO1	To gain knowledge in programming languages.
K2	CO2	Understand fundamentals of C programming language.
K3	CO3	Analyze and experiment the concepts of pointers ,arrays, and structures and Files in C.
K4	CO4	Apply and develop application using C.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	L	-
CO2	S	S	M	L
CO3	S	S	S	S
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.




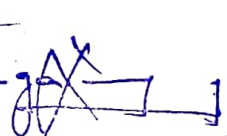
Unit No.	Topics	Hours
19CEU01	FUNDAMENTALS OF COMPUTING AND C PROGRAMMING	I
I	Introduction to computers: Characteristics and Limitations of computer-Block Diagram of Computer-Types of Computers-Uses of Computers-Computer Generations. Input and output devices: Keyboard and Mouse-Inputting Data in other ways- Types of Software: System Software-Application Software. Memories: Primary- Secondary and Cache memory. Programming Languages: Evolution of Programming Languages-Translator programs –Problem Solving Techniques.	9
II	Introduction to C: Introduction –Structure of C Program –Writing the first C Program –File used in C Program –Compiling and Executing C Programs –Using Comments –Keywords –Identifiers – Data Types –Variables –Constants –I/O operations –Operators and Expressions –Programming Examples –Type Conversion and Type Casting.	12
III	Decision Control and Looping Statements: Introduction to Decision Control Statements –Conditional Branching Statements –Looping Statements –Nested Loops –Jumps in loops – Goto Statement. Functions Introduction –using functions –Function declaration –Function definition –Function call –Return statement –Categories of Functions–Recursive function.	12
IV	Arrays: Introduction –One dimensional- Declaration of Arrays –Two dimensional –Multi dimensional –Dynamic arrays – Character arrays and Strings. Pointers: Understanding pointers–Declaring Pointer Variables – Initialization of pointer variables - Accessing a variable through its pointer - Pointer Expressions –Pointers and Arrays- Array of Pointers-Pointers to Functions.	13
V	Structure and Union: Introduction- Defining Structures- Declaring structure variables-Accessing Structure members-Initialization-Array of structures- Arrays within structures-Structure within structures-Unions. Files: Introduction to Files – Defining and opening a file- Closing a file-I/O operations on files- Random access to files-Command line arguments.	14

Text Book:

1. E.Balagurusamy, " Computing Fundamentals and C Programming", TMH 7th reprint 2011.

Reference Books:

1. Balaguruswami, " Programming in ANSI C", - TMH
2. Y.Kanetkar, " Let us C", BPB Publications.
3. Brain W Kwenighan, Dennis M.Ritchie . "The C Programming Language" ,,Prentice Hall Software Series 2nd Edition.

Course Designed by	Verified by HOD	Checked by	Approved by
Mr.M.Karthi 	Dr.Rangaraj.R 		

Dr.R.Rangaraj
M.Sc.(CS), M.Phil., Ph.D., M.Sc(Psy).
Professor & Head,
PG & Research Dept. of Computer Science,
Hindusthan College of Arts & Science,
Coimbatore - 641 022.

Co-ordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Programme Code:	BSC	Bachelor of Science (Computer Science)		
Course Code:	19CEU02	Course Title	Batch:	2019 and Onwards
		COMPUTER SYSTEM ARCHITECTURE	Semester:	I
Hrs/Week:	4		Credits:	4

Course Objectives

- To explore the concepts of the organization, architecture and designing concept of computer system
- To design the components of basic computer.

Course Outcomes (CO)

K1	CO1	Understand the data representation system.
K2	CO2	Comprehend the logic circuits and registers
K3	CO3	Analyze the concepts of the Computer Organization and Design.
K4	CO4	Apply the Computer Components such as CPU, Input/ Output and Memory organization.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	M	S	M	L
CO2	S	L	M	
CO3	S	M	S	L
CO4	M	L	M	

S - Strong; M-Medium; L-Low.


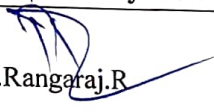


19CEU02	COMPUTER SYSTEM ARCHITECTURE	I
Unit No.	Topics	Hours
I	Data Representation: Number Systems-Binary-Octal-Hexadecimal number-Complements-Floating Point Representation-Other Binary codes – Error Detection Codes- Logic Circuits: Logic Gates-Combinational Circuits-Half- Adder-Full-Adder- Flip-Flops-SR - JK – D and T flip-flop.	9
II	Basic computer organization: Instruction codes - Computer registers - computer instructions - Timing and Control - Instruction cycle - Memory-Reference Instructions - Input-output and interrupt - Complete computer description.	9
III	Central processing unit: Introduction - General Register Organization - Stack Organization - Instruction format - Addressing Modes - Data transfer and Manipulation - Program Control - Reduced Instruction Set Computer (RISC) - Complex Instruction Set Computer (CISC) - comparison of RISC and CISC. Pipelining: Parallel processing – Pipelining - Arithmetic Pipeline - Instruction Pipeline - RISC Pipeline.	9
IV	Input – Output organization: Input-output interface : Asynchronous Data Transfer - Modes of Transfer - Priority Interrupt – DMA - Input-Output Processor (IOP) - CPU-IOP communication - Serial Communication.	9
V	Memory Organization: Memory Sub System - Memory hierarchy - Main memory - Auxiliary memory - Flash memory - Associative memory - Cache memory - Virtual memory. Self Study : Intel 8086 Microprocessor	9

Text Book:

I. M. Morris Mano, "Computer System and Architecture", Pearson Education; Third edition reprint 2017

Reference Books:

1. Badri Ram, "Advanced Microprocessors and Interfacing", TMH, 2012
2. W. Stallings, "Computer Organization & Architecture", Pearson Education 8th Edition, 2012.
3. M. Carter, "Computer Architecture", Schaum's outline series, TMH. Special Indian Edition.

Course Designed by	Verified by HOD	Checked by	Approved by
 Mrs.D.Mythili	 Dr.Rangaraj.R		

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M.Sc.(CS), M.Phil., Ph.D., M.Sc(Psy).
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Co-ordinator
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Coimbatore-641 028.

Programme Code:	BSC	Bachelor of Science (Computer Science)		
Course Code:	19CEU04	Course Title	Batch:	2019 and onwards
Hrs/Week:	4	PRACTICAL I: PROGRAMMING USING C	Semester:	I
			Credits:	2

Course Objective

- To learn the fundamentals of C Programming
- To gain knowledge about arrays, structures, pointers and functions
- To develop the ability to apply file I/O operations.

Course Outcomes (CO)

K1	CO1	Write C programs.
K2	CO2	Apply pointers for effective memory access.
K3	CO3	Employ structure and pointer.
K4	CO4	Illustrate file access.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	S	S	M
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.

19CEU04	PRACTICAL I : PROGRAMMING USING C	I
Ex. No.	Program List	
1	Develop a Simple Calculator using switch case.	
2	Find the Sum Of The Digits	
3	Sort numbers in Ascending and descending order using Arrays.	
4	Sort a set of names in Dictionary Order	
5	Find the Prime numbers between two integers using functions	
6	Implement Matrix operations Addition, Subtraction and Multiplication – using functions.	
7	Generate Fibonacci Numbers using recursive functions	
8	String manipulations without using string functions (string length, string comparison, string copy) (Using function pointers).	
9	Store information of Students using Structures	
10	Implement dynamic memory allocation.	
11	Demonstrate the I/O file Operations.	
12	Model a system to generate the Mark Statement of a Student	

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Programme Code:	BSC	Bachelor of Science (Computer Science)		
Course Code:	19CEU05	DATA STRUCTURES	Batch:	2019 and onwards
Hrs/Week:	4		Semester:	II
			Credits:	3

Course Objectives:

- To understand the concept of fundamental data structure and about writing algorithms to solve problems practically.
- To design and implement various data structure algorithms for developing applications.

Course Outcomes (CO)

K1	CO1	Recall the fundamentals concepts of data structures.
K2	CO2	Understand the concepts of trees and graphs.
K3	CO3	Analyze and experiment concepts of sorting.
K4	CO4	Apply and classify concepts of merging and Files

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	M	L
CO2	S	S	S	-
CO3	S	S	S	-
CO4	S	S	S	-

S - Strong; M-Medium; L-Low.

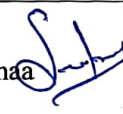

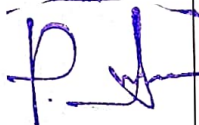
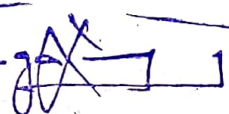
19CEU05	DATA STRUCTURES	II
Unit No.	Topics	Hours
1	Introduction: Introduction to Algorithm –Arrays -Stacks and Queues-Fundamentals- Linked List: -Singly Linked List – doubly linked list and Dynamic-Sparse Matrices- Polynomial addition.	9
2	Trees: Binary tree representations – Binary Tree Traversal – Threaded Binary Trees -Counting binary trees. Graphs: Terminology and representations - Traversals, Connected Components.	10
3	Internal sorting - Searching-Insertion sort-Quick sort-Heap Sort-2 way merge sort-Sorting on several keys. External Sorting: Storage device- Magnetic tape – Disk storage – Sorting with disk- K-way merging - Sorting with tape-Balanced Merge sorts-Polyphase Merge.	11
4	Symbol tables: Static tree table –Dynamic Tree tables-Hash tables - Hashing Functions-overflow handling-Theoretical evaluation of overflow techniques. Files: Files, Queries and Sequential organizations	8
5	Index Techniques: -Hashed Index-tree indexing-B trees. File organizations: Sequential organizations-Random Organization- Linked Organization- Inverted Files-Storage Management.	7

Text Book:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar, "Fundamentals of Data Structure", Galgotia Publications, 1981.

Reference Books:

1. Shmuel Tomi Klein, "Basic Concepts in Data Structures", Cambridge University Press, 2016.
2. Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, "Fundamentals Of Data Structures In C", Universities Press (India) Limited, 2017.
3. Mark Allen Weiss, "Data Structure oan Algorithm analysis in C", Pearson Education, Second Edition, Sixteenth Impression 2014.

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Programme Code:	BSC	Bachelor of Science (Computer Science)		
Course Code:	19CEU06	PYTHON PROGRAMMING	Batch:	2019 and onwards
Hrs/Week:	3		Semester:	II
			Credits:	3

Course Objective

- To know the programming concepts of python.
- To learn how to design and solve problems with algorithms using python.

Course Outcomes (CO)

K1	CO1	Deliberate Python syntax and semantics and be fluent in the use of Python flow control and functions.
K2	CO2	Understand, run and manipulate Python Programs using core data structures.
K3	CO3	Apply proficiency in handling Strings and File Systems.
K4	CO4	Able to Analyze Dictionaries and use Regular Expressions.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	M	L	M	L
CO2	M	M	L	M
CO3	S	M	S	S
CO4	M	S	S	M

S- Strong; M-Medium; L-Low.

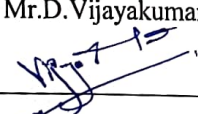
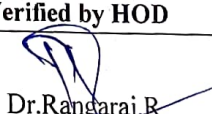
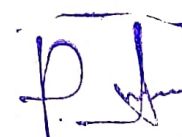
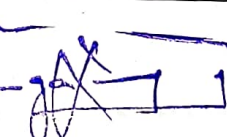
19CEU06	PYTHON PROGRAMMING	II
Unit No.	Topics	Hours
1	PYTHON BASICS, LIBRARIES Overview of Python-History of Python - Origins Features - Downloading and Installing Python - Running Python. Basic Syntax -Hello World - Interactive mode Programming - Script mode Programming - A simple Python Example- Python Libraries.	6
2	DATA, EXPRESSIONS, STATEMENTS Python Interpreter and Interactive mode - Values and Types: Int, Float, Boolean, String, and List; Variables – Expressions - Statements, Tuple Assignment - Precedence of Operators – Comments. Modules and Functions: Function Definition and Use, Flow of Execution, Parameters and Arguments.	6
3	CONTROL FLOW, FUNCTIONS Conditionals: Boolean Values and Operators - Conditional (if), Alternative (if-else), Chained Conditional (if-elif-else). Iteration: State, While, For, Break, Continue, Pass. Fruitful Functions: Return Values - Parameters - Local and Global Scope - Function Composition – recursion. Strings: String Slices - String Functions and Methods - Lists as Arrays.	6
4	LISTS, TUPLES Lists: List Operations - List Slices - List Methods - List Loop – Mutability – Aliasing - Cloning Lists - List Parameters. Tuples: Tuple Assignment - Tuple as Return Value.	6
5	DICTIONARIES, FILES Dictionaries: Operations and Methods - Advanced List Processing - List Comprehension. Files and Exception: Text Files - Reading and Writing Files - Format Operator - Command Line Arguments.	6

Text Books

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>).

Reference Books

1. Mark Lutz, "Programming Python ", O Reily, 4th Edition, 2010, ISBN 9780596158118
2. Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", 2009, ISBN:9781430216322
3. Magnus Lie Hetland, "Beginning Python: From Novice to Professional", 2nd Edition, 2009, ISBN:9781590599822.

Course Designed by	Verified by HOD	Checked by	Approved by
Mr.D.Vijayakumar 	 Dr.Rangaraj R		

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Programme Code:	BSC	Bachelor of Science (Computer Science)		
Course Code:	19CEU08	Course Title	Batch:	2019 and onwards
		PROGRAMMING USING PYTHON	Semester:	II
Hrs/Week:	4		Credits:	2

Course Objective

- To understand the concepts of Python Program.
- To design and implement various data structure algorithms for developing applications using Python Programming

Course Outcomes (CO)

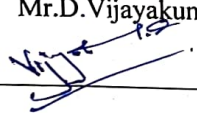

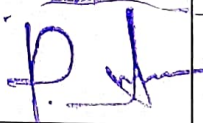

K1	CO1	Understand concepts of Basic Python Program.
K2	CO2	Implement the concepts of sorting
K3	CO3	Apply the concepts of Data structure using python
K4	CO4	Develop applications through searching Algorithms

Mapping of Outcomes

PO \ CO	PO1	PO2	PO3	PO4
CO1	S	S	M	L
CO2	S	M	L	S
CO3	S	S	M	S
CO4	S	S	L	S

S- Strong; M-Medium; L-Low.

19CEU08	PROGRAMMING USING PYTHON	II
Ex. No.	Program List	
1	Generate first n prime numbers.	
2	Find the exponentiation of a number.	
3	Find the maximum in the given list of numbers.	
4	Implementation of Binary Search.	
5	Implementation of Linear Search.	
6	Perform Selection Sort.	
7	Perform Insertion Sort.	
8	Perform Merge sort.	
9	Gene Sequence Mining using String Manipulation	
10	Bio Computing using String Manipulation	

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU09	Course Title	Batch:	2019 - 2020
Hrs/Week:	5	Programming with Java	Semester:	III
			Credits:	5

Course Objective

- To impart the basic knowledge of object oriented programming, the fundamental concepts of java.
- To analyze and implement the concepts of Exception Handling, Multithreading, and AWT Applet in java.

Course Outcomes (CO)

K1	CO1	Gain knowledge about the principles of Java programming.
K2	CO2	Apply and experiment the concepts of Object Oriented Programming and Develop java standalone applications.
K3	CO3	Employ the robust & concurrent application using Multithreading and Exception handling concepts.
K4	CO4	Relate and Experiment Java applications with Graphical User Interface (GUI)using AWT

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	M	L
CO2	S	M	S	L
CO3	S	S	S	S
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.

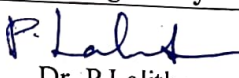
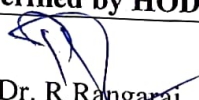
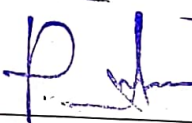

19CEU09	Programming with Java	III
Unit No.	Topics	Hours
I	Introduction to Java: Features of Java - History of Java- Structure – Java Tokens – Statements – Java Virtual Machine - Data Types - Variables - Operators - Decision Making and Branching - Decision Making and Looping	10
II	Object Oriented Concepts: Classes, Objects and Methods: Methods & variables - Constructor-Overloading - Static members - Final Classes – Abstract method- Arrays, Strings and Vectors. – Interfaces: Multiple Inheritance –Extending interfaces-implementing interfaces. Packages: Putting Classes together-creating, accessing & using packages.	15
III	Multithreaded Programming: Creating Threads -Extending Threads -Thread life cycle- Thread Exception-priority-implementing runnable interface. Managing Errors and Exceptions: Introduction- Exception handling – Exceptions- Multiple Catch statement-using finally statement– Applet Programming – Graphics Programming.	10
IV	Files: Managing Input / Output Files in Java: Concepts of Streams- Stream Classes – Byte Stream classes – Character stream classes – Using streams – I/O Classes – File Class – I/O exceptions – Creation of files – Reading / Writing characters, Byte-Handling Primitive data Types – Random Access Files.	10
V	Advanced concepts of Java: AWT Class and Controls: Introduction -AWT class - AWT controls-Labels, Buttons, CheckBox, List, TextField, TextArea– AWT managers and menus – Layout manager - MenuBar & Menus - Event handling by AWT components. Introduction: Java Bean - Socket Programming – Servlets - Java Server Pages, JDBC.	15

Text Book:

1. Balagurusamy.E, " Programming with Java – A Primer" , TMH, 3rd Edition.

Reference Books:

1. Patrick Naughton & Herbert Schildt, "The Complete Reference Java 2", TMH, 3rd Edition.
2. John R. Hubbard, "Programming with Java", TMH, 2nd Edition.
3. Herbert Schildt, "The Complete Reference Java", Paperback, 7th Edition.

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU10	Course Title	Batch:	2019 - 2020
Hrs/Week:	5	Computer Networks	Semester:	III
			Credits:	5

Course Objective

- Study the basic terminology of computer networks and to enumerate the layers of TCP/IP and OSI reference model.
- To introduce the various aspects of Network Security.

Course Outcomes (CO)

K1	CO1	Describe the basic concept of Computer Networks Terminology and explain The layers of TCP/IP and OSI reference model.
K2	CO2	Examine the concept of Bluetooth Technology.
K3	CO3	Understand and Building the skills of Subnetting and Routing Mechanism.
K4	CO4	Explain the Network Security Primitives.

Mapping of Outcomes

PO CO	PO1	PO2	PO3	PO4
CO1	M	M	M	M
CO2	S	S	S	S
CO3	S	M	L	L
CO4	L	S	M	M

S - Strong; M-Medium; L-Low.

19CEU10	Computer Networks	III
Unit No.	Topics	Hours
I	Introduction: - Uses Of Computer Networks- Network Hardware- Network Software- Reference Models- The OSI Reference Model- The TCP/IP - Reference Model- A Comparison Of The OSI And TCP/IP Reference Models- Example Networks- The Internet Third-Generation Mobile Phone Networks- Wireless LANS: RFID and Sensor Networks- The Physical Layer: The Theoretical Basis For Data Communication- Fourier Analysis- Bandwidth-Limited Signals- The Maximum Data Rate of a Channel- Guided Transmission Media - Wireless Transmission-Communication Satellite - The Mobile Telephone System.	10
II	The Data Link Layer:- Data Link Layer Design Issues- Error Detection and Correction- Elementary Data Link Protocols- Sliding Window Protocols- The Medium Access Control Sub layer- Multiple Access Protocols- ALOHA- Carrier Sense Multiple Access Protocols- Collision - Free Protocols- Limited-Contention Protocols- Wireless LAN Protocols- Ethernet- Wireless LANs- Broadband Wireless- Bluetooth- RFID- Data Link Layer Switching.	15
III	The Network Layer:- Network Layer Design Issues- Routing Algorithms- The Optimality Principle -Shortest Path Algorithm-Flooding-Distance Vector Routing-Link State Routing-Hierarchical Routing-Broadcast Routing-Multicast Routing - Anycast Routing -Routing For Mobile Hosts- Routing In Ad Hoc Networks- Congestion Control Algorithms- Internetworking- The Network Layer In The Internet- IP Addresses – IP Version 6 -Internet Control Protocols- OSPF-BGP-Internet Multicasting-Mobile IP.	10
IV	The Transport Layer: - The Transport Service-Services Provided To The Upper Layers-Transport Service Primitives-Berkeley Sockets- Elements Of Transport Protocols- The Internet Transport Protocols: UDP-The Internet Transport Protocols: TCP- Performance Issues- Delay-Tolerant Networking.	10
V	The Application Layer: - DNS - The Domain Name System-Electronic Mail- Network Security- Cryptography- Symmetric-Key Algorithms- Public-Key Algorithms- Digital Signatures- Communication Security- Authentication Protocols- Email Security- Web Security.	15

Text Book:

1. Andrew S. Tanenbaum and David J. Wetherall - "Computer Networks"- Prentice hall India Pub- Fifth Edition- 2011.

Reference Books:

1. Achyut. S. Godbole, " Data Communications and Networks"- Tata McGraw-Hill Publishing Company- 2007.
2. William Stallings-" Data and computer communications"- PHI- seventh edition- 2000.
3. R. Sivaranjani, K.A. Senthildevi, "Computer Networks", Aruna Publications -2017

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU11	Course Title	Batch:	2019 - 2020
		Software Engineering	Semester:	III
Hrs/Week:	4		Credits:	4

Course Objective

- To assist the students in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.
- To develop skills that will enable them to construct software of high quality, software that is reliable, and that is reasonably easy to understand, modify and maintain.
- To foster an understanding of why these skills are important.

Course Outcomes (CO)

K1	CO1	Identify specifications in design and components to build the Architecture
K2	CO2	Identify and build an appropriate process model for a given project
K3	CO3	Write the principles of various phases in software development
K4	CO4	Plan for the appropriate testing at different levels during the development of the software.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	S	S	M
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.

19CEU11	Software Engineering	III
Unit No.	Topics	Hours
I	INTRODUCTION AND AGILE DEVELOPMENT Software Engineering-Software Process- Generic process model-Prescriptive process model-specialized, unified process-Agile Development-Agile Process- Extreme Programming- Other agile Process models-Software engineering Knowledge-core Principles-Principles that guide each framework Activity.	10
II	REQUIREMENTS MODELING Requirements Analysis-Scenario Based Modeling, UML Models-Data Modeling Concepts, Class Based Modeling, Requirements Modeling Strategies, Flow Oriented Modeling, Creating a Behavioral Model, Pattern for Requirement Modeling.	9
III	SOFTWARE DESIGN CONCEPTS Design Process, Design Concepts, Design Model , Architectural Design: Software Architecture, Architectural Genres, Styles, Design, Component Level Design: Designing Class Based Components, Designing Traditional Components, Component Based Development, User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Pattern Based Design: Design Patterns, Pattern Based Software Design, Architectural Patterns, Component Level Design Patterns, User Interface Design Patterns, WebApp Design Patterns.	10
IV	QUALITY CONCEPTS AND TESTING Software Quality- Software Quality Dilemma- Achieving Software Quality-elements of Software Assurance, Statistical Software Quality Assurance, Software Reliability-Testing: Strategic Approach to software Testing- Strategic Issues- Testing: Strategies for Conventional Software, Object oriented software, Web Apps-Validating Testing- System Testing- Art of Debugging, software Testing Fundamentals, White Box Testing, Basis Path Testing, Control Structure Testing, Black Box Testing, Model Based Testing.	10
V	RISK MANAGEMENT AND MAINTENANCE Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Monitoring, and Management, Maintenance: Software Maintenance-Software Supportability- Reengineering- Business Process Reengineering- Software Reengineering- Reverse Engineering- Restructuring- Forward Engineering- Economics of Reengineering.	9

Text Book:

1. Roger S.Pressman," Software Engineering- A Practioner's Approach", Seventh Edition,Mc Graw-Hill International Edition,2010.

Reference Books:

1. Ian Sommerville, "Software Engineering", 8th Edition, Pearson Education Asia, 2011.
2. Stephan Schach, Software Engineering, Tata McGraw Hill 2007.
3. Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson Education, Second Edition.

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU13	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Practical - III: Programming Using JAVA	Semester:	III
			Credits:	3

Course Objective

- Understand and Develop Standalone Java Programs.
- Design and Develop GUI Applications using AWT and Applet.

Course Outcomes (CO)

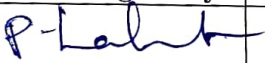
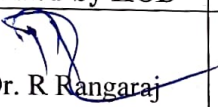
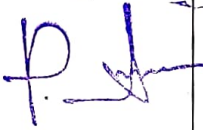

K1	CO1	Design and Develop Java problems using object-oriented concepts
K2	CO2	Develop java applications using packages & collection interfaces.
K3	CO3	Apply and Develop concurrent Applications using Multithreading
K4	CO4	Develop Event driven and Graphical User Interface programming using AWT and Applet

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	L
CO2	S	S	S	L
CO3	S	S	S	M
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.

19CEU13	Practical - III: Programming Using JAVA	III
Ex. No	Program List	
1	Write the java program for the manipulation of String class.	
2	Write a java program to implement the multiple Inheritance using Interfaces.	
3	Write a java program to demonstrate the use of Packages.	
4	Write a java program to implement the concept of Multithreading.	
5	Write a java program to create an Exception and Throw the Exception.	
6	Write a java program to demonstrate Graphics and Applet class.	
7	Write a java program to implement the concept of Applet & AWT Events.	
8	Develop a Java Program to implement Swing components.	
9	Develop a GUI program using Swing components.	
10	Write a java program which open an existing file and append the text to that file.	
11	Develop a program to Analyze the Gene sequence.	
12	Write a program for calculating Bio-computing.	

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU14	Course Title	Batch:	2019 - 2020
Hrs/Week:	3	Practical – IV: Web Design	Semester:	III
			Credits:	2

Course Objective

- Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
- Develop skills in analyzing the usability of a web site.
- Understand how to plan and conduct user research related to web usability.

Course Outcomes (CO)

K1	CO1	Design a complete website.
K2	CO2	Design a different layout styles which include backend programming.
K3	CO3	To apply the concepts of variety of fonts.
K4	CO4	To Develop applications through HTML, CSS, ASP.NET and PHP.

Mapping of Outcomes

PO \ CO	PO1	PO2	PO3	PO4
CO1	S	S	M	L
CO2	S	S	S	M
CO3	S	M	S	L
CO4	M	S	L	M

S - Strong; M-Medium; L-Low.

19CEU14	Practical – IV: Web Design	III
Ex. No.	Program List	
1	Demonstrate and show the Procedure to create a new site using dream HTML, CSS.	
2	Create a page for a company using simple CSS style sheet.	
3	Create a simple web page using Photoshop.	
4	Create a Professional Magazine Web Layout using Photoshop.	
5	Create your first home page for a company having four pages home, about us, contacts us, gallery using dream weaver.	
6	Design a sample gallery page for a company to show the concept of Working with images.	
7	Create a simple login page by checking username and password for login using ASP.NET.	
8	Demonstrate how to design a sample page and Publish a website in PHP.	

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU15	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Relational Database Management System	Semester:	IV
			Credits:	5

Course Objective

- To understand database management system, data availability, data integrity, data security, and data independence.
- To analyze database requirements and determine the entities involved in the system and their relationship to one another.
- To inculcate knowledge on RDBMS concepts.

Course Outcomes (CO)

K1	CO1	Defines the fundamental elements of Database Management System.
K2	CO2	Implements the Relational Database Design and Data Modeling using Entity-Relationship (ER) model.
K3	CO3	Demonstrates the use of constraints and Relational Algebra Operations, Use of SQL in querying the database and applying various Normalization Techniques.
K4	CO4	Performs PL/SQL programming using Cursor Management, Error Handling, Procedures, Functions, Triggers and Packages.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	M	M	S	S
CO3	M	M	S	S
CO4	S	S	S	S

S- Strong; M-Medium; L-Low.

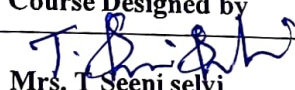

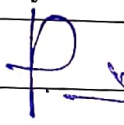
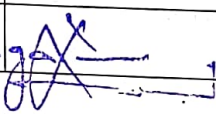
19CEU15	Relational Database Management System	IV
Unit No.	Topics	Hours
I	Database Concepts: A Relational approach: Database – Relationships – Database Management System (DBMS) – The Relational Database Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling and Normalization: Data Modeling – Dependency– Database Design– Normal forms – Dependency Diagrams – Denormalization.	14
II	Oracle 9i: An Overview: Personal Databases – Client/Server Databases – Oracle9i: An Introduction – The SQL *Plus Environment – Structured Query Language (SQL) – Logging into SQL *Plus - SQL *Plus Commands. Oracle Tables: Data Definition Language (DDL): Naming Rules and conventions– Data Types – Constraints – Creating an Oracle Table– Displaying Table Information – Altering an Existing Table– Dropping, Renaming, Truncating a Table – Oracle’s Various Table Types – Spooling – Error Codes.	14
III	Working with Tables: Data Management and Retrieval: Data Manipulation Language(DML) – Adding a new Row/Record – Customized Prompts – Updating and Deleting Existing Rows/Records – Retrieving Data from a Table – Arithmetic Operations – Restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions –Grouping Data. Multiple Tables: Joins and Set operators: Join – Set operators.	15
IV	PL/SQL:A Programming Language: Fundamentals of PL/SQL – PL/SQL Block Structure –Comments– Data Types –Variable Declaration – Assignment Operation – Bind Variables– Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation– Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE cursor– WHERE CURRENT OF Clause – Cursor with Parameters –Cursor Variables – Exceptions – Types of Exceptions.	14
V	PL/SQL Composite Data Types: Records – Tables – VArrays. PL/SQL Named Blocks: Procedures – Functions – Packages –Triggers –Data Dictionary Views.	15

Text Book:

Nilesh Shah. "Database Systems using Oracle", PHI Learning Private Limited, 2nd edition, 2014.

Reference Books:

1. Raghu Ramakrishnan and Johannes Gehrke, " Database Management Systems", McGraw-Hill Education, 2003.
2. Singh, "Database Systems: Concepts, Design & applications", Pearson Education.
3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, Fifth edition, 2005.

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU16	Course Title	Batch:	2019 - 2020
		Operating System	Semester:	IV
Hrs/Week:	6		Credits:	5

Course Objective

- Understand the purpose, structure and functions of Operating System.
- Study the process management, scheduling and implementation of Memory management policies and virtual memory.
- Understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.

Course Outcomes (CO)

K1	CO1	Describe the important computer system resources and the role of operating system in their management policies and algorithms.
K2	CO2	Discuss the process management policies and scheduling of processes by CPU
K3	CO3	Illustrate the storage management with respect to different storage management Technologies
K4	CO4	Analyze the memory management and its allocation policies.

Mapping of Outcomes

PO CO	PO1	PO2	PO3	PO4
CO1	S	M	M	-
CO2	M	L	M	L
CO3	M	M	S	-
CO4	S	L	M	M

S - Strong; M-Medium; L-Low.

19CEU16	Operating System	IV
Unit No.	Topics	Hours
I	Introduction to operating system: Introduction - Mainframe systems - Desktop Systems - Multiprocessor Systems - Distributed Systems - Clustered Systems - Real Time Systems - Handheld Systems - System Components - Operating System Services - System Programs -Process Concept - Process Scheduling - Operations on Processes - Cooperating Processes -Inter-process Communication	14
II	Scheduling in operating system: Scheduling- Threads - Overview - Threading issues - CPU Scheduling - Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Multiple-Processor Scheduling - Real Time Scheduling - The Critical-Section Problem - Semaphores - Critical regions - Monitors.	15
III	Memory Allocation: System Model - Deadlock Characterization - Methods for handling Deadlocks - Deadlock Prevention - Deadlock detection - Recovery from Deadlocks - Storage Management - Swapping - Contiguous Memory allocation - Paging - Segmentation - Segmentation with Paging.	14
IV	Memory Management: Virtual Memory - Demand Paging - Process creation - Page Replacement - Allocation of frames - Thrashing - File Concept - Access Methods - Directory Structure - File Sharing - Protection	14
V	File Structure: File System Structure - File System Implementation - Directory Implementation - Allocation Methods - Free-space Management. Kernel I/O Subsystems - Disk Structure - Disk Scheduling- Disk Management - Swap-Space Management. Case Study: The Linux System, Windows	15

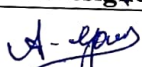
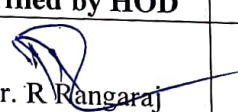
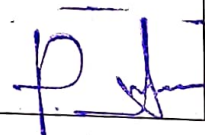

Text Book:

1. Harvey M. Deitel, "Operating System", Pearson Education Pvt. Ltd, Third Edition, 2019.

Reference Books:

1. William Stallings, "Operating System", Prentice Hall of India, 4th Edition, 2003.

2. Dhamdhrer, "Systems Programming and Operating System", TM 2nd Edition Revised.

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU17	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Practical -V: RDBMS Applications	Semester:	IV
			Credits:	3

Course Objective

- To Understand and gain knowledge in database concepts.
- To Design and develop applications using front end tools and back end DBMS.

Course Outcomes (CO)

K1	CO1	Paraphrasing and underlying concepts of database
K2	CO2	Experimenting the Database model and determining the DDL and DCL commands
K3	CO3	Structures PL/SQL functions
K4	CO4	Design and Validate by building applications.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	M	L
CO2	S	M	L	S
CO3	S	S	M	S
CO4	S	S	L	S

S - Strong; M-Medium; L-Low.

19CEU17	Practical -V: RDBMS Applications	IV
Ex. No.	Program List	
1	Create a table for Student details with Registration Number as Primary Key and following fields: Name, Course, Gender, Age, Year of Joining and Percentage. Insert at least 10 rows and perform various queries using any one Comparison, Logical, Set, Sorting and Grouping Operators.	
2	Create a table for Student database and perform DDL and DML Commands and generate a report.	
3	Develop a database for Employee applications by applying Built-in Functions.	
4	Write a PL/SQL block to find out if a year is a leap year. A leap year is divisible by 4 but not by 100, or it is divisible by 400. (Hint: The function MOD (n,d) divides n by d and return the integer remainder from the operations).	
5	Write a PL/SQL code to find Factorial of a given number using Recursive Function.	
6	Write a PL/SQL program in Cursor using Loops.	
7	Create a database trigger to implement in the main and transaction tables which is related to the inventory system for checking the data validity with the tables having the needed fields	
8	Write a PL/SQL program to create a table for a bank account and create an exception for managing the account where the account is said to be zero.	
9	Develop a simple project for Student Database Management System using Visual Basic as front end and ORACLE as back end.	
10	Demonstrate simple project for Airline Reservation Management System using Visual Basic as front end and ORACLE as back end and display a report.	

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU19	Course Title	Batch:	2019 - 2020
		Practical -VI: Software Testing	Semester:	IV
Hrs/Week:	5		Credits:	3

Course Objective

- Analyze the requirements for the given problem statement
- Design and implement various solutions for the given problem
- Employ various design strategies for problem solving.
- Construct control flow graphs for the solution that is implemented

Course Outcomes (CO)

K1	CO1	List out the requirements for the given problem
K2	CO2	Design and implement the solution for given problem in any programming language (C, C++, JAVA)
K3	CO3	Derive test cases for any given problem
K4	CO4	Apply the appropriate technique for the design of flow graph

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	S	S	M
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.

19CEU19	Practical -VI: Software Testing	IV
Ex. No.	Program List	
1	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on boundary-value analysis, execute the test cases and discuss the results.	
2	Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases and discuss the test results.	
3	Design, develop, code and run the program in any suitable language to implement the Next Date function. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases and discuss the test results.	
4	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on equivalence class partitioning, execute the test cases and discuss the results.	
5	Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of equivalence class testing, derive different test cases, execute these test cases and discuss the test results.	
6	Design, develop, code and run the program in any suitable language to implement the Next Date function. Analyze it from the perspective of equivalence class value testing, derive different test cases, execute these test cases and discuss the test results.	
7	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on decision-table approach, execute the test cases and discuss the results.	
8	Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of decision table-based testing, derive different test cases, execute these test cases and discuss the test results.	
9	Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of dataflow testing, derive different test cases, execute these test cases and discuss the test results.	
10	Design, develop, code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.	
11	Installing and opening the selenium IDE.	
12	Using Selenium IDE, Write a test suite containing minimum 4 test cases.	

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU20	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	.NET Programming	Semester:	V
			Credits:	5

Course Objective

- To Understand the concept of .Net Framework and GUI Design Tool.
- Determine to modularize code with C# Methods and Properties.
- Understand the concept of Data access using ADO.Net.
- Develop Web applications using Asp .Net

Course Outcomes (CO)

K1	CO1	Getting started with .Net Data types and variable using .Net framework.
K2	CO2	Development of console applications.
K3	CO3	Create & develop distributed data driven applications using ADO.Net framework
K4	CO4	Relating the basic concepts of ASP.Net with web Applications

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	M	M	M
CO2	S	M	S	M
CO3	S	S	M	M
CO4	S	M	S	M

S - Strong; M-Medium; L-Low.

19CEU20	.NET Programming	V
Unit No.	Topics	Hours
I	Essential Visual Basic.Net: The .NET Framework and the Common Language Runtime - Building VB.NET Applications - The Visual Basic Integrated Development Environment(IDE)- The Visual Basic Language: Conditionals: Visual Basic Statements - Statement Syntax - The Option and Imports Statements - Declaring Constants - Declaring variables - Data Types - Making Decisions with If...Else Statements - Using Select Case - Making Selections with Switch and Choose.	14
II	C# Basics: Data Types, Variables & Constants, Operators in C#, Arithmetic Operators, Prefix and Postfix notation, Assignment Operators, Relational Operators, Other Operators, Operator's precedence, Flow Control and Conditional Statements. Object and Classes: Concept of a class, Objects, Fields, Methods, Access modifiers, Properties, Static members of the class, Constructors, Destructors, Method overloading, events and delegates, Operator overloading.	14
III	C# Using Libraries: Namespace-System, Input/Output, Multi-Threading, Networking and Sockets, Data Handling, Windows Forms, C# in Web application, Error Handling.	15
IV	ADO.NET Fundamentals: Understanding Data Management – Configure database – SQL Basics - ADO.Net basics – Direct Data Access – Disconnect Data Access. Data Binding: Single-Value data binding.	15
V	Introduction to ASP.NET: Overview of the ASP.NET-Asp.Net Standard Controls- Displaying information- Accepting User Input- Displaying Images- Asp.Net Validation Controls- ASP.NET Working with Data.	14

Text Book:

1. Steven Holzner, "Visual Basic.NET Programming Black Book", Dream Tech Press, 2013
2. E. Balagurusamy, "Programming in C#", Tata McGraw Hill, 3rd Edition, 2010
3. Shirish Chavan. (2007), Visual Basic.Net, 1st Edition, Pearson Education, New Delhi .Matt J. Crouch, "ASP.NET and VB.NET Web Programming", Edition 2012.

Reference Books:

1. Blair Richard & Crosland Jonathan Professional VB.NET, Willy
2. Herbert Schildt (2010). Complete Reference C#, Tata McGraw-Hill.
3. Joe Duffy (2010). Professional .Net Framework 2.0l, Wiley India
4. Jeffrey R.Shapiro, "The Complete Reference Visual Basic.Net", TataMcGraw Hill

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Programme code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU21	Course Title	Batch:	2019-2020
Hrs/Week:	6	Data Mining	Semester:	V
			Credits:	5

Course Objective

- To understand the principles of Data Mining.
- To gain knowledge on various Data classification Methods.
- To Cluster the high dimensional data for better organization of the data and to develop areas - web mining, text mining.
- To be familiar with the Data warehouse architecture and its Implementation.

Course Outcomes (CO)

K1	CO1	To understand principles, concepts and applications of data mining
K2	CO2	Extract knowledge using data classification techniques
K3	CO3	Adapt to new data mining tools and ethical aspects of web mining
K4	CO4	Design a data mart or data warehouse for any organization

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	M	S	S	S
CO3	S	S	S	S
CO4	S	M	S	S

S - Strong; M-Medium; L-Low.

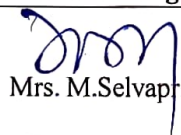

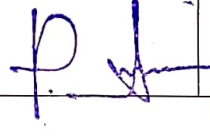
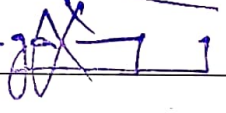
19CEU21	Data Mining	V
Unit No.	Topics	Hours
I	Data Mining: - Data Mining Functionalities – Data Pre-processing – Data Cleaning – Data Integration and Transformation – Data Reduction-Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.	14
II	Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines	15
III	Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.	14
IV	Mining Object, Spatial, Multimedia, Text and Web Data:Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.	14
V	Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.	15

Text Book:

1. Jiawei Han, Micheline Kamber and Jian Pei "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2011.

Reference Books:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: "Introduction to Data Mining", Pearson, First impression, 2014,
2. Micheline Kamber, Jian Pei: "Data Mining -Concepts and Techniques", 3rd Edition, Morgan Kaufmann Publisher, 2012
3. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU22	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Practical - VII: Programming using .NET	Semester:	V
			Credits:	3

Course Objective:

- Programming concepts in .Net Framework.
- It also covers the concepts of server controls, form validation, tracking and session handling,
- Error handling, inheritance, delegates, file operations and ADO.net Connectivity.
- To implement database applications using .NET .
- This course presents the practical aspects of application development using fundamentals of VB.Net,
- C#. Net and ASP.Net .

Course Outcomes (CO):

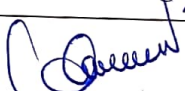


K1	CO1	Implement the concepts of programming language
K2	CO2	Implement the behaviour of various objects and classes
K3	CO3	Apply the decision and iteration control structures
K4	CO4	Design and develop the applications using ADO.Net

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	M	M	S
CO2	S	M	M	S
CO3	S	S	M	M
CO4	S	M	S	S

S - Strong; M-Medium; L-Low.

19CEU22	Practical - VII: Programming using .NET
Ex. No.	Program List
1	Write a VB.Net Program to Demonstrate the usage of Classes and its members using Console Application
2	Write a VB.Net Program to Demonstrate the use of Decision Making and Looping Statements.
3	Write a C# .Net Program to Demonstrate the use of Various Events
4	Write a C# .Net Program to display the use of Exception Handling
5	Write a C# .Net Program to work with Various Controls (10)
6	Write a C# .Net Program to Prepare Student Details with ADO.Net
7	Write a VB .Net Program to Prepare Library Management with ADO.Net
8	Write a ASP .Net program to navigate between pages using Controls
9	Write a ASP .Net Program to validate a Data (Validation Controls)
10	Write a ASP .Net Program to prepare details of Employee Payroll System in web.

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU23A	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Elective I: Internet of Things	Semester:	V
			Credits:	5

Course Objective

- To make the graduates to get updated with a basic knowledge of electronics and Microprocessors.
- To learn the concepts and different protocols used in IOT.
- To learn security aspects of IOT and where the applications of IOT can be deployed.
- To learn how to analysis the data in IOT and to understand the ARDUINO Hardware and Software platform

Course Outcomes (CO)

K1	CO1	To learn the architectural framework of IOT
K2	CO2	To exemplify the vulnerability and security aspects in IOT
K3	CO3	To Enumerate the real time applications of IOT in smart cities, health care, agriculture Industrial IoT and Industry 4.0
K4	CO4	To explore the IOT Arduino microcontroller hardware and software

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	M
CO2	S	M	S	S
CO3	M	M	S	S
CO4	L	L	S	S

S - Strong; M-Medium; L-Low.

19CEU23A	Elective I: Internet of Things	V
Unit No.	Topics	Hours
I	Internet of Things : An Overview : Internet of Things – IoT Conceptual Framework – IoT Architectural view – Technology behind IoT – Sources of IoT. Design Principles of Connected Devices : Introduction – IoT/M2M Systems Layers and Designs Standardization – Communication Technologies. Design Principles for Web Connectivity : Introduction – Web Communication Protocols for Connected Devices.	14
II	Internet Connectivity Principles : Introduction – Internet Connectivity – Internet Based Communication – IP Addressing in the IoT. Data Acquiring, Organising , Processing and Analytics : Introduction – Data Acquiring and Storage – Organising the data – Transactions, Business Processes, Integration and Enterprise Systems	14
III	Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks : Introduction – Sensor Technology – Participatory Sensing, Industrial IoT and Automotive IoT – Actuator – Sensor Data Communication Protocols – Radio Frequency Identification Technology – Wireless Sensor Networks Technology, IoT Privacy, Security and Vulnerabilities Solutions : Introduction – Vulnerabilities, Security Requirements and Threat Analysis – Use Cases and Misuse Cases – IoT Security Tomography and Layered Attacker Model	15
IV	Business Models and Processes Using IoT : Introduction – Business Models and Business Model Innovation – Value Creation in the Internet of Things – Business Model Scenarios for Internet of Things – IoT Case Studies: IoT for smart cities, health care, agriculture, M2M, Web of things, Industrial IoT, Industry 4.0	15
V	The Arduino Platform: The Arduino Hardware - The Software Integrated Development Environment (IDE) - Installing Arduino on Your Computer -Installing the IDE: Macintosh Installing the IDE: Windows, Really Getting Started with Arduino-Anatomy of an Interactive Device- Sensors and Actuators- Blinking an LED- The Code, Step by Step.	14

Text Book:

1. Raj Kamal, *Internet of Things Architecture and Design Principles*, McGraw Hill 2017
2. Hanes David, Salgueiro Gonzalo, Grossetete Patrick, Barton Rob, *IoT Fundamentals: Networking Technologies, Protocols and Use Cases for the Internet of Things* by Pearson, 2017
3. Massimo Banzi, Michael Shiloh, *Getting Started with Arduino*, O'Reilly, 2019

Reference Books:

1. Arshdeep Bahga, Vijay Madisetti, *Internet of Things (A Hands-on-Approach) 1st Edition*.
2. Peter Waher, *Mastering Internet of Things: Design and Create Your Own IoT Applications Using Raspberry Pi 3*, 2018.
3. Colin Dow, *Internet of Things Programming Projects: Build Modern IoT Solutions with the Raspberry Pi and Python*
4. Andrew Minter, *Analytics for the Internet of Things (IoT)*, 2017.
5. Adeel Javed, *Building Arduino Projects for the Internet of Things: Experiments with Real- World Applications*

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU23B	Elective I: Cloud Computing	Batch:	2019 - 2020
Hrs/Week:	6		Semester:	V
			Credits:	5

Course Objective

- To be familiar with concept of Cloud Computing Architecture.
- To have knowledge on the evolution of cloud from existing technologies.
- To learn key concepts of Virtualization and cloud computing services.
- To appreciate the emergence of cloud as the next generation computing paradigm.

Course Outcomes (CO)

K2	CO1	Classifies the key and enabling technologies that help in the development of cloud.
K3	CO2	Develops the ability to understand and use the architecture of compute and storage cloud.
K1	CO3	Illustrates the use of current cloud technologies
K4	CO4	Analyze importance of Virtualization along with their technologies.

Mapping of Outcomes

PO CO	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	S	M	S	M
CO3	S	S	M	M
CO4	S	M	S	S

S - Strong; M-Medium; L-Low.





19CEU23B	Elective I: Cloud Computing	V
Unit No.	Topics	Hours
I	Cloud Computing Fundamentals The Need for Cloud computing- Defining Cloud Computing- Principles of Cloud Computing – Cloud Ecosystem- Requirements for cloud services – Cloud Application – Benefits and Drawbacks	12
II	Cloud Computing Architecture and Management Introduction- Cloud Architecture- Anatomy of Cloud- Network Connectivity in Cloud Computing- Applications on the Cloud- Managing the Cloud- Migrating Application to Cloud	15
III	Cloud Deployment and Service Models Cloud Deployment Models: Private Cloud- Public Cloud- Community Cloud- Hybrid Cloud. Cloud Service Models: Infrastructure as a Service- Platform as a Service- Software as a service.	15
IV	Virtualization Introduction – Virtualization Opportunities – Processor Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Data Virtualization, Application Virtualization – Approaches to Virtualization – Full Virtualization, Para Virtualization, Hardware assisted Virtualization	15
V	Cloud Service Providers Introduction- Google- Amazon web services- Microsoft- IBM- Salesforce – Rackspace- VMware – Manjrasoft.	15

Text Book:

1. K.Chandrasekaran "Essentials of Cloud Computing", CRC Press, Taylor and Francis group, 2015.

Reference Book:

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
3. Toby Velté, Anthony Velté, Robert Elsenpeter, "Cloud Computing - A Practical Approach, Tata Mcgraw Hill, 2009.

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU23C	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Elective I: Big Data Analytics	Semester:	V
			Credits:	5

Course Objective

- To impart knowledge in Fundamental of Big Data Analytics,
- Map Reduce Fundamentals and to recognize the key concepts of Hadoop framework,
- To gain knowledge on Hadoop related tools such as Apache Hive, Apache Mahout, Apache Pig for big data analytics.
- To get insight in to data Visualization.

Course Outcomes (CO)

K1	CO1	Understand the basic concepts in Big Data Analytics and gain the ability to choose the right solution for a task involving big data, including databases, architectures and cloud services.
K2	CO2	Understand the different methods to analyze and visualize the big data.
K3	CO3	Develop the skill set to build effective solutions for Big Data issues using Hadoop and its Eco-System.
K4	CO4	Get insights into different data visualization techniques and standard tools

Mapping of Outcomes

PO \ CO	PO1	PO2	PO3	PO4
CO1	S	M	L	L
CO2	M	M	L	S
CO3	L	M	S	-
CO4	L	M	L	S

S - Strong; M-Medium; L-Low.





19CEU23C	Elective I: Big Data Analytics	V
Unit No.	Topics	Hours
I	Introduction to Big Data, Types of Digital Data, Characteristics of Big Data, Evolution of Big Data, Definition of Big Data, Data Appliance, Challenges with Big Data, Big data sources, Best practices in Big Data Analytics, Introduction to Data Modeling	15
II	Introduction to elementary data analysis: Measures of center: Mean, Median, Mode, Variance, Standard deviation, Range, Normal Distribution : Center, Spread, Skewed Left, Skewed Right, Outlier, Correlation Patterns, Magnitude and Direction in relationship, Introduction to Bayesian Model	15
III	Introduction to Big Data Processing and Apache Hadoop, Installation and Configuration of Hadoop in Ubuntu, HDFS Concepts, MapReduce Framework, Anatomy of a Map Reduce Job Run, Job Scheduling, Shuffle and Sort, Task Execution	14
IV	Introduction to Hadoop Eco System, Apache Hive, Apache Mahout, Apache Pig, Case studies: Analyzing big data with twitter, Big data for Ecommerce, Big data for blogs.	14
V	History of Visualization, Goals of Visualization, Types of Data Visualization: Scientific Visualization, Information Visualization, Visual Analytics, Impact of visualization, Big Data Visualization Tools: Tableau, Google Chart.	14

Text Book :

1. Seema Acharya, Subhasini Chellappan, "Big Data Analytics", Wiley, 2015
2. Frank J Ohlhorst, —Big Data and Analytics: Turning Big Data into Big Money!, Wileyand SAS Business Series, 2012.
3. Tom White, — Hadoop: The Definitive Guide| Third Edition, O'reily Media, 2012.

Reference Books:

1. Michael C. Reingruber, William W. Gregory —The Data Modeling Handbook: A Best-Practice.

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU24	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Practical VIII: PHP and R programming	Semester:	V
			Credits:	3

Course Objective

- To understand basics of PHP and R Programming.
- To gain the knowledge about arrays, string, list.
- To develop the ability for applying File I/O Operations.
- To get the knowledge of accessing elements on list.

Course Outcomes (CO)





K1	CO1	Demonstrate and debug PHP and R Programs.
K2	CO2	Apply Branching and looping concepts in PHP Programs
K3	CO3	Analyse the use of functions and compound data using lists and arrays
K4	CO4	Create a new database and perform the insertion and deletion operations using PHP

Mapping of Outcomes

PO \ CO	PO1	PO2	PO3	PO4
CO1	S	S	M	L
CO2	S	M	S	L
CO3	S	S	S	S
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.

19CEU24	Practical VIII: PHP and R Programming	V
Ex. No.	Program List	
1.	Write a PHP program to provide a table of number.	
2.	Write a PHP program to check reverse string.	
3.	Write a PHP program to print the alphabet triangle .	
4.	Write a PHP program to merge two arrays into a new array.	
5.	Write a PHP program to create a new database and perform the operations like insert, fetch records in that database.	
6.	Write R program to create a list containing strings, numbers, vectors and a logical values.	
7.	Write R program to get the details of objects in memory.	
8.	Write R program to convert the a matrix to one dimensional array.	
9.	Write R program to access the elements of List.	
10.	Write R program to add, delete and Update the elements of a list.	

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU25	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Open Source Tools	Semester:	VI
			Credits:	5

Course Objective

- To impart the basic knowledge of Open Source Technologies in analyzing and implementing the concepts of Web Servers and My SQL with PHP Scripting Code.
- To Use open source database software packages that each go head-to-head with commercial products from Oracle, Microsoft, Sybase, and IBM
- To expose students to free open source software environment and introduce them to use open source packages.
- To understand the installation of various packages in open source operating systems

Course Outcomes (CO)

K1	CO1	Gain knowledge about the principles of Server Script.
K2	CO2	Apply and experiment the concepts PHP in Web applications.
K3	CO3	Employ the robust & concurrent application using PostgreSQL, MongoDB, Hadoop concepts.
K4	CO4	Relate and Experiment Linux Vi Editor with Essential commands

Mapping of Outcomes

PO \ CO	PO1	PO2	PO3	PO4
CO1	S	M	S	M
CO2	S	L	S	M
CO3	S	S	M	S
CO4	S	L	S	M

S - Strong; M-Medium; L-Low.

19CEU25	Open Source Tools	VI
Unit No.	Topics	Hours
I	Introduction to open source Open source Introduction: Open Source – Open source vs. Commercial Software – What is Linux? – Free Software – Where I can use Linux? Linux Kernel – Linux Distributions	14
II	Linux operating system Linux Introduction: Linux Essential Commands – File system Concept – Standard Files – Vi Editor – Partitions creation – Shell Introduction – String Processing – Installing Application	15
III	Open Source Web Servers Open Source Web Servers: Installation, Configuration and administration of Apache, Nginx. Open Source Tools, IDE,RDBMS: Eclipse IDE, OpenStack cloud technology, Version Control Systems, GIT, CVS, Open Source Repositories: GitHub, SourceForge, Google Code, Open Source RDBMS:MYSQL basics, installation and usage, PostgreSQL, NoSQL, MongoDB, Hadoop	15
IV	MY SQL Introduction-Basic Select statement-From Clause-Where Clause-Understanding Basic Select Statements-Adding records to a table using INSERT Statement-Changing data with Update Statement-How to delete rows from a table-Basics of sorting data using ORDER BY Clause.	15
V	Server script Introduction : General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives , Operations and Expressions – PHP Variables – Operations and Expressions Control Statement – Array – Functions – Basic Form Processing – File and Folder Access – Cookies – Sessions – Database Access with PHP – MYSQL – MYSQL Functions – Inserting Records – Selecting Records – Deleting Records – Update Records	13

Text Book:

1. James Lee and Brent Ware: "Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", Dorling Kindersley(India) Pvt. Ltd, 2008.
2. Eric Rosebrock, Eric Filson: "Setting up LAMP: Getting Linux, Apache, MySQL and PHP and working Together", Published by John Wiley and Sons, 2004.
3. Gregory A.Larson "Transact-SQL-The building blocks to SQL server programming language"-Redgate,Publication , First Edition-2020.

Reference Books:

1. Dacie Cristian- "Pack Pub AJAX and PHP" - 2006.
2. Scouarnec Yann- Stolz Jeremy Jeremy and Glass Michael - "Beginning PHP5- APACHE- MYSQL Web Development" - Wiley-India. New Delhi- 2005.
3. Christopher Diggins-" Linux Unwired"- Shroff Publishers & Distributors Pvt. Ltd-2004.

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU26A	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Elective II: Software Testing	Semester:	VI
			Credits:	5

Course Objective

- Comprehending and testing products, while considering factors like functionality, performance, security and many others, is a multi-faceted and complex task.
- To improve analysis power, to learn new tools and to implement the learning in real life.
- To identify the needs of software test automation, and define and develop a test tool to support test automation.
- To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.

Course Outcomes (CO)

K1	CO1	The ultimate purpose of software testing is not to find bugs, but to make the product superior.
K2	CO2	Software Development life cycle defines a methodology for improving the quality of software and the overall development process.
K3	CO3	Regression Testing is performed to validate the build that hasn't changed for a period of time. This build is deployed or shipped to customers.
K4	CO4	To validate if the test object is complete and works as per the expectation of the users and the stakeholders

Mapping of Outcomes

PO \ CO	PO1	PO2	PO3	PO4
CO1	S	S	M	L
CO2	S	M	S	L
CO3	S	S	S	S
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.



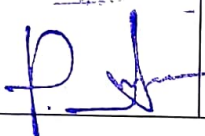
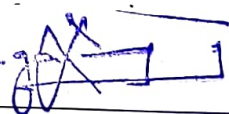
Unit No.	Topics	Hours
19CEU26A	Elective II: Software Testing	VI
I	Introduction to Testing: Principle of Testing- Context of Testing in Producing Software - A test in time-Test the test first-The end of pendulum- Putting all together-Phases of Software project.	14
II	Software development and Life cycle model: Quality Assurance and Control-Testing verification and validation-Process model to represent different phases-Life cycle model: Waterfall Model, Iterative Model or Spiral model- Rapid Application model and V model Prototyping .	15
III	Testing Types and Tools Testing Types: Unit Testing –Mutation Testing- Data Flow Testing- Domain Testing. Testing tools: Test Tools and Automation, Testing frame work, types of testing tools- Concept of Unit Testing- Unit Testing in extreme Programming- JUnit: Framework for Unit Testing- Tools for Unit Testing.	15
IV	System and Acceptance Testing Over View of System and Acceptance Testing-Why System Testing- Functional Vs Non Functional Testing-Functional Testing-Non Function Testing-Acceptance Testing- Performance Testing-Factors of testing- Methodology of testing- Tools of testing.	14
V	Regression Testing What is Regression Testing- Types of Regression Testing - When Regression Testing is done- When Regression Testing is performed- Planning Regression Testing-Management of Regression Testing- Execution of Regression Testing- Reporting Regression Testing.	14

Text Books:

1. SrinivasanDesikan&Gopalswamy Ramesh, "Software Testing Principles and Practices", PearsonEducatio,2006.
2. KshirasagarNaik ,PriyadarshiTripathy "Software Testing and Quality Assurance Theory and Practice" A John Wiley & Sons, Inc., publication,2008

Reference Books:

1. RemuRajani, Pradeep Oak, "Software Testing. –Effective Methods, Tools & Techniques" – Tata McGraw Hill.
2. Bob Hughes & Mike Cotterell, "Software Project Management ",4th ed, PHI.
3. Ron Patton, "Software Testing" Second Edition, 2005.

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU26B	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Elective II: Network Security and Cryptography	Semester:	VI
			Credits:	5

Course Objective

- To understand basics of Cryptography and Network Security
- To be able to secure a message over insecure channel by various means.
- To learn about how to maintain the Confidentiality, Integrity and Availability of a data
- To understand various protocols for network security to protect against the threats in the networks.

Course Outcomes (CO)

K1	CO1	Provide security of the data over the network.
K2	CO2	Do research in the emerging areas of cryptography and network security
K3	CO3	Implement various networking protocols.
K4	CO4	Protect any network from the threats in the world.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	M	S	M	L
CO2	S	M	S	L
CO3	S	S	M	S
CO4	S	S	S	M

S - Strong; M-Medium; L-Low.





19CEU26B	Elective II: Network Security and Cryptography	VI
Unit No.	Topics	Hours
I	Introduction: Overview- Computer security concepts- The OSI security architecture- Security Attacks- Security services- security mechanisms. – A model of network security -classical Encryption techniques - Symmetric cipher model - Substitution techniques-Transposition techniques.	14
II	Cryptography and Block Ciphers: introduction to cryptography - Block cipher principles - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and block ciphers - Modern Block Ciphers:feistel cipher structure – DES - Encryption & Decryption, Differential & linear crypt analysis - AES.	15
III	Public key encryption: Public key cryptography & RSA-Basics of number theory - RSA algorithm - key management - Diffe Hellman key exchange - Elliptic curve cryptography	14
IV	Network and Internet Security: Network and Internet Security- Transport layer security: Secure Socket Layer- HTTP-Secure shell(SSH).Wireless Network Security : IEEE 802.11 Wireless LAN overview- Wireless Application Protocol Overview- WAP End to End Security.	14
V	IP Security and Firewalls: IP Security and Firewalls- IP Security :IPSecurity Overview. Architecture - Authentication header - Intrusion detection - password management -Viruses and related Threats - Virus Counter measures - Firewall Design Principles - Trusted Systems.	15

Text Book:

1. William Stallings, "Cryptography and Network Security Principles and Practices", Pearson/PHI, Edition 7th- 2007.

Reference Books:

1. W.Mao, "Modern Cryptography—Theory and Practice", Pearson Education.-2003.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger—Security in computing— Prentice Hall of India-2009.
3. Roberta Bragg, Mark Rhodes – Ousley, Keith Strassberg, "Network Security", The Complete reference, Tata McGraw Hill Edition, 2007.

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU26C	Course Title	Batch:	2019-2020
		Elective II: Artificial Intelligence and Expert Systems	Semester :	VI
Hrs/Week:	6		Credits:	5

Course Objective

- Use appropriate search algorithms for any AI problem
- Represent a problem using first order and predicate logic
- Provide the apt agent strategy to solve a given problem
- Design software agents to solve a problem

Course Outcomes (CO)

K1	CO1	Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
K2	CO2	Apply these techniques in applications which involve perception, reasoning and learning.
K3	CO3	Acquire the knowledge of real world Knowledge representation.
K4	CO4	Use different machine learning techniques to design AI machine and enveloping applications for real world problems.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	M	M	S
CO3	S	M	S	S
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.




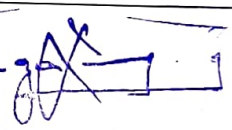
19CEU26C	Elective II: Artificial Intelligence and Expert Systems	VI
Unit No.	Topics	Hours
I	Introduction –Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.	14
II	Problem solving Methods: Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games	14
III	Predicate Logic: First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information	15
IV	Architecture: Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.	15
V	AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving	14

Text Book:

1. Bratko, — "Prolog: Programming for Artificial Intelligence", Fourth edition, Addison-Wesley Educational Publishers Inc., 2011

Reference Books:

1. M. Tim Jones, — "Artificial Intelligence: A Systems Approach", Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009.
3. Nils J. Nilsson, — "The Quest for Artificial Intelligence" Cambridge University Press, 2009.

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU27	Course Title	Batch:	2019 - 2020
		Practical IX: Open Source Tools	Semester:	VI
Hrs/Week:	6		Credits:	3

Course Objective

- To impart the basic knowledge of Server Scripting Concepts and Shell Script.
- To analyze and implement the concepts of Website applications with My SQL Database.
- To understand the kernel configuration and virtual environment
- To understand various version control systems

Course Outcomes (CO)

K1	CO1	Basic knowledge about the Linux Shell Script.
K2	CO2	Web Page Creation for business deployment is applied.
K3	CO3	Implementing PHP Programming with application using My SQL Database Applications.
K4	CO4	Creation and Functioning of tables using My SQL Databases.

Mapping of Outcomes

PO CO	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	S	M	S	L
CO3	S	S	S	S
CO4	L	S	S	S

S - Strong; M-Medium; L-Low.

19CEU27	Practical IX: Open Source Tools	VI
Ex. No.	Program List	
1.	Write a shell script to show the following system configuration: a. Currently logged user and his log name. b. Current shell, home directory, Operating System type, current Path setting, current working directory. c. Show currently logged number of users, show all available shells. d. Show CPU information like processor type, speed. e. Show memory information.	
2.	Write a shell script to implement the filter commands	
3.	Create a my sql table and execute queries to read, add, remove and modify a record from that table.	
4.	Write a PHP program interface to create a database and to insert a table into it.	
5.	Write a PHP program using classes to create a table.	
6.	Write a PHP program to upload a file to the server.	
7.	Write a PHP program to access the data stored in a mysql table.	
8.	Write a PHP program to create a directory, and to read contents from the directory.	
9.	Write a server side PHP program that displays marks, total, grade of a student in tabular format by accepting user inputs for name, number landmarks from a HTML form.	
10.	Write a PHP program that adds products that are selected from a web page to a shopping cart.	

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Programme Code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU28A	Course Title	Batch:	2019 - 2020
Hrs/Week:	6	Elective III: Animation Techniques	Semester:	VI
			Credits:	5

Course Objective

- Developing the basic skills necessary for the student to produce digital character based animation, titles for film and video.
- Learning and experiencing the arts of storytelling, animation and cinematography while making 2D animation movies, motion graphics, and GIF stickers.
- Understanding principles that translate sequential images into action to make animation believable.
- To apply audio and video production techniques to an animation project.

Course Outcomes (CO)

K1	CO1	Define and apply design principles and theories to animation production
K2	CO2	Evaluate and apply the principles of animation based on the requirements of the storyline.
K3	CO3	Assess, criticize the current animation trends in relation to the past trends.
K4	CO4	Demonstrate progress in basic drawing and animation skills

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	M	L
CO2	S	M	S	L
CO3	S	S	S	S
CO4	S	M	S	S

S - Strong; M-Medium; L-Low.

19CEU28A	Elective III: Animation Techniques	VI
Unit No.	Topics	Hours
I	History of Computer Animation - Fundamentals of Animation: Animation principles and history - Animation process - Importance of drawing in animation context- Types of animation- Animation software tools.	13
II	Story boarding -Matrix representations -Tabular data-Animation with flash, illustrations.	15
III	Definition, 2D animation, 3D animation, Real time Animation, Key Frame Animation, Character Animation, motion part animation, shape animation.	15
IV	Hierarchical animation, Procedural Animation, Simulation and Camera Animation, Traditional Animation, Stop Motion Animation, Computer Animations and Application of animations.	15
V	Difference between film and animation, drawn animation, cut off animation, Flash, Shockwave. Animation File Formats, Cartoon Vs animation.	14

Text Book:

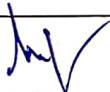

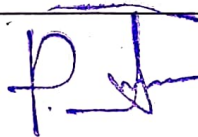
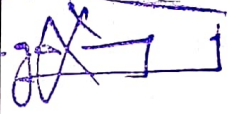
1. Prabat K and Leigh and Kiran Thakrar, "Multimedia Systems and Design", Pearson India Edition, 2015.

Reference Books:

1. Mary Murphy, "Beginner's Guide to Animation", Everything you need to know to get started October 14th 2008.

2. Andy Wyatt, "The Principles, Practice and Techniques of Successful Digital Animation", March 2010.

3. Newmann W.M. and Sproull R.F., "Principles of Interactive Computer Graphics", Tata McGraw-Hill, Second edition, 2008.

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Programme code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU28B	Course Title	Batch:	2019-2020
Hrs/Week:	6	Elective III: Multimedia and its Applications	Semester:	VI
			Credits:	5

Course Objective

- To understand the standards available for different audio, video and text applications.
- To learn various multimedia authoring systems in multimedia production team.
- To design and create interactive multimedia products.
- Develop competencies in designing and producing instructional multimedia.

Course Outcomes (CO)

K1	CO1	Understand the concepts and processes of multimedia products.
K2	CO2	Understand the techniques and technologies used in the development of multimedia solutions.
K3	CO3	Plan the development of an idea into the realization of a product.
K4	CO4	Use appropriate tools for the design, development and creation of digital media artefacts.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	L
CO2	S	S	S	L
CO3	S	S	S	M
CO4	S	S	S	M

S - Strong; M-Medium; L-Low.

19CEU28B	Elective III: Multimedia and its Applications	VI
Unit No.	Topics	Hours
I	Introduction to Multimedia: Multimedia Definition - Use Of Multimedia - Delivering Multimedia - Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext.	14
II	Images & Sound: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Formats. Sound: The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.	15
III	Animation & Video: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.	15
IV	Making Multimedia: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - An Authoring Systems Needs-Multimedia Production Team.	14
V	Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent.	14

Text Book:

1. Tay Vaughan, "Multimedia: Making It Work", 9th Edition, Osborne/McGrawHill, 2014.

Reference Books:

1. Ralf Steinmetz & Klara Nahrstedt, "Multimedia Computing, Communication & Applications", Pearson Education, 2012.

2. V.K.Jain, "Introduction to Multimedia and Its Applications", 1st Edition, 2012.

3.. K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovanovic, "Introduction to Multimedia Communications Applications, Middleware, Networking", John Wiley and Sons, 2006.

Course Designed by	Verified by HOD	Checked by	Approved by
Mrs. K. Gandhimathi	Dr. R. Rangaraj		

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Programme code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU28C	Course Title	Batch:	2019-2020
Hrs/Week:	6	Elective III: E-Commerce	Semester:	VI
			Credits:	5

Course Objective

- To enable the students to learn and understand the E-Commerce strategies.
- To understand the E-Market and EDI standards and implementations.
- To study and understand the online payments in E-Commerce applications and other E-Commerce applications used in the internet.
- To learn about the business over internet and to promote and encourage use of computers.

Course Outcomes (CO)

K1, K2	CO1	Understanding the basics of E-Commerce and its strategies.
K2	CO2	Knowledge in basics of business strategy, E-Commerce implementation, the credit transaction trade cycle.
K3	CO3	Understand the E-markets, EDI standards, communication and implementations.
K4	CO4	Understand the internet, HTML, server side scripting and client side scripting languages, online payments in E-Commerce applications.

Mapping of Outcomes

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	L
CO2	S	S	S	L
CO3	S	S	S	M
CO4	S	S	S	M

S - Strong; M-Medium; L-Low.

19CEU28C	Elective III: E Commerce	VI
Unit No.	Topics	Hours
I	Introduction to E-Commerce: History of E-Commerce – Definition-E-Commerce & the Trade Cycle – Electronic Market – Electronic Data Interchange – The Internet Commerce -Commercial use of internet –Growth of the Internet-Origins of the web– The E-Commerce in Perspective. Business Strategy: The Value Chain – Supply Chains – Porter’s Value Chain Model – The Inter Organizational Value Chain.	14
II	The Introduction to Business Strategy: The Introduction to Business Strategy – Strategic Implications of IT Enabling Technologies of the World Wide Web – Business Environment – Business Capability – Existing Business Strategy – Strategy Formulation & Implementation Planning – e-Commerce Implementation -Commerce Evaluation. The Inter Organizational Transactions – The Credit Transaction Trade Cycle.	15
III	E-Marketing: Traditional Marketing–Usage of E-Markets-Advantages & Disadvantages of E-Markets. E-advertising: Means of Advertising – Conductions Online Market research-market segmentation- Data mining & market research. EDI: Introduction – Definition - Benefits of EDI – EDI Standards – EDI Communication EDI Implementation – EDI Agreement – EDI Security.	14
IV	The Internet & E-security: The Internet – The Development of the Internet – TCP/IP – Internet Components – Uses of the Internet – A Page on the Web: HTML Basics – Introduction to HTML– Client Side Scripting – Server Side Scripting – The Elements of E-Commerce: Elements – e-Visibility – The e-Shop – On line Payments - Digital signature. E-Security: Security on the internet – Security incidents on the internet –Security and Email–Network and web based security.	15
V	E-Business: The Internet Bookshops – Grocery Supplies - Software Supplies and Support – ElectronicNewspapers – The Internet Banking - The Virtual Auctions – Online Share Dealing –Gambling on the Net – e-Diversity- cookies and privacy-copyright.	14

Text Book:

1. David Whiteley, "E-Commerce – Strategy, Technology & Applications", Tata McGrawHil, 2017.

Reference Books:

1. P.T.Joseph, S.J," E-Commerce - An Indian Perspective", Sixth Edition, PHI 2019.
2. CSV Murthy, "e-Commerce– Concepts, Models, Strategies", Himalaya Publishing House, 2015.
3. Dr.C.S.Rayudu, "e-Commerce e-Business", Himalaya publishing house, 2015.

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Programme code:	BSC	Programme Title: Bachelor of Science in Computer Science		
Course Code:	19CEU29	Course Title	Batch:	2019-2020
Hrs/Week:	6	Practical X:Animation Techniques in Multimedia	Semester:	VI
			Credits:	3

Course Objective

- To encourage students to practice free hand drawing with animation related techniques.
- To apply drawing techniques for animation with the help of mannequins and uses of light box equipment for animation.
- To analyze the line of action and create gesture drawing and understand the principles of animation with the help of basic cell animation exercises.
- To learn the experimental animation.

Course Outcomes (CO)

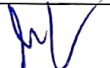


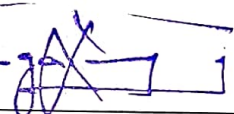
K1	CO1	To learn different type drawings with latest animation techniques.
K2	CO2	To understand written and verbal competencies to describe and analyze visual graphic design through writing, conceptual development, research, study of theory and critique of the intent of their own work.
K3	CO3	To analyze and develop necessary techniques and execution of form and content relevant to the field in digital medium.
K4	CO4	Demonstrate progress in basic drawing and animation skills.

Mapping of Outcomes

PO CO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	M	S	M
CO3	S	S	S	M
CO4	S	S	S	S

S - Strong; M-Medium; L-Low.

19CEU29	Practical X: Animation Techniques in Multimedia	VI
Ex. No.	Program List	
1.	Frame a Layout Designing in Multimedia	
2.	Design a illustration using Animation Techniques	
3.	Design a vector art using Animation Techniques	
4.	Design a letterhead using Animation Techniques	
5.	Design a logo using Animation Techniques	
6.	Design a pamphlet/Flyer/Brochure using Animation Techniques	
7.	Design a poster using Animation Techniques	
8.	Design your favourite cartoon character using Animation Techniques	

Course Designed by	Verified by HOD	Checked by	Approved by
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