KONGUNADU ARTS AND SCIENCE COLLEGE

(AUTONOMOUS)

COIMBATORE – 641 029

DEPARTMENT OF COMPUTER SCIENCE

CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)

(2019 - 2020 and onwards)

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
Coimbatore – 641029

Vision:

Developing the total personality of each and every student in a holistic way by adhering to the principles of Swami Vivekananda and Mahatma Gandhi.

Mission:

- Imparting holistic and man-making education with emphasis on character, culture and values - moral and ethical.
- Designing the curriculum and other courses that transform its students into value added and skilled human resources.
- Constantly updating academic and management practices towards total quality management and promotion of quality in all spheres.
- Extending the best student support services by making them comprehensive and by evolving a curriculum relevant to student community and society at large.
- Taking steps to make education affordable and accessible by extending scholarships to the meritorious and economically disadvantaged students.
- Motivating teachers in such a way that they become the role models in promoting Higher Education.

DEPARTMENT OF COMPUTER SCIENCE

Vision:

To inculcate Human, Moral and ethical values in the young minds of the students and thereby improving the total personality of the students.

Mission:

- To produce employable graduates to cater the needs of various industries.

PROGRAMME OUTCOMES (PO)

PO1 Understand the basic concepts, fundamental principles and scientific theories that are needed for higher learning and research.

PO2 Identify, formulate and analyze the complex situations to arrive acceptable solutions by applying domain specific knowledge, acquired through the programme.

PO3 Learn moral and ethical values and commit to professional ethics and responsibilities in the associated disciplines. Exercise social concern with the ability to act with awareness of issues in diversified domains to participate in the national development.

PO4 Ability to design, implement and evaluate a computational system to meet the desired needs within realistic constraints.

PO5 Realize the need for self and life-long learning to move along with the scientific and technological developments.

PO6 Ability to communicate and engage effectively with diverse stakeholders.

PO7 Analyze the impacts of computing on individuals, organizations and society.

PO8 Acquire skills of observing and drawing logical inferences from the scientific facts.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1 Impart the core knowledge in the areas such as Software Engineering, Data Communication, Networking and Security, Database Management, Web Technology, Operating System, Artificial Intelligence and other emerging areas in Computer Science.

PSO2 Provide well trained professionals to industries by enhancing the programming skills and new computing technologies through theoretical and practical knowledge.

PSO3 Train to solve real world problems by selecting appropriate techniques and best logic.

PSO4 Enhance the ability to design and develop software applications, to understand the basic concepts of hardware and to comprehend and apply mathematical and accounting principles.

PSO5 Make use of Computer Science techniques to one's own work as a member or a leader in a team to arrive conclusions and carryout projects.

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
COIMBATORE - 641 029.

B.Sc. COMPUTER SCIENCE
Curriculum and Scheme of Examination under CBCS

(APPLICABLE TO STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2019-2020 & Onwards)

Semester	Part	Subject code	Title of the Paper	Instruction Hours / Cycle	Exam. Marks			Duration of Exam.(hours)	Credits
					CIA	ESE	Total		
I	I	19TML1A1	Language 1@	6	25	75	100	3	3
	II	19ENG101	English I	6	25	75	100	3	3
	III	19UCS101	**C.P.1** – COBOL Programming	4	25	75	100	3	4
		19UCS1CL	**C.Pr.1** – COBOL Programming - Lab	6	40	60	100	3	2
		19UCS1A1	**Allied 1**–Discrete Mathematics and Statistics	6	25	75	100	3	5
	IV	**19EVS101**	**Environmental Studies ****	**2**	**-**	**50**	**50**	**3**	**2**
			Total Instruction Hours	**30**			**550**		**19**
II	I	19TML2A2	Language II@	6	25	75	100	3	3
	II	19ENG202	English II	6	25	75	100	3	3
	III	19UCS202	**C.P.2 -** C Programming	4	25	75	100	3	4
		19UCS2CM	**C.Pr.2** – C Programming - Lab	6	40	60	100	3	2
		19UCS2A2	**Allied 2**–Operations Research	6	25	75	100	3	5
	IV	**19VED201**	**Value Education – Moral and Ethics ****	**2**	**-**	**50**	**50**	**3**	**2**
			Total Instruction Hours	**30**			**550**		**19**
III	III	19UCS303	**C.P.3 -** Data Structures	5	25	75	100	3	4
		19UCS304	**C.P.4** – Operating Systems	5	25	75	100	3	4
		19UCS305	**C.P.5 -**Object Oriented Programming with C++	5	25	75	100	3	5
		19UCS3CN	**C.Pr.3 –** Object Oriented Programming with C++ **-** Lab	6	40	60	100	3	2
		19UCS3A3	**Allied 3**–Business Accounting	5	25	75	100	3	5
	IV	19UCS3S1	**Skill Based Subject 1-** PHP Programming	2	25	75	100	3	3
		19TBT301 / 19TAT301 / 19UHR3N1	**Basic Tamil */ Advanced Tamil **/ Non-Major Elective 1-Human Rights****	**2**	**__**	**75**	**75**	**3**	**2**
			Total Instruction Hours	**30**			**675**		**25**

IV	III	19UCS406	**C.P.6 –** Database Management System	5	25	75	100	3	4
		19UCS407	**C.P.7 –** Software Engineering and Testing	5	25	75	100	3	4
		19UCS408	**C.P.8 –** Visual Basic and Oracle	5	25	75	100	3	5
		19UCS4CO	**C.Pr.4 –** Visual Basic and Oracle Lab	6	40	60	100	3	2
		19UCS4A4	**Allied 4–**Digital Principles and Computer System Architecture	5	25	75	100	3	5
	IV	19UCS4SL	**Skill Based Subject 2** – PHP Programming Lab	2	40	60	100	3	3
		19T BT402 / 19T AT402 / 19UWR4N2	**Basic Tamil*/ Advanced Tamil** / Non-Major Elective 2-Women's Rights****	**2**	**—**	**75**	**75**	**3**	**2**
	Total Instruction Hours			**30**			**675**		**25**
V		19UCS509	**C.P.9 –** Systems Software	6	25	75	100	3	4
	III	19UCS510	**C.P.10 –** Java Programming	5	25	75	100	3	5
		19UCS5CP	**C.Pr.5 –** Java Programming -Lab	6	40	60	100	3	2
		19UCS511	**C.P.11 –** Data Communication and Networking	6	25	75	100	3	4
		19UCS5E1	**Major Elective I**	**5**	**25**	**75**	**100**	**3**	**5**
	IV	-	EDC – Web Designing using HTML	2	40	60	100	3	3
	-	19UCS5IT	Internship Training ****	Grade					
	Total Instruction Hours			**30**			**600**		**23**
VI	III	19UCS612	**C.P.12** – Artificial Intelligence	4	25	75	100	3	4
		19UCS613	**C.P.13** – Python Programming	4	25	75	100	3	4
		19UCS6CQ	**C.Pr.6** – Python Programming Lab	6	40	60	100	3	2
		19UCS614	**C.P.14** – Information Security	5	25	75	100	3	5
		19UCS6E2	**Major Elective II**	5	25	75	100	3	5
		19UCS6Z1	Project Work and Viva-Voce ***	4	20	80	100	3	5
	IV	19UCS6SM	**Skill Based Subject 3** – Software Testing Lab	2	40	60	100	3	3
	Total Instruction Hours			**30**			**700**		**28**
	V	19NCC/NSS/ YRC/PYE/EC C/RRC/WEC 101#	Extension Activities *	-	50	-	50	-	1
			GRAND TOTAL	**180**			**3800**		**140**

Note:

CBCS - Choice Based Credit System
CIA - Continuous Internal Assessment
ESE - End of Semester Examinations

@ Hindi/Malayalam/ French/Sanskrit – 19HIN/MLM/FRN/SAN101-202.

***** No End-of-Semester Examinations. Only Continuous Internal Assessment (CIA).

****** No Continuous Internal Assessment (CIA). Only End-of-Semester Examinations (ESE).

******* Project Report- 60 Marks; Viva-Voce-20 Marks; Internal-20 Marks.

******** Aptitude and Logical Reasoning*:* The Written examination will be conducted and evaluated for 100 marks. According to their marks, the grades will be awarded as given below.

Marks %	Grade
85-100	O
70-84	D
60-69	A
50-59	B
40-49	C
<40	U (Reappear)

Major Elective Papers

(2 papers are to be chosen from the following 6 papers)

1. Cloud Computing
2. Network Security
3. Embedded Systems
4. Big Data Analytics
5. Mobile Computing
6. Internet of Things

Non-Major Elective Papers

1. Human Rights
2. Women's Rights
3. Consumer Affairs

Subject Code and Title of the Extra Departmental Course (EDC)

19UCS5X1 - Web Designing using HTML

 # List of Extension Activities

1. National Cadet Corps (NCC)
2. National Service Scheme (NSS)
3. Youth Red Cross (YRC)
4. Physical Education (PYE)
5. Eco Club (ECC)
6. Red Ribbon Club (RRC)
7. Women Empowerment Cell (WEC)

Note: In Core/Allied Subjects, No. of papers both Theory and Practical are included wherever applicable. However, the total credits and marks for Core/Allied subjects remain the same as stated below.

Tally Table:

S.No.	PART	SUBJECT	MARKS	CREDITS
1.	Part I	Language - Tamil/Hindi/ Malayalam/ French / Sanskrit	200	6
2.	Part II	English	200	6
3.	Part III	Core- Theory/Practical	2000	72
		Allied	400	20
		Electives/Project	300	15
4.	Part IV	Basic Tamil / Advanced Tamil / Non Major Elective	150	4
		Skill Based Subjects	300	9
		EDC	100	3
		Environmental Studies	50	2
		Value Education	50	2
5.	Part V	Extension Activities	50	1
	TOTAL		**3800**	**140**

- 25% CIA is applicable to all subjects except JOC, COP and SWAYAM Courses, which are considered as extra credit courses.
- The students are advised to complete a **SWAYAM-MOOC** before the completion of the 5th semester and the course completed certificate should be submitted to the HoD. Two credits will be given to the candidates who have successfully completed.
- A **Field Trip** preferably relevant to the course should be undertaken every year.

Components of Continuous Internal Assessment

Components		Marks	Total
Theory			
CIA I	75	(75 + 75 =150 / 10)	25
CIA II	75	15	
Assignment/Seminar		5	
Attendance		5	
Practical			
CIA Practical		25	40
Observation Notebook		10	
Attendance		5	
Project			
Review		15	20
Regularity		5	

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Remember; **K2**-Understanding; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate

1. Theory Examination - Part I, II & III

(i) CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K2 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K3 & K4 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

(ii) CIA I & II and ESE: 55 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	55
K2 Q11 to 15	B (Either or pattern)	5 x 3 = 15	Short Answers	
K3 & K4 Q16 to 20	C (Either or pattern)	5 x 6 = 30	Descriptive / Detailed	

2. Practical Examination

Knowledge Level	Section	Marks	Total
K3	Experiments	50	60
K4		10	
K5	Record Work		

3. Project Viva-Voce

Knowledge Level	Section	Marks	Total
K3	Project Report	60	80
K4		20	
K5	Viva voce		

Components of Continuous Internal Assessment

Components			Marks	Total
Theory	CIA 1	75	(75+75 = 150/10)	25
	CIA 2	75	15	
	Assignment/Seminar		5	
	Attendance		5	
Practical	CIA Practical		25	40
	Observation Notebook		10	
	Attendance		5	
Project	Review		15	20
	Regularity		5	

19UCS101

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS101**		**Core Paper 1 – COBOL Programming**		
Batch **2019-2020**	Semester **I**	Hours / Week **4**	Total Hours **60**	Credits **4**

Course Objectives

1. To make use of COBOL programming in business, finance, and administrative systems.
2. To identify the four divisions of COBOL program and describe their purpose.
3. To construct conditions to execute procedures within a COBOL program.
4. To recognize similarities and common characteristics of two or more programming languages.

Course Outcomes (CO)

K1	CO1	Understand the syntax and semantics of the COBOL language
K2	CO2	Recognize how to develop and implement a program in the COBOL language
K3	CO3	Develop various forms of data representation and structures supported by the COBOL language
K4	CO4	Appreciate the appropriate applications (typically business) of the COBOL language

UNIT I **[13 Hours]**

Introduction to COBOL - Character set - Constants and Variables – Arithmetic Operations - Layout of COBOL program –Divisions of COBOL- IDENTIFICATION DIVISION, ENVIRONMENT DIVISION, DATA DIVISION, PROCEDURE DIVISION- Code Characters
– Edit Characters - Level numbers used in COBOL – Language Description notation.

UNIT II **[12 Hours]**

Arithmetic Verbs- ADD, SUBTRACT, MULTIPLY, DIVIDE, COMPUTE- Data movement Verb MOVE - On Size Error and Rounded Options - IF statement - GOTO, GOTO DEPENDING ON Statements – Condition names (88 Level number)- Simple COBOL Programs.

UNIT III **[11 Hours]**

Perform statements – Simple Perform, Perform … Thru, Perform …Times, Perform … Until, Perform … varying – Renames Clause – Redefines Clause – Simple programs illustrating the use of the above verbs and clauses.

UNIT IV **[12 Hours]**

Table handling – Syntax and rules of Occurs Clause –SORT verb syntax and rules – **Merge verb syntax and rules *** - Simple programs to demonstrate the applications of the Occurs clause and Sort/Merge Verbs.

UNIT V **[12 Hours]**

File Concepts – Different Organizations : Sequential, Line Sequential, Indexed – Different Access Methods : Sequence, Random, Dynamic - OPEN, CLOSE, READ, WRITE, AT END for Sequential file handling – STRING and UNSTRING verbs - Screen Section features – Simple business application programs like Pay Slip preparation, Electricity Bill preparation using Sequential file concepts.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. M.K.Roy & G.Dastidar **(**1989), **"COBOL Programming"**, Second Edition, TMH Publishers.

Reference Books:

1. V.Rajaraman (1997), "**COBOL Programming",** Sixth Edition, Prentice Hall of India.
2. Stern and Stern (1994), "**COBOL Programming",** Seventh Reprint, Tata McGraw Hill.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	H	H	M	H
CO4	S	M	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCSICL

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCSICL**		Title: **Core Practical 1 – COBOL Programming - Lab**		
Batch **2019-2020**	Semester **I**	Hours / Week **6**	Total Hours **90**	Credits **2**

Course Objectives

1. To expose different features of COBOL language and implement them.
2. To learn the fundamental concepts of four Divisions.
3. To understand Input and Output Statements.
4. To develop programs relevant to business applications.

Course Outcomes (CO)

K1	CO1	Study the logical structure of a computer program and to develop programs in COBOL language.
K2	CO2	Understand Control structures.
K3	CO3	Learn how to compile, debug, link and executing COBOL programs.
K4	CO4	Demonstrate practical applications of programs developed in COBOL.

LIST OF PRACTICAL PROBLEMS

1.Write a program to explain the use of z,* edit characters. Read values through the keyboard and display both the unedited and edited data.

2. Write a program to find the biggest number among the three given numbers using IF statement of COBOL.

3. Write a program to convert the temperature given in Fahrenheit to Centigrade and vice versa using GO TO.. Depending ON option.

4. Write a program to calculate the factorial value of a given number using Perform … until option of COBOL.

5. Write a program to calculate the Simple Interest for the money deposited in a bank.

6. Write a program to read the roll number, name and mark of 3 students using Occurs clause and display the details that are entered.

7. Write a program to demonstrate the Redefines Clause. Assume necessary data.

8. Write a program to demonstrate the Renames Clause. Assume necessary data.
9. Write a program to create a Sequential File for student details. Assume that a record of a student has the fields roll number, name and mark.
10. Write a program to demonstrate the use of SORT verb. Assume necessary data.
11. Write a program to demonstrate the use of MERGE verb. Assume necessary data.
12. A file contains the following records about a class.

Fields	columns
Serial number	1 - 4
Roll number	5 - 10
Name	11 - 30
Age	31 - 32
Sex	33
Year in the college	34

Select the record with the following characteristics and write them in two files.

File-1 : records of all male students over 18 years of age , who are in the third year in the college.

File –2 : records of all the female students under 19 of age, in the fourth year of the college.

Use conditions name for the sex and year in the college.

13. An electricity company supplies electricity to four types of customer coded 1,2,3&4. The rate schedule for customers is shown in one table as

customer code	1	2	2	3	3	4
consumption	all	below 1000	above 1000	below 5000	above 5000	all & above
rate/unit	0.50	0.40	0.50	0.30	0.50	0.30

The customer record is :

col. 1-5	customer number
col. 6-30	name & address
col. 31-37	consumption in units
col. 38	customer code

Read a customer record and print a bill using GOTO DEPENDING ON statement.

14.Create a sequential file with the following record layout using the SCREEN SECTION

Fields	Pictures
Order number	9(6)
Customer number	9(5)
Salesman number	9(4)
Date	9(6)
Number of items	9
Product code	x(6)
Quantity	9(5)v99

19UCSICL

15. Print the words of a given sentence one word per line. Display the first letter of all the words together as a single word at the end. The words in the sentence may be separated by 1 or more spaces.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours/60 marks)

Record : **10 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	**10**	**10**
Program Coding	**10**	**10**
Execution & Modifications	**5**	**5**

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	M	S
CO3	S	H	H	S	H
CO4	S	S	S	M	S

S – Strong **H** – High **M** – Medium **L** – Low

19UCS202

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS202**		**Core Paper 2 – C Programming**		
Batch **2019-2020**	Semester **II**	Hours / Week **4**	Total Hours **60**	Credits **4**

Course Objectives

1. To impart adequate knowledge on the need of programming languages and problem solving techniques.
2. To develop an in-depth understanding of functional and logical concepts of C Programming.
3. To provide exposure to problem-solving through C programming.
4. To familiarize the basic syntax and semantics of C Language

Course Outcomes (CO)

K1	CO1	Recollect various programming constructs and to develop C programs.
K2	CO2	Understand the fundamentals of C programming.
K3	CO3	Choose the right data representation formats based on the requirements of the problem.
K4	CO4	Implement different Operations on arrays, functions, pointers, structures, unions and files.

UNIT I **[12 Hours]**

Introduction to C – Overview of Compilers and Interpreters – Structure of C Program-Programming Rules- Character Set – Keywords – Variables – Data types – Type Conversion – Constant and Volatile Variables. Operators and Expressions : Priority of operators – Arithmetic, Relational, Logical, Assignment, Increment / Decrement, Conditional, Bitwise and Special Operators. I/O in C : Formatted ,Unformatted , Library Functions.

UNIT II **[12 Hours]**

Decision Statements: if, if/else, switch, break, continue, goto. Loop Control Statements : Introduction – for, nested for loops- while, do-while statements.

UNIT III **[13 Hours]**

Arrays: Introduction – Definition – 1D, 2D, 3D or Multi Dimensional Arrays.
Strings: Standard Functions – Application of Strings. Pointers: Features – Declaration – Pointer and Arrays – Array of Pointers – Pointers to Pointers – Pointers and Strings – Void Pointers.

19UCS202

UNIT IV **[12 Hours]**

Functions: Definition- Declaration – Types of Functions – Call by Value – Call by reference – Recursion – Pointer to Function. Storage Class: Automatic, External, Static, Register variables. **Preprocessor Directives: Macros - Conditional Compilation – Predefined Macros ***.

UNIT V **[11 Hours]**

Structure and Union: Introduction – Declaration and initialization – Union. Files: Streams and File Types – File I/O – Structured Read and Write – Other File Function – Command Line Arguments – Application of Command Line Arguments.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. Ashok N Kamthane (2002), "**Programming with ANSI and Turbo C"**, 1st Edition, Pearson Education Publications.

Reference books :

1. E .Balagurusamy (1998), **"Programming in ANSI C",** TMH publications.
2. Henry Mullish & Herbert L Cooper **(**1996), "**The Spirit of C",** Jaico Publication House.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	H
CO4	S	S	H	H	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCS2CM

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS2CM**		**Core Practical 2 – C Programming – Lab**		
Batch **2019-2020**	Semester **II**	Hours / Week **6**	Total Hours **90**	Credits **2**

Course Objectives

1. To introduce the field of programming using C language.
2. To enhance the analyzing and problem solving skills and use the same for writing programs in C.

Course Outcomes (CO)

K3	CO1	Develop programming skills using the fundamentals and basics of C Language.
K3	CO2	Develop programs using the basic elements like control statements, Arrays and Strings
K4	CO3	Enable effective usage of arrays, structures, functions and pointers.
K5	CO4	Implement files and command line arguments.

LIST OF PRACTICAL PROBLEMS

1. Write a program to find the sum, average, standard deviation for a given set of numbers.
2. Write a program to generate 'n' prime numbers.
3. Write a program to find the biggest number among a set of numbers.
4. Write a program to arrange a set of numbers in ASCENDING ORDER using BUBBLE SORT.
5. Write a program to merge a set of numbers available in Two Array into a Single Array.
6. Write a program to calculate a sine value and compare it with built-in function.
   [$x - x^3/3! + x^5/5!$ ……]
7. Write a Recursive function to calculate factorial value which compute nCr value.
8. Write a program to find the number of palindromes in a given sentence.

9. Write a function to perform
   i) String Copy
   ii) String Concatenation
   iii) String Reverse.
10. Write a program to implement LINEAR SEARCH to find a particular name in a list of names.
11. Write functions for following STACK operations
   i) PUSH
   ii) POP
   iii) LIST STACK
12. Write a generalized program to perform Matrix Addition.
13. Write a program to print the student's marksheet assuming rno, name, marks in 5 subjects in a structure. Create an array of structures and print the marksheet in the university pattern.
14. Write a program to display the content of an array using pointers.
15. Write a program which takes a file as command line argument and copy it to another file.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours/60 marks)

Record : **10 Marks**

Particulars	**Program1 (Marks)**	**Program2 (Marks)**
Algorithm	**10**	**10**
Program Coding	**10**	**10**
Execution & Modifications	**5**	**5**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	H
CO4	S	S	H	H	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCS303

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS303**		**Core Paper 3 – Data Structures**		
Batch **2019-2020**	Semester **III**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

1. To educate the concepts of fundamentals of writing algorithms and approach in problem solving.
2. To represent the basic concepts of stack, queue, linked list, trees and graphs.
3. To understand the concepts of searching and sorting techniques.

Course Outcomes (CO)

K1	CO1	Remember the concepts of algorithms for searching, sorting and dynamic programming.
K2	CO2	Understand the representations of data and various algorithm
K3	CO3	Apply appropriate algorithms and data structures for real time applications.
K4	CO4	Analyze the complexity of different algorithms

UNIT I **[13 Hours]**

Introduction – overview - **How to create programs and analyze them** *. Arrays – structures – ordered lists – representation of arrays – simple applications

UNIT II **[15 Hours]**

Stacks and queues – Fundamentals – structure-operations –Multiple stacks and queues. Applications Evaluation of Expressions.

UNIT III **[16 Hours]**

Linked lists – single linked lists – Linked stacks and queues – **The storage pool * -** Applications – Polynomial addition, sparse matrices. Double Linked Lists – Dynamic storage management – **Garbage collection and compaction ***.

19UCS303

UNIT IV **[16 Hours]**

Trees : Basic Terminology – Binary Trees – Binary Tree Representation – Applications of Trees. Searching: Binary, sequential, and Fibonacci.

UNIT V **[15 Hours]**

Sorting:– Internal sorting Insertion, quick, merge, heap, radix sorts – External sorting – Sorting with disks – K-way merging– sorting with tapes – Balanced merge - Polyphase merge. Symbol tables – Static tree – Dynamic tree – Hash tables.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. Ellis Horowitz & Sartaj Sahani (1999), **"Fundamentals of Data Structures"**, Galgotia book source.

Reference Books:

1. Ashok N Kamthane (2004), **"Programming and Data Structures",** Pearson Education.
2. Robert Kruse, C.L.Jondo, Bruse Leung (2008), **"Data Structures and Program Design in C",** Pearson Education, Asia, Second Edition.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	H	S	M	S
CO3	S	H	M	H	H
CO4	S	S	S	S	S

S – Strong **H** – High **M** – Medium **L** – Low

19UCS304

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS304**		**Core Paper 4 – Operating Systems**		
Batch **2019-2020**	Semester **III**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

1. Students will gain knowledge of basic operating system concepts.
2. To have an in-depth understanding of process concepts, deadlock and memory management.
3. To provide an exposure to scheduling algorithms, devices and information management.
4. Students will familiarize on the general structure of an operating system and case study is also provided.

Course Outcomes (CO)

K1	CO1	Remember the basic concepts of operating system.
K2	CO2	Understand the concepts like interrupts, deadlock , memory management and file management.
K3	CO3	Analyze the need for scheduling algorithms.
K4	CO4	Implement different algorithms used for representation, scheduling, allocation in DOS and UNIX operating system.

UNIT I **[14 Hours]**

Introduction and Definition of OS - Process Concept: Definition of Process – Process States – Process State Transition – Interrupt Processing – Interrupt Classes - Context Switching Deadlock: Introduction - Deadlock Prevention - Deadlock Avoidance – Deadlock Detection – Deadlock Recovery - Indefinite Postponement.

UNIT II **[16 Hours]**

Storage Management Real Storage: Real Storage Management Strategies – Contiguous Vs Non-Contiguous Storage Allocation – Single User Contiguous Storage Allocation – Fixed Partition Multiprogramming – Variable Partition Multiprogramming, Multiprogramming with Storage Swapping.

Virtual Storage Organization: Evolution and Basic Concepts – Definition of Paging and Segmentation - Virtual Storage Management Strategies- Page Replacement Strategies – Locality.

UNIT III **[15 Hours]**

Processor Management Job and Processor Scheduling: Preemptive Vs Non-Preemptive Scheduling - Priorities – Deadline Scheduling - FIFO – RR – Quantum Size – SJF - SRT – HRN.

Distributed Computing: Classification of Sequential and Parallel Processing– Array Processors – Dataflow Computers -Multiprocessing – Fault Tolerance.

UNIT IV **[15 Hours]**

Device and Information Management Disk Performance Optimization: Operation of Moving Head Disk Storage – Need for Disk Scheduling - Seek Optimization – FCFS – SSTF – SCAN – RAM Disks – Optical Disks.

File and Database Systems: File System – Functions – Organization – Allocating and Freeing Space – File Descriptor – Access Control Matrix.

UNIT V

CASE STUDIES **[15 Hours]**

LINUX: History of LINUX – Overview of LINUX: LINUX Goals – Interfaces to LINUX – The Shell – LINUX Utility Programs – Kernel Structure – Processes: Fundamental Concepts - Memory Management: Fundamental Concepts - File System: Fundamental Concepts - Security: Fundamental Concepts.

WINDOWS VISTA: History – System Structure: Operating System Structure, The Kernel Layer - **Processes and Threads: Fundamental Concepts *** - Caching in Windows Vista – **Security: Fundamental Concepts ***

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Books:

1. H.M.Deitel (2003), **"Operating Systems",** Second Edition,Pearson Education Publ. (Unit I – Unit IV)
2. Andrew S.Tanenbaum (2006), "**Modern Operating System",** Third Edition Prentice Hall of India Pvt. Ltd., Delhi. (Unit V)

Reference Books:

1. Achyut S Godbole (2002), **"Operating Systems",** TMH Publications.
2. Abraham Silberschatz, Galvin,Gagne, (2004), **Operating Systems Concepts,** Sixth Edition, John Wiley & Sons.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	H	S	S	S	S
CO3	S	S	H	S	H
CO4	S	H	S	S	M

S – Strong **H** – High **M** – Medium **L** – Low

19UCS305

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS305**		**Core Paper 5 – Object Oriented Programming with C++**		
Batch **2019-2020**	Semester **III**	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objectives

1. To develop a greater understanding of the issues involved in programming language design and object oriented paradigms and its implementation.
2. To impart adequate knowledge on the need of object oriented programming languages.
3. To enhance problem solving and programming skills in C++ by implementing the object oriented concepts.

Course Outcomes (CO)

K1	CO1	Remember the characteristics of Procedure and Object Oriented Programming Languages
K2	CO2	Understand the fundamentals of C++ programming structure, function overloading and constructors.
K3	CO3	To be able to program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc.
K4	CO4	Apply the concepts in object oriented programming in terms of software reuse and managing complexity to solve real-world problems.

UNIT I **[14 Hours]**

Introduction to C++ - Key concepts of OOP – advantages – OOlanguages –I/O in C++.C++ declarations. Control structures: Decision making statements: if..Else, jump, goto, break, continue, Switch case statements. **Loops in C++: for, while, do..while loops*-**Functions in C++- inline Functions- function overloading.

UNIT II **[16 Hours]**

Classes and Objects : Declaring objects – defining member functions- static member variables and functions – array of objects – friend functions – overloading member functions – constructors and destructors –characteristics –calling constructors and destructors .

19UCS305

UNIT III **[15 Hours]**

Operator overloading: overloading unary, binary operators – overloading friend function- type conversion . Inheritance: Types of Inheritances – Single, multilevel, multiple, hierarchical, hybrid, Multipath inheritance- virtual base classes – abstract classes.

UNIT IV **[16 Hours]**

Pointers-Declaration-Pointer to class, object-this pointer – Pointer to derived classes and base classes- Arrays- characteristics – arrays of classes –Binding ,Polymorphism and Virtual Functions.

UNIT V **[14 Hours]**

Files – File Stream classes – File modes – Sequential File Read/Write operations –Templates – Exception handling – **Strings and String Functions *.**

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. Ashok N Kamthane **(**2003), **"Object oriented Programming with Ansi and Turbo C++",** 1st Edition, Pearson Education Publication.

Reference Books:

1. E.Balagurusamy (1998), **"Object oriented programming with C++",** TMH Publication.
2. Maria Litvin & Gary Litvin **(**2002), **"C++ for you",** Vikas Publication.
3. John R Hubbard (2002), **"Programming with C++",** 2nd Edition,TMH Publication.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	H	H	S	H
CO4	S	S	S	S	M

S – Strong **H** – High **M** – Medium **L** – Low

19UCS3CN

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS3CN**		**Core Practical 3 – Object Oriented Programming with C++ - Lab**		
Batch **2019-2020**	Semester **III**	Hours / Week **6**	Total Hours **90**	Credits **2**

Course Objectives

1. To familiarize the students with language environment and to develop the programs for solving the problems using function overloading, constructors and object.
2. This course provides methods and technologies involved in building complex software. It also introduces concepts that includes various steps involved in developing software including requirement elicitation, system design, object design and testing.

Course Outcomes (CO)

K3	CO1	Implement the concepts of object oriented programming.
K3	CO2	Apply string functions to perform operator overloading,
K4	CO3	Demonstrate virtual functions and inheritance.
K5	CO4	Implement files and command line arguments.

LIST OF PRACTICAL PROBLEMS

1. Create a class to implement the data structure STACK. Write a constructor to initialize the TOP of the stack to 0. Write a member function PUSH( ) to insert an element and a member function POP( ) to delete an element. Check for overflow and underflow conditions.

2. Create a class ARITH which consists of a FLOAT and an INTEGER variable . Write member functions ADD( ) , SUB( ) , MUL( ) , DIV( ) , MOD( ) to perform addition ,multiplication, division and modulus respectively. Write member functions to get and display values.

3. Create a class MAT has a 2-Dmatrix and R & C represents the rows and columns of the matrix . Overload the operators +,-,* to add, subtract and multiply two matrices .Write member functions to get and display MAT object values.

4. Write a program to define Class A, B and C. The Class C is derived from A and B. Define count() member function in all the classes as virtual, count number of objects created.

5. Define a Class to represent a Bank Account. Include the following members:
    1. Name of the depositor.
    2. Account number.
    3. Type of account.
    4. Balance amount.

Member functions:

1. To assign initial values.
2. To deposit an amount.
3. To withdraw an amount after checking balance.
4. To display name and balance.

Write a main program to test the program.

6. Write a program to implement Destructors.

7. Write a program to implement multilevel inheritance.

8. Write a program to overload member functions in base and derived class.

9. Create a class STRING. Write member functions to initialize , get and display strings . Overload the operator + to concatenate two strings, == to compare 2 strings and a member function to find the length of the string.

10. Create a class which consists of EMPLOYEE detail like eno, ename, dept, basic salary, grade. Write member functions to get and display them. Derive a class PAY from the above class and write a member function to calculate da, hara, pf, depending on the grade and display the Payslip in a neat format using console I/O.

11. Create as class SHAPE which consist of two VIRTUAL FUNCTIONS Cal_Area( ) and Cal_PERI to calculate Area and Perimeter of various figures. Derive three classes SQUARE, RECTANGLE and TRIANGLE from the class SHAPE and calculate Area and Perimeter of each class separately and display the result.

12. Create two classes which consists of two private variables, one Integer and one Float variable in each class. Write member functions to get and display them. Write a FRIEND function common to arguments and the Integer and Float values of both the objects separately and display the result.

13. Write a user defined function USERFUN( ) which has the formatting commands like setw( ), showpoint, showpos, precision( ). Write a program which prints an multiplication table and uses USERFUN( ) for formatting.

14. Write a program to demonstrate the concept function with default arguments .

15. Write a program which takes a file as argument and copies in to another file with line numbers using Command Line Arguments.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

19UCS3CN

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours/60 marks)

Record : **10 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	**10**	**10**
Program Coding	**10**	**10**
Execution & Modifications	**5**	**5**

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S
CO2	S	S	H	S	S
CO3	S	H	H	H	H
CO4	S	S	H	H	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCS406

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS406**		**Core Paper 6 – Database Management System**		
Batch **2019-2020**	Semester **IV**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

1. To grasp the different issues involved in the design of a database system.
2. To study the physical and logical database designs and database modeling like relational, hierarchical, and network models.
3. To understand essential DBMS concepts such as: database security, integrity and normalization.
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling and designing a DBMS.

Course Outcomes (CO)

K1	CO1	Define data independence, data models for database systems, database schema and database instances.
K2	CO2	Understand and use data manipulation language to query and manage a database.
K3	CO3	Analyze and design a real database application.
K4	CO4	Apply normalization concepts for designing a good database with integrity constraints.

UNIT I **[14 Hours]**

Introduction: Purpose of Database Systems - View of Data - Data Models - Database Languages - Transaction Management - Storage Management Database Administrator - Database Users – Overall System Structure.

Entity Relationship Model: Basic concepts - Keys - Entity Relationship Diagram, Weak Entity sets, Extended E-R Features : Specialization, generalization.

UNIT II **[17 Hours]**

Relational Model: Relational Algebra - Views. SQL: Background - Basic Structure - Set Operations - Aggregate Functions - Null values - Derived Relations - Views - Modification of the database - Joined Relations - Data Definition Language.

19UCS406

UNIT III **[15 Hours]**

Integrity Constraints: Domain Constraints - Referential Integrity - Assertions - Triggers. Functional Dependencies – Relational Database Design: Pitfalls – Decomposition-Normalization using Functional Dependencies.

UNIT IV **[15 Hours]**

Object Oriented Databases: New Database Applications - Object Oriented Data Model - Object Oriented Languages - Persistent Programming Languages.

Database System Architecture: Centralized Systems- Client/ Server Systems – Parallel Systems- Distributed Systems- Network Types.

UNIT V **[14 Hours]**

New Applications: Decision Support Systems - Data Analysis - Data Mining - Data Warehousing - Spatial and Geographic Databases – **Multimedia Databases - Mobility and Personal Databases *** - Information-Retrieval Systems - Distributed Information Systems .

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan (1997), "**DATABASE SYSTEM CONCEPTS",** Third Edition, Tata McGraw Hill International Editions.

Reference Books:

1. Alexis Leon and Mathews Leon (1999),"Database Management Systems", Vikas Publications.
2. Elmasri Navathe (2006),"Database Management Systems", Pearson Education Publications, Fourth Edition.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	H
CO2	H	S	S	M	S
CO3	S	H	S	S	S
CO4	S	S	M	H	S

S – Strong **H** – High **M** – Medium **L** – Low

19UCS407

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS407**		**Core Paper 7 – Software Engineering and Testing**		
Batch **2019-2020**	Semester **IV**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

1. To enhance the basic software engineering methods and practices.
2. To learn the techniques for developing software systems.
3. To understand the object oriented design.
4. To understand software testing approaches.

Course Outcomes (CO)

K1	CO1	Understand the basic concepts of software engineering
K2	CO2	Apply the software engineering models in developing software applications.
K3	CO3	Implement the object oriented design in various projects
K4	CO4	Analyze the various software testing approaches

UNIT I **[13 Hours]**

Introduction – The Evolving Role of Software – Software Crisis – Software Myths – Software Engineering Technology – Software Process Models – Prototyping Model- Requirements Engineering – System Modeling.

UNIT II **[16 Hours]**

Requirements Analysis and Elicitation for Software – Software Prototyping – Specification – Mechanics of Structured Analysis – Data Dictionary –Elements of Analysis Model- Functional Modeling and Information Flow - Transform Mapping – Transaction Mapping.

UNIT III **[15 Hours]**

Object Oriented Design – Design for Object-Oriented Systems - System Design Process. Introduction: Quality, Quality Assurance and Quality Control - Testing, Verification and Validation. Types of Testing: White-Box Testing- Black-Box Testing.

UNIT IV **[16 Hours]**

Integration Testing: What is Integration Testing-Integration Testing as a Type of Testing-Integration Testing as a Phase Testing - Scenario testing - System and Acceptance Testing: Functional versus Non-functional Testing - Functional Testing – Nonfunctional Testing – Acceptance Testing.

19UCS407

UNIT V **[15 Hours]**

Performance Testing: Introduction - Factors Governing Performance Testing-Methodology for Performance Testing- Regression Testing: What is Regression Testing- Types of Regression Testing - **Test Planning*, Execution and Reporting***.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text books:

1. Roger S Pressman (2001), **"Software Engineering"**, 5th Edition, TMH Publishers [Unit I,II&III].
2. Srinivasan Desikan & Gopalswamy Ramesh (2006),"**Software Testing Principles and Practices"**, Pearson Education. [Unit IV & V]

Reference Books:

1. Ian Somerville (2001), **"Software Engineering",** 6th Edition, Pearson Education Publication.
2. William E.Perry (2006), **"Effective Methods for Software Testing"**, 3rd Edition, Wiley, India.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	M
CO2	H	S	S	S	S
CO3	S	H	H	S	S
CO4	S	S	S	M	S

S – Strong **H** – High **M** – Medium **L** – Low

19UCS408

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS408**		**Core Paper 8 – Visual Basic and Oracle**		
Batch **2019-2020**	Semester **IV**	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objective

1. The main aim of the course is to cover visual basic and oracle programming skills required for modern software development.
2. To study the advantages of Controls available with visual basic.
3. To gain a *basic* understanding of database access and management using data controls.
4. To facilitate the learner to carry out project works using the tools available in VB and Oracle.

Course Outcomes (CO)

K1	CO1	Demonstrate fundamental skills in utilizing the tools of a visual environment such as command, menus and toolbars.
K2	CO2	Implement SDI and MDI applications using forms, dialogs, and other types of GUI components.
K3	CO3	Understand the connectivity between VB with MS-ACCESS, ORACLE and SQL and SQL database
K4	CO4	Implement the methods and techniques to develop projects.

UNIT I **[14 Hours]**

Introduction – Integrated Development Environment: Menu Bar, Tool Bar, Project Explorer Window, Property Window, Form Layout Window, Code Window – Properties, Methods, Events – Working With Forms – Declaring Data Types And Variables – Built-In Functions *-Procedures And Control Statements – Arrays.

UNIT II **[13Hours]**

Working with Controls – Classification of Controls – Text Box – Labels – Command Buttons – Check Box- Combo Box – List Box- Option Buttons – Frames – Timer Control – Scroll Bars – Menus & Dialog Box – Graphics Controls – SDI – MDI – Control Arrays.

UNIT III **[16 Hours]**

ODBC – DAO: Creating a Database, Creating a Record Set, Types of Record Set, Opening a Database, Add, Edit, Update and Delete Records, Moving to First, Last, Next and Previous Records in a Record Set, Searching a Record Set, Sorting a Record Set – Data Environment and Data Reports.

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UNIT IV **[16 Hours]**

Basic database concepts, characteristics of relational DBMS model *, CODD's Law, ORACLE Tools. Interactive SQL : Invoking SQL * Plus, Data Manipulation in DBMS – The Oracle data types – insertion, updating, deletion, modification – Select Command – Removing, Deleting, Dropping tables, Data Constraints, Arithmetic, Logical Operators, Oracle Functions, Grouping Data from Tables - Manipulating Dates.

UNIT V **[16 Hours]**

Joins, Sub Queries – Union, Intersect and Minus Clause, Granting and Revoking of permissions.
PL/SQL: Introduction, PL/SQL Syntax, Understanding PL/SQL Block Structure – Conditional Controls in PL/SQL: if-then- Iterative Controls in PL/SQL: while, for- Oracle Transactions: Rollback, Commit commands.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Books:

1. Gray Cornell (2003), **"Visual Basic 6 from ground up"** TMH, New Delhi, 1st Edition, (Unit I,II & III).
2. Ivan Bayross (1997), **"Commercial Application Development Using ORACLE Developer 2000"**, BPB Publication, 1st Edition, (Unit IV and V).

Reference Books:

1. Deitel and Deitel, T.R.Nieto (1998), **"Visual Basic 6 - How to Program",** Pearson Education. First Edition.
2. Dr.P.S.Deshpande (2007), **"SQL and PL/SQL for Oracle Lock Black Book"**, Dream Tech. Press, Edition.

19UCS408

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	S	H	H	M
CO4	S	H	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCS4CO

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS4CO**		**Core Practical 4 – Visual Basic and Oracle - Lab**		
Batch **2019-2020**	Semester **IV**	Hours / Week **6**	Total Hours **90**	Credits **2**

Course Objectives

1. To develop applications using Graphical User Interface tools.
2. To understand the design concepts.
3. To design and build database systems and demonstrate their competence.

Course Outcomes (CO)

K1	CO1	Understand the concepts of Visual Basic
K2	CO2	Learn the advantages of Controls in VB
K3	CO3	Design and develop the event- driven applications using Visual Basic framework.
K4	CO4	Apply the knowledge of database methods.

LIST OF PRACTICAL PROBLEMS

1. Write a code for the following:

Scroll the text "Visual Programming Lab" from left to right and right to left on client area.

2. Divide the client area into 8 * 8 cells and while moving the mouse on these cells, the shape of cursor should change in every cell.

3. Using mouse down event, write a visual basic application to identify whether the right button or the left button was clicked

4. Write code to develop calculator program, which includes basic mathematical functions like addition, subtraction, multiplication and division.

5. Write a program to maintain the following information in a business database:

- Supplier address
- Customer address
- Types of business
- Stock level of business

Execute the program with suitable data and show the results in a NEAT format.

19UCS4CO

6. Use the circle method to draw several ellipse and circles so that they have the appearance of a pair of eyes.

7. Create a designer with basic primitives like circle, square, rectangle, ellipse and fill the same.

8. Design an application using the common dialog control to display the Font, Save and open dialog box without using the action property of the control.

9. Draw points on a form at random with red, blue and green colors.

10. Using the Flex Grid control write a program that calculates addition subtraction, multiplication, and division of numbers ranging from 1 to 12.

11. Develop a simple project on automated system for Railway Reservation

12. Develop a simple project on automated system for Payroll.

13. Develop a simple project on automated system for attendance maintenance.

14. Develop a simple project on automated system for students mark list preparation.

15. Develop a simple project on automated system for telephone billing.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours/60 marks)

Record : **10 marks**

	Program1 (marks)	**Program2 (marks)**
Algorithm	**10**	**10**
Program Coding	**10**	**10**
Execution	**5**	**5**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	S	H	H
CO2	S	M	H	S	S
CO3	S	S	H	M	H
CO4	S	H	S	S	S

S – Strong **H** – High **M** – Medium **L** – Low

19UCS509

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS509**		**Core Paper 9 – Systems Software**		
Batch **2019-2020**	Semester **V**	Hours / Week **6**	Total Hours **90**	Credits **4**

Course Objective

1. To comprehend the processing of programs on a computer system.
2. To understand the design and implementation of language processor.
3. To enhance the ability of program generation through expansion.
4. To gain knowledge about Code optimization and software tools.

Course Outcomes (CO)

K1	CO1	Know the program generation and program execution activities in detail.
K2	CO2	Understand the concepts of Macro Expansions.
K3	CO3	Gain the knowledge of Editing processes.
K4	CO4	Apply appropriate software tools for program development.

UNIT I **[18 Hours]**

Language Processors : Introduction – Language Processing activities – Fundamentals of language processing – Fundamentals of language specification – Language processor development tools.

UNIT II **[18 Hours]**

Assemblers : Elements of assembly language programming – A simple assembly scheme – Pass structure of assemblers – Design of a two pass assembler – Pass I of the assembler – Pass II of the assembler.

UNIT III **[18 Hours]**

Macros and Macro Processor : Macro definition and call – Macro expansion – Nested macro calls – Advanced macro facilities – Design of a macro preprocessor – Design of a macro assembler .

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UNIT IV **[19 Hours]**

Compliers and Interpreters : Aspects of compilation – Memory allocation – Compilation of expressions – A toy code generator for expressions – Intermediate code for expressions -Compilation of control structures – Code optimization – optimizing transformations – Local optimization – Global optimization – Interpreters.

UNIT V **[17 Hours]**

Linkers : Relocation and linking concepts – Design of a linker – Self-relocating programs – Linking for overlays – Loaders.

Software Tools : Software tools for program development – **Editors – Debug monitors *** – Programming environments – User interfaces.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. D.M. Dhamdere (2002), "**Systems Programming And Operating Systems**" Tata McGraw-Hill Publishing Company Limited -Second Revised Edition .

Reference Books:

1. Leland.L.Beck (1997), "**An Introduction to System Programming**", Addison Wesley, Third Edition.
2. John J.Donovan (1991), "**System Programming** ", MCGraw Hill Edition.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	S	H	M	H
CO4	S	S	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCS510

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS510**		**Core Paper 10 – Java Programming**		
Batch **2019-2020**	Semester **V**	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objectives

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2. Understand the fundamentals of object-oriented programming in Java, including managing classes, objects, invoking methods etc and exception handling mechanisms.
3. Concepts of inheritance, packages, interfaces and multithreading are introduced.

Course Outcomes (CO)

K1	CO1	Remember the fundamentals of programming such as variables, conditional statements and iterative execution statements.
K2	CO2	Understand the concepts of arrays, strings, packages and multithreading.
K3	CO3	Analyze the concepts of applet programming, graphics programming and files.
K4	CO4	Create a software application using the Java programming language

UNIT I **[15 Hours]**

JAVA Evolution : History – Features – How Java differs from C and C++ - Java and Internet- Java and WWW – Web Browsers.Overview of Java Language : Introduction – Simple Java program – Structure – javaTokens – Statements-Java virtual Machine.

UNIT –II **[15 Hours]**

Constants- variables – Data types – Operators and Expressions. Decision Making and Branching: If,If..else,else..if ladder,Switch, ?: operator Decision Making and Looping : While,do,for – jumps in loops-labelled loops. Classes,Objects and Methods.

UNIT –III **[16 Hours]**

Arrays,Strings and Vectors- Interfaces:Multiple Inheritance-**Packages :Putting classes together *** – Multi Threaded Programming.

UNIT – IV **[14 Hours]**

Managing Erros and Exceptions–Applet programming–**Graphics programming** *.

19UCS510

UNIT –V **[15 Hours]**

Files : Introduction – concept of streams – Stream classes – Using streams – I/O classes- File class – I/O Exceptions – creation of files- Reading/Writing characters /Bytes-Handling primitive data types – Random Access Files.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book :

1. E.Balagurusamy (2000), **"Programming with Java – A Primer"**, TMH Publications, 2nd Edition.

Reference Books:

1. Patrick Naughton and Herbert Schildt (2000)**, "The Complete Reference Java 2"**, 3rd Edition, TMH Publications.
2. C.Xavier (2000**), "Programming with Java 2",** Scitech Publications.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	M
CO2	S	S	S	S	S
CO3	S	H	S	S	H
CO4	H	S	H	S	M

S – Strong **H** – High **M** – Medium **L** – Low

19UCS5CP

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS5CP**		**Core Practical 5 – Java Programming - Lab**		
Batch **2019-2020**	Semester **V**	Hours / Week **6**	Total Hours **90**	Credits **2**

Course Objectives

1. This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
2. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, graphics concepts, applet programming concepts etc.,
3. Upon completion, students should be able to design, code and debug JAVA language programs.

Course Outcomes (CO)

K1	CO1	Remember the fundamentals of Java programming language
K2	CO2	Understand the basics of Java programming, multi-threaded programs and Exception handling
K3	CO3	Analyze and use Java in a variety of applications.
K4	CO4	Write and debug a software application developed using the Java programming language.

LIST OF PRACTICAL PROBLEMS

1. Write a program, which creates and displays a message on the window.
2. Write a program to draw several shapes in the created window.
3. Write a program to create an applet and draw grid lines.
4. Write a java program to create a frame with two buttons called father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother appear.
5. Write a java program to create four text fields for the name, street, city and pincode with suitable labels. Also add a button called my details, when you click the button your name, street, city and pincode must appear in the text fields.
6. Write a Java program to create a frame with three text fields for name, age and qualification and a text field of multiple line for address.
7. Write a Java program to demonstrate multiple selection list box.

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8. Write Java program to create a menu bar and pull down menus

9. Write a Java program to create a window when we press M or m the window displays Good Morning **A** or a the window displays Good Afternoon E or e the window displays Good Evening N or n the window displays Good Night.

10. Write a program to move different shapes(Circle, Ellipse, Square, Rectangle) according to the arrow key pressed.

11. Write a program to draw circle, ellipse, square, rectangle at the mouse click position.

12. Write a program to handle the divide by zero exception

13. Write a program to create an exception called payoutofbounds and throw the exception.

14. Write a program to explain the multithreading with the use of multiplication tables. Three threads must be defined. and each one must create one multiplication table; they are 5 tables, 7 tables and 13 table.

15. Write a program to illustrate thread priority. Create three threads and assign three different priorities.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours/60 marks)
Record : **10 marks**

	Program1 (marks)	**Program2 (marks)**
Algorithm	**10**	**10**
Program Coding	**10**	**10**
Execution	**5**	**5**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	H	H	S	S
CO4	S	S	S	M	S

S – Strong **H** – High **M** – Medium **L** – Low

19UCS511

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS511**		**Core Paper 11 – Data Communication and Networking**		
Batch **2019-2020**	Semester **V**	Hours / Week **6**	Total Hours **90**	Credits **4**

Course Objectives

1. To educate the concepts of terminology and concepts of the OSI reference model and the TCP/IP reference model and protocols such as TCP, UDP and IP.
2. To be familiar with the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
3. Introduce the student to a network routing for IP networks and how a collision occurs and how to solve it and how a frame is created and character count of each frame.

Course Outcomes (CO)

K1	CO1	Remember the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.
K2	CO2	Understand Internet structure and can see how standard problems are solved and the use of cryptography and network security
K3	CO3	Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.
K4	CO4	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies;

UNIT I **[18 Hours]**

Introduction to Data Communications and Networking: Introduction-Fundamental Concepts - Data Communication – Protocols – **Standards *** – Signal Propagation – Analog and Digital Signals. Information Encoding: Representing Different Symbols – Minimizing Errors - Analog and Digital Transmission Methods – Modes of Data Transmission and Multiplexing. Transmission Errors: Detection and Correction.

UNIT II **[18 Hours]**

Transmission Media: Guided Media - Unguided Media. Network Topologies: Mesh, Star, Tree, Ring, Bus – Switching: Circuit switching, Message switching, Packet switching. Routing Algorithms: Routers and Routing – Factors affecting Routing Algorithms – Routing Algorithms – Approaches to Routing – Network Protocols and OSI Model.

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UNIT III **[18 Hours]**

Local Area Networks (LAN), Metropolitan Area Networks (MAN) and Wide Area Networks (WAN): LAN – Ethernet – MAN – Switched Multimegabit Data Services (SMDS) - WAN – WAN Architecture - WAN Transmission Mechanism - WAN Addressing – Packet Forwarding – Aloha - Integrated Services Digital Network (ISDN) – X.25 Protocol – Frame Relay.

UNIT IV **[17 Hours]**

Asynchronous Transfer Mode (ATM) - Internetworking Concepts, Devices, Internet Basics, History and Architecture – An Introduction to TCP / IP, IP, ARP, RARP, ICMP.

UNIT V **[19 Hours]**

TCP: Features of TCP**, Relationship between TCP and IP ***, Ports and Sockets, TCP connections, What makes TCP Reliable, TCP Packet Format – User Datagram Protocol (UDP): UDP Packet, Difference between UDP and TCP – Domain Name System (DNS) – Electronic Mail (Email) – File Transfer Protocol (FTP).

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. Achyut S. Godbole, (2007), **Data Communications and Networks**, Ninth reprint, Tata McGraw-Hill Publishing Company Limited.

Reference Books:

1. Behrouz A. Forouzan, (2007), **Data Communications and Networking**, Second Edition Update, Nineteenth reprint, Tata McGraw-Hill Publishing Company Limited.
2. Andrew S. Tanenbaum, (2001), **Computer Networks**, Third Edition, Prentice Hall of India.

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MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	H
CO2	S	H	S	S	S
CO3	S	H	H	M	H
CO4	H	S	S	S	M

S – Strong **H** – High **M** – Medium **L** – Low

19UCS612

Programme Code: **B.Sc.**		Title: **Computer Science**		
Course Code: **19UCS612**		Title: **Core Paper 12 – Artificial Intelligence**		
Batch **2019-2020**	Semester **VI**	Hours / Week **4**	Total Hours **60**	Credits **4**

Course Objectives

1. To understand the basic concepts of Artificial Intelligence (AI) and identify the AI problems and domains.
2. To provide search techniques to solve the problems.
3. To represent and access the domain specific knowledge.

Course Outcomes (CO)

K1	CO1	Understand the nature of AI problems and task domains of AI.
K2	CO2	Apply the appropriate search procedures to solve the problems by using best algorithms.
K3	CO3	Analyze and select the suitable knowledge representation method.
K4	CO4	Manipulate the acquired knowledge and infer new knowledge.
K5	CO5	Demonstrate the development of AI systems by encoding the knowledge.

UNIT I **[12 Hours]**

Introduction: AI Problems - AI techniques - Criteria for success. Problems, Problem Spaces, Search: State Space Search - Production Systems - Problem Characteristics - Issues in Design of Search.

UNIT II **[13 Hours]**

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First Search – OR Graphs – A* Algorithm - Problem Reduction – AND-OR Graph – AO* Algorithm, Constraint Satisfaction, Means-ends Analysis.

UNIT III **[11 Hours]**

Knowledge Representation Issues: Representations and Mappings -Approaches to Knowledge Representations -Issues in Knowledge Representations - Frame Problem.

UNIT IV **[12 Hours]**

Using Predicate Logic: Representing Simple Facts in Logic - Representing Instance and Isa Relationships - Computable Functions and Predicates - Resolution - Natural Deduction.

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UNIT V **[12 Hours]**

Representing Knowledge using Rules: Procedural Vs Declarative Knowledge – **Logic Programming – Forward Vs Backward Reasoning** * – Matching – Control Knowledge.

Expert Systems : Introduction – Characteristic Features of Expert System – Background History– Applications – Importance of Expert Systems.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Books:

1. Elaine Rich and Kelvin Knight (1991), **" Artificial Intelligence"**, Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, (chapters 1-6 only).
2. Dan.W.Patterson, "**Introduction to Artificial Intelligence and Expert Systems**", Prentice Hall, India Learning Pvt Ltd, 2009.

Reference Books :

1. George F Luger (2002), **"Artificial Intelligence"**,4th Edition, Pearson Education Publ.
2. V.S.Janakiraman and K.Sarukesi (2001), "**Foundations of AI and Expert System**", Mac Milan India Ltd.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	H	M	H	H
CO4	S	S	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCS613

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS613**		**Core Paper 13 – Python Programming**		
Batch **2019-2020**	Semester **VI**	Hours / Week **4**	Total Hours **60**	Credits **4**

Course Objectives

1. To introduce the fundamentals of Python Programming.
2. To teach about the concept of Functions in Python.
3. To impart the knowledge of Lists, Tuples, Files and Directories.
4. To learn about dictionaries in python.

Course Outcomes (CO)

K1	CO1	Remembering the concept of operators, data types, looping statements in python programming.
K2	CO2	Understanding the concepts of Input / Output operations in file.
K3	CO3	Applying the concept of functions and exception handling
K4	CO4	Analyzing the structures of list, tuples and maintaining dictionaries.

UNIT I **[13 Hours]**

Introduction to Python: Introduction-Python Overview-Getting started with python-Comments- Python Identifiers-Reserved Keywords-Variables-Standard data types. Operators-Statement and expressions-String operations- Boolean expressions- Control statements- Iteration-While statement-Input from keyboard.

UNIT II **[12 Hours]**

Built-in functions- Composition of functions - User defined functions-Parameters and Arguments-Function calls-The return statement-Python recursive function – The Anonymous Function – Writing Python Scripts. Strings-Compound data types- Len function- String slices- Strings are immutable- Strings traversal-Escape characters- String formatting operators-String formatting functions.

UNIT III **[13 Hours]**

Lists - values and accessing elements - Lists and mutable - Deleting elements from list- Built-in list operations - Built-in list methods. Tuples - Creating tuples – Accessing values in tuples – tuples are Immutable – Tuple assignment- Tuples as return values- Variable length argument tuples- Basic Tuple operations. Built-in tuple functions.

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UNIT IV **[10 Hours]**

Dictionaries – Creating a dictionary - Accessing values in a dictionary – Updating dictionary – Deleting elements from dictionary - Properties of dictionary keys – Operations in dictionary – Built-in dictionary methods.

Classes and Objects: Overview of OOP - Class Definition - Creating Objects - Objects as arguments - Objects as Return Values - Built-in class attribute - Inheritance – Method Overriding - Data Encapsulation - Data Hiding.

UNIT V **[12 Hours]**

Files: Text files: Opening a file – Closing a file – The file object attributes- Writing to a file – Reading from a file - Renaming a file – Deleting a file – Files related methods.

Directories: mkdir() , chdir(). Exception: Built-in exceptions – Handling Exceptions – Exception with arguments – User defined exceptions.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. E. Balagurusamy (2017), "**Problem Solving and Python Programming"**, McGraw-Hill, First Edition.

Reference Book:

1. Ashok Namdev Kamthane, Amit Ashok Kamthane (2017), "**Programming and Problem Solving with Python"**, McGraw-Hill, First Edition.
2. **Martin Jones** (2015), **"Python for Complete Beginners"**, Createspace Independent Publisher, First Edition.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	M	H	S
CO2	H	S	H	S	S
CO3	S	H	H	S	H
CO4	S	S	S	M	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCS6CQ

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS6CQ**		**Core Practical 6 – Python Programming - Lab**		
Batch **2019-2020**	Semester **VI**	Hours / Week **6**	Total Hours **90**	Credits **2**

Course Objectives

1. To gain knowledge about the concepts of python programming.
2. To understand the concepts of Built-in functions and User-defined functions.
3. To develop programs using String functions.

Course Outcomes (CO)

K1	CO1	Remember different types of operators in programming.
K2	CO2	Implement the concepts of built-in functions in programming.
K3	CO3	Analyze the use control structures in programming.
K4	CO4	Apply the concepts of exception handling in programs.

LIST OF PRACTICAL PROBLEMS

1. Write a program to solve quadratic equation.
2. Write a program to convert temperature in Celsius to Fahrenheit and Fahrenheit to Celsius.
3. Write a program to generate prime numbers upto a given number.
4. Write a program to multiply two matrices.
5. Write a program to create a simple calculator using functions.
6. Write a program to accept 5 subject marks and to calculate the total, average and grade of a student.
7. Write a program to generate an electricity bill.
8. Write a program to count the number of each vowel in a string.
9. Write a program to perform binary search for a given set of numbers.
10. Write a program to demonstrate tuples functions and operations
11. Write a program to demonstrate dictionaries functions and operations
12. Write a python program to demonstrate File Input and Output operations.
13. Write a program to demonstrate Multiple Inheritance.
14. Write a program to demonstrate Exception Handling
15. Write a program to demonstrate Classes and their Attributes.

19UCS6CQ

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Guidelines to the distribution of marks for practical Examinations:

Two Questions will be given for each student. (3 Hours/60 marks)

Record: **10 marks**

	Program1 (marks)	**Program2 (marks)**
Algorithm	**10**	**10**
Program Coding	**10**	**10**
Execution	**5**	**5**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	M	H	S
CO2	H	S	S	S	H
CO3	S	H	S	H	H
CO4	S	M	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCS614

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS614**		**Core Paper 14 – Information Security**		
Batch **2019-2020**	Semester **VI**	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objectives

1. To learn basics of computer security and cyber crimes.
2. To familiarize the role of security in operations system and databases.
3. To know various types of viruses, attacks and threats in hardware, software and data security.

Course Outcomes (CO)

K1	CO1	Students can able to understand the basics of computer security and its terminology.
K2	CO2	Recapitulate various Attacks, Threats and Vulnerabilities in the system.
K3	CO3	Assess cyber security risk management policies in order to adequately protect critical information and assets.
K4	CO4	Students can employ, design and implement appropriate security technologies and policies to protect computers and digital information.

UNIT I **[14 Hours]**

Is there Security Problem in Computing? : What does Security mean? –Attacks-The Meaning of Computer Security-Computer Criminals. Protection in general purpose operating systems : Protected Objects and Methods of Protection-Memory and Address Protection-Control of Access to General Objects-File Protection Mechanisms-User Authentication.

UNIT II **[16 Hours]**

Program Security: Secure Programs- Nonmalicious Program Errors – Viruses and other Malicious Code - Targeted Malicious Code - Controls against Program Threats.

UNIT III **[15 Hours]**

Database and Data Mining Security: Introduction to Databases- Security Requirements-Reliability and Integrity - **Multilevel Databases*** – Proposals for Multilevel Security- Data Mining.

UNIT IV **[14 Hours]**

Security in Networks: **Network Concepts***-Threats in Networks-Firewalls-Intrusion Detection Systems.

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UNIT V **[16 Hours]**

Legal and Ethical Issues in Computer Security: Protecting Programs and Data- Information and the Law-Computer Crime- Ethical Issues in Computer Security.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. Charles P Pfleeger and Shai Lawrence Pfleeger, (2007), "**Security in Computing",**Fourth Edition, Prentice Hall.

Reference Books:

1. Ross J.Anderson and Ross Anderson (2001), **"Security Engineering: A Guide to Building Dependable Distributed Systems"**, Wiley.
2. Debby Russell and Sr.G.T.Gangemi (2006),"**Computer Security Basics (Paperback)"**, Second Edition, O'Reilly Media.
3. Thomas R.Peltier, Justin Peltier and John Blackley (2001), **"Information Security Fundamentals"**, 2nd Edition, Prentice Hall, Reprint.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	H	H	H
CO2	M	H	H	H	H
CO3	H	H	H	M	M
CO4	S	S	H	M	M

S – Strong **H** – High **M** – Medium **L** – Low

19UCS6Z1

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS6Z1**		**Project Work and Viva-Voce**		
Batch **2019-2020**	Semester **VI**	Hours / Week **4**	Total Hours **60**	Credits **5**

Course Objectives

1. To understand and select the task based on their core skills.
2. To get the knowledge about analytical skill for solving the selected task.
3. To get confidence for implementing the task and solving the real time problems.

Course Outcomes (CO)

K3	CO1	Identify and formulate the problem
K4	CO2	Analyse the problem and collect necessary data.
K5	CO3	Design and develop the project using appropriate software by applying the programming skills.
K5	C04	Implement, evaluate and generate reports.

MARK DISTRIBUTION :

	Marks
CIA	**20**
Viva – Voce *	**20**
Project Record *	**60**

* Both Internal & External Examiners shall evaluate Project & Viva-Voce jointly.

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	M	H	H	H
CO2	M	H	H	H	H
CO3	H	H	H	M	M
CO4	S	S	H	M	M

S – Strong **H** – High **M** – Medium **L** – Low

19UCS4A4

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS4A4**		**Allied 4 – Digital Principles and Computer System Architecture**		
Batch **2019-2020**	Semester **IV**	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objectives

1. To educate the basics of computer hardware and how software interacts with computer hardware.
2. To familiarize with different numbering methods like binary, octal, and hexadecimal.
3. To impart the knowledge of buses, I/O devices, flip flops, Memory and bus structure.
4. To understand the concepts of memory hierarchy and compare different methods for computer architecture.

Course Outcomes (CO)

K1	CO1	Remember basic structure of computer and numbering methods like binary, octal and hexadecimal and explain how arithmetic and logical operations are performed by computers.
K2	CO2	Understand various data transfer techniques in digital computer and control unit operations.
K3	CO3	Apply performance issues in processor and memory design of a digital computer various data representations.
K4	CO4	Analyze architectures and computational designs and computer architecture concepts related to design of modern processors, memories and I/Os.

UNIT- I **[15 Hours]**

Number Systems and Codes - Binary Number System : Binary to Octal, Decimal, Hexadecimal Conversions – Decimal Number System : Decimal to Binary, Octal, Hexadecimal Conversions – Octal Number System : Octal to Binary, Decimal, Hexadecimal Conversions - Hexadecimal Number System : Hexadecimal to Binary, Octal, Decimal Conversions –ASCII Code – Excess – 3 Code – Gray Code.

UNIT- II **[14 Hours]**

Digital Logic : The Basic Gates – AND, OR, NOT – Universal Logic Gates : NAND and NOR – AND-OR-Invert Gates.

Combinational Logic Circuits : Boolean Laws and Theorems – Sum-of-Products Method - Truth Table to Karnaugh Map – Pairs, Quads and Octets – Karnaugh Simplification - Don’t Care Conditions- Product-of-Sums Method.

19UCS4A4

UNIT – III **[15 Hours]**

Multiplexers - Demultiplexers – 1-of-16 Decoders – BCD-Decimal Decoders - Encoders – Flip-flops: RS Flip-flops- Edge-trigerred RS Flip-flops - Edge-trigerred D Flip-flops - Edge-trigerred JK Flip-flops.

UNIT – IV **[17 Hours]**

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

Input–Output Organization: **Peripheral Devices *** - Input-Output Interface – Asynchronous Data Transfer (strobe control & handshaking) – Priority Interrupt – Direct Memory Access – Input – Output Processor – Serial Communication.

UNIT –V **[14 Hours]**

Memory Organization**:** Memory Hierarchy – Main Memory – Cache Memory – Virtual Memory.

Multiprocessors: **Characteristics of Multiprocessors * -** Interconnection Structures.

* -Self Study and Questions for Examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Books:

1. Albert Malvino, Donald P.Leach (1995), **"Digital Principles and Applications"**, Third Edition, McGraw Hill Company [Unit I, II, III].

2. M.MORRIS MANO (1999), "**Computer system Architecture "**, 3rd Edition, Pearson Education Publications, [Unit IV, V].

Reference Books:

1. T.C .Bartee (2003) , **" Digital computer Fundamentals "** , Sixth Edition, Tata McGraw Hill.

2. John P.Hayes (1998), **"Computer Architecture and Organization "**, Third Edition, Tata McGraw Hill Publishers Pvt Ltd.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	H	M	S	H	H
CO4	S	S	S	S	M

S – Strong **H** – High **M** – Medium **L** – Low

19UCS3S1

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS3S1**		**Skill Based Subject 1 – PHP Programming**		
Batch **2019-2020**	Semester **III**	Hours / Week **2**	Total Hours **30**	Credits **3**

Course Objectives

1. To learn the basic programming techniques using JavaScript and PHP.
2. To gain an insight of creating classes and using functions in PHP.
3. To learn the process of developing a PHP application and to work with files and directories.

Course Outcomes (CO)

K1	CO1	Remember the basic syntax of PHP and Java script
K2	CO2	Understand Arrays and Strings in PHP
K3	CO3	Implement the concepts of files and directories
K4	C04	Evaluate the database connectivity using PHP and SQLite

UNIT - I **[6 Hours]**

HTML : Introduction – markup language– common tags – headers – meta Elements – text styling – linking - Linking – creating & using images– horizontal rules and More line breaks*. Ordered and unordered list - HTML Tables - HTML Forms and Formatting –HTML Forms – Frameset Element – Nested Framesets.

UNIT - II **[6 Hours]**

Introduction to PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.

UNIT-III **[6 Hours]**

Controlling Program Flow: Writing Simple Conditional Statements – Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

19UCS3S1

UNIT-IV **[7 Hours]**

Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations –Using Arrays with Forms – Working with Array Functions – Working with Dates and Times.

UNIT-V **[5 Hours]**

Working with Files and Directories: Reading Files – Writing Files – Processing Directories.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Presentation, Seminar, Quiz, Discussion & Assignment

Text Books:

1. Vikram Vaswani, (2008), **PHP – A Beginner's Guide**, First Edition, Tata McGraw–Hill publications.
2. Ivan Bayross, (2002), **Web enabled commercial application development using HTML, DHTML, JavaScript, Perl CGI**, Second edition, BPB publications.

Reference Books:

1. Steven Holzner, (2007), **The PHP Complete Reference**, First Edition, Tata McGraw–Hill publications.
2. Steven Holzner , (2005), **Spring in to PHP5**, Addison Wesley Publications.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	H	M	S	H	H
CO4	S	S	S	S	M

S – Strong **H** – High **M** – Medium **L** – Low

19UCS4SL

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS4SL**		**Skill Based Subject 2 – PHP Programming Lab**		
Batch **2019-2020**	Semester **IV**	Hours / Week **2**	Total Hours **30**	Credits **3**

Course Objectives

1. To develop the ability to build efficient web based applications using PHP
2. To learn the basic constructs in PHP Programming.
3. To utilize the concepts of Strings and Array functions in PHP applications.

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Course Outcomes (CO)

K3	CO1	Recollect the concepts of HTML Programming ,creating a web page using HTML and validate it using PHP
K4	CO2	Understand the concept of String functions and Arrays
K5	CO3	Validate the file system functions

List of Practical Programs

1. Develop a Webpage for a Company using HTML Tags
2. Develop a Webpage for a college using Image map.
3. Develop a Webpage for Online Shopping.
4. Develop a PHP program using controls and functions
5. Develop a PHP program and Check message passing mechanism between pages.
6. Develop a PHP program using String functions and Arrays.
7. Develop a PHP program using parsing functions (use Tokenizing)
8. Develop a PHP program to check File System Functions.
9. Develop a PHP program for mail ID creation.
10. Develop a PHP program using Session.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

19UCS4SL

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours/60 marks)

Record : **10 marks**

	Program1 (marks)	**Program2 (marks)**
Algorithm	**10**	**10**
Program Coding	**10**	**10**
Execution	**5**	**5**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	H	S	M
CO2	H	S	S	S	S
CO3	S	H	H	S	S

S – Strong **H** – High **M** – Medium **L** – Low

19UCS6SM

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS6SM**		**Skill Based Subject 3 – Software Testing Lab**		
Batch **2019-2020**	Semester **VI**	Hours / Week **2**	Total Hours **30**	Credits **3**

Course Objectives

1. To gain knowledge about recording the test case in different modes.
2. To design and construct the test cases using Test Script Language.
3. To learn about GUI objects and bitmap objects

Course Outcomes (CO)

K3	CO1	Apply validation and verification in sample applications.
K4	CO2	Analyze the fields of the database and text area of the applications.
K5	CO3	Implement the concepts of checkpoints.

List of Practical Programs

1. Write a program to create calculator using HTML and validate using Selenium IDE with test case.
2. Write a program to create image link using HTML and validate using Selenium IDE with test case.
3. Write a program to create a registration form using HTML and validate using Selenium IDE with test case.
4. Write a program to create a webpage to scroll the text in right, left, up and down directions using HTML and validate using Selenium IDE with test case.
5. Write a program to create company website using HTML and validate using Selenium IDE with test case.
6. Write a program to create department website using HTML and validate using Selenium IDE with test case.
7. Write a program to create a resume using HTML and validate using Selenium IDE with test case.
8. Write a program to create a web page for student mark list using JavaScript and validate using Selenium IDE with test case.

19UCS6SM

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours/60 marks)

Record : **10 marks**

	Program1 (marks)	**Program2 (marks)**
Algorithm	**10**	**10**
Program Coding	**10**	**10**
Execution	**5**	**5**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	H	S	M
CO2	H	S	S	S	S
CO3	S	H	H	S	S

S – Strong **H** – High **M** – Medium **L** – Low

Programme Code : **09**	**B.Sc Computer Science**		
Batch : **2019-2020**	**Elective Paper – Cloud Computing**		
	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objective

1. To understand the basic knowledge about the cloud computing techniques and architecture.
2. To learn the presents cloud computing collaborations and applications.
3. To impart the new concept of various virtualization in cloud computing
4. To gain knowledge of cloud services and cloud security.

Course Outcomes (CO)

K1	CO1	Understand the concepts of cloud Architecture and its services.
K2	CO2	Classify different services providers and its services, tools.
K3	CO3	Demonstrate various web based applications for collaborating everyone in the cloud computing.
K4	CO4	Analyze the best service provider for cloud computing in terms of storage, services.

UNIT-I **[14 Hours]**

Cloud Computing Basics: Cloud Computing Overview – Applications – Intranets and the Cloud. Hardware and Infrastructure: Clients– Security – Network - Services.

UNIT-II **[15 Hours]**

Cloud Computing Architecture: Introduction - Cloud Reference Model – Types of Clouds – Organizational aspects.

UNIT – III **[16 Hours]**

Accessing the Cloud : Platforms – Web Applications – Web Browsers. Cloud Storage: Overview – Cloud Storage Providers.

UNIT – IV **[15 Hours]**

Cloud Applications: Scientific Applications: Healthcare, Geosciences – Business and Consumer Applications: CRM and ERP, **Media Applications***, **Multiplayer Online Gaming*.**

UNIT – V **[15 Hours]**

Standards: Application – Client – Infrastructure – Service. Software as a Service: Overview – Driving Forces - Industries – Healthcare, Banking.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Books:

1. Anthony T.Velte ,Toby J.Velte, Robert Elsenpeter (2010), **"Cloud Computing – A Practical Approach"** , TMH (UNIT I, UNIT III, UNIT V).
2. Rajkumar Buyya, Christian vecchiola , Thamarai selvi (2013), **"Mastering Cloud computing",** Mc Gram Hill Edu, (UNIT II, UNIT IV).

Reference Books:

1. Haley Beard (July 2008), **"Cloud Computing Best Practices for measuring processes for on demand computing, Applications and data centers in the cloud with SLA's "** .
2. Judith Hurwitz, Robin Bloon (2009),**" Cloud Computing for Dummies"**.
3. Michael Miller (2009), **" Cloud computing – Web based application "** , Pearson Edu Inc, First Impression.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	M	H	S
CO3	S	H	H	M	H
CO4	S	S	S	S	M

S – Strong **H** – High **M** – Medium **L** – Low

Programme Code : **09**	**B.Sc Computer Science**		
Batch : **2019-2020**	**Elective Paper – Network Security**		
	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objectives

1. To learn the need for network security and security approaches.
2. To inculcate the concept of transferring authentic data along the network with several methods and algorithms.
3. To enrich the knowledge on different types of Internet Security Protocols.

Course Outcomes (CO)

K1	CO1	Remember the basic concept of Cryptography and various types of attacks.
K2	CO2	Understand about various types of protocols for Internet Security.
K3	CO3	Implement various algorithms for Cryptography
K4	CO4	Review Firewall and IP security

Syllabus

UNIT I **[17 Hours]**

Attacks on Computers and Computer Security: Introduction – The Need for security – Security Approaches – Principles of Security – Types of Attacks: A General View – A Technical View - The Practical side of Attacks – Programs that Attack: Virus, Worms, Trojan Horse.

Cryptography: Introduction – Plain Text and Cipher Text – Substitution Techniques – Transposition Techniques - Encryption and Decryption – Steganography.

UNIT II **[19 Hours]**

Symmetric Key Algorithms and AES: Introduction – Algorithm Types and Modes – An Overview of Symmetric Key Cryptography - DES – IDEA.
Asymmetric Key Algorithms, Digital Signatures and RSA: Introduction – The RSA Algorithm – An Overview of Asymmetric Key Algorithms - Digital Signatures

UNIT III **[18 Hours]**

Digital Certificates and Public Key Infrastructure (PKI): Introduction – Digital Certificates – Private Key Management – The PKIX model – PKCS .

UNIT IV **[18 Hours]**

Internet Security Protocols: Introduction – Basic Concepts – SSL – TLS – SHTTP – TSP – SET – Email Security – WAP – * Security in GSM.

UNIT V **[18 Hours]**

User Authentication and Kerberos: Introduction – Authentication Basics – Passwords – Certificate based Authentication – Biometric Authentication – Kerberos – KDC – Security Handshake pitfalls. SSO – DOS Attacks **– CSSV*.**

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. Atul Kahate, (2008), **Cryptograpy and Network Security**, Second Edition, McGraw Hill Education Pvt., Limited.

Reference Books:

1. Charlie Kaufman, Radia Pearlman, Mike Speciner,(2006), **Network Security Private Communication in Public World**, Second Edition, IEEE Publications.
2. Nitesh dhanjani, Justin Clarke, "**Network Security Tools**", Shroff Publications and Distributions Pvt Ltd , Mumbai, 2005.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	M	H	S
CO3	S	H	H	M	H
CO4	S	S	S	S	M

S – Strong **H** – High **M** – Medium **L** – Low

Programme Code : **09**	**B.Sc Computer Science**		
Batch : **2019-2020**	**Elective Paper – Embedded Systems**		
	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objectives

1. To teach all aspects of design and development of an embedded System.
2. To understand hardware and software of development system.
3. To earn the basic concepts of operating systems and embedded system project management.

Course Outcomes (CO)

K1	CO1	Acquire knowledge about microcontrollers embedded processors and their applications.
K2	CO2	Understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
K3	CO3	Apply key concepts of embedded systems like interrupts interaction, drivers, and ports with peripheral devices.
K4	CO4	Analyze the design concept of embedded systems.

Syllabus

Unit I **[15 Hours]**

Introduction to Embedded System: An Embedded System – Processor in the System– Other Hardware units – Software embedded into a system – Exemplary embedded system – Embedded system on chip and in VLSI circuit. Processor and Memory organization: Structural units in a processor – Processor selection – **Memory devices**,**Memory selection** *- Allocation of memory – DMA.

Unit II **[14 Hours]**

Devices and buses for device networks: I/O devices – Device drivers and Interrupts servicing mechanism: Device drivers – Parallel port device drivers – Serial port device drivers– Interrupt servicing mechanism – Context and the periods for context-switching, dead-line and interrupt latency.

Unit III **[16 Hours]**

Program modeling concepts in single and multiprocessor systems: Modeling process for software analysis before software implementation – Programming models for event controlled or response time constrained real time programs. Inter-process communication and synchronization of processes, tasks and threads: Multiple processor – Problem of sharing data by multiple tasks and routines – Inter-process communication.

Unit IV **[15 Hours]**

Real time operating systems: Operating system services – I/O subsystem – Network operating systems – Real time and embedded operating systems – Interrupt routine in RTOS environment – RTOS task scheduling.

Unit V **[15 Hours]**

Embedded system project management – embedded system design and code design issues in system development process – Uses of target system or its emulator and In circuit emulator – Uses of scopes and logic analysers for system h/w tests – **Issues in embedded system design***.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. RajKamal,(2007), **Embedded Systems – Architecture, Programming And Design**, Second Edition, TMH publications.

Reference Books:

1. David E Simon, (1999), **An Embedded Software Primer,** Thirteenth Reprint, Addison Wesley, Pearson Education Asia.
2. Tammy Noergaard, (2013), **Embedded System Architecture**, Second Edition, Elsevier.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	H	M	H	H
CO4	S	S	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

Programme Code : **09**	**B.Sc Computer Science**		
Batch : **2019-2020**	**Elective Paper – Big Data Analytics**		
	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objectives

1. To understand and apply scaling up machine learning techniques and associated computing techniques and technologies.
2. To identify the characteristics of datasets and compare the trivial data and big data for various applications.
3. To recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

Course Outcomes (CO)

K1	CO1	Understand the different dimensions of digital data.
K2	CO2	Apply the concept of data classification on different types of data
K3	CO3	Analyze the characteristics of different patterns of data
K4	CO4	Implement the concept of bigdata in different scenarios

UNIT I **[15 Hours]**

Data Evolution: Data Development Time Line – ICT Advancement-a Perspective – Data Growth-a Perspective – IT Components-Business Process – Landscape-Data to Data Science – Understanding data: Introduction – Type of Data: Numeric – Categorical – Graphical – High Dimensional Data — Data Classification – Hot Data – Cold Data – Warm Data – Thick Data – Thin Data - Classification of digital Data: Structured, Semi-Structured and Un-Structured.

UNIT II **[15 Hours]**

Sources of Data: Time Series – Transactional Data – Biological Data – Spatial Data – Social Network Data – Data Evolution – Data Sources

Data Science: Data Science-A Discipline – Data Science vs Statistics – Mathematics - Programming Language - Database, - Machine Learning. Data Analytics Relation: Data Science, Analytics, Big Data Analytics.

UNIT III **[14 Hours]**

Data Science Components: Data Engineering, Data Analytics-Methods and Algorithm, Data Visualization Big Data: Introduction To Big Data: - Evolution What is Big Data – Sources of Big Data. Characteristics of Big Data 6Vs – Big data- Challenges of Conventional Systems.

UNIT IV **[16 Hours]**

Data Processing Models – Limitation of Conventional Data Processing Approaches – Big Data Myths - Data Discovery-Traditional Approach, Big Data Technology: Big Data Exploration - Data Augmentation – Operational Analysis – 360 View of Customers – Security and Intelligence

UNIT V **[15 Hours]**

Big Data Usecases –Big Data Technology Potentials – Limitations of Big Data and Challenges- Big Data Roles Data Scientist , Data Architect, Data Analyst – Skills – Case Study : Big Data – Customer Insights – Behavioral Analysis – Big Data Applications - Marketing – Retails – Insurance – Risk and Security – Health care.

* - Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. V. Bhuvaneswari, T. Devi, “Big Data Analytics: A Practitioner‟s Approach” 2016.

Reference Books:

1. Han Hu, Yonggang Wen, Tat-Seng, Chua, XuelongLi,“Toward Scalable Systems for Big
2. SeemaAcharya, SubhashniChellappan, “Big Data Analytics”, Wiley, 2015.

Mapping

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	H	M	H	H
CO4	S	S	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

Programme Code : **09**	**B.Sc Computer Science**		
Batch : **2019-2020**	**Elective Paper – Mobile Computing**		
	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objectives

1. To learn the basic concepts of Mobile Computing and its Applications.
2. To provide various emerging technologies in Mobile computing services.
3. To gain knowledge about GSM, GPRS, CDMA and 3G.

Course Outcomes (CO)

K1	CO1	member the concept of Wireless LANs, PAN, Mobile Networks
K2	CO2	Understand positioning techniques of location-based services and applications
K3	CO3	Apply all techniques used in the GSM and GPRS
K4	CO4	Analyze CDMA and wireless LANS.

Syllabus

UNIT-I **[15 Hours]**

Introduction: Mobility of bits and bytes, wireless- The beginning, mobile computing – Networks – Middleware and Gateways – Application and Services – Developing Mobile computing Applications – Security in Mobile Computing.

Mobile Computing Architecture: History of Computers – History of Internet – Internet – The ubiquitous network – Architecture for Mobile Computing– Three Tire Architecture - Design consideration for Mobile Computing- Mobile Computing through Internet – Making existing Applications Mobile - Enabled.

UNIT-II **[15 Hours]**

Mobile Computing through Telephony: Evolution of Telephony – Multiple Access Procedures - Mobile Computing through Telephone – Developing an IVR application – Voice XML – Telephony Application Programming Interface (TAPI)

Emerging Technologies: Introduction – Bluetooth- Radio Frequency Identification – Wireless broadband – Mobile IP- Internet Protocol Version 6(IPV6)- Java Card.

UNIT-III **[15 Hours]**

Global system for Mobile Communication (GSM): Global system for Mobile Communication- GSM Architecture – GSM entities – Call routing in GSM, PLMN Interface – GSM Address Identifiers – Network aspects in GSM- GSM frequency allocation – Authentication and Security.

Short Message Service (SMS) : Mobile Computing over SMS - **Short Message Service***- Value added services through SMS – Accessing the SMS bearer.

UNIT – IV **[15 Hours]**

General Packet Radio Service (GPRS) : Introduction – GPRS and packet data network – GPRS network architecture – GPRS network operations – Data services in GPRS – Applications for GPRS- limitations of GPRS – Billing and Charging in GPRS.

Wireless Application Protocol (WAP): Introduction – WAP – MMS- GPRS application.

UNIT- V **[15 Hours]**

CDMA and 3G : Introduction – Spread spectrum technology – IS 95- CDMA versus GSM – Wireless data – Third generation network – Application on 3G.

Wireless LAN : Introduction – Wireless LAN advantages – IEEE 802.11 standards – Wireless LAN architectures – Mobility in Wireless LAN – Deploying Wireless LAN – Mobile Ad-hoc network and sensor network – Wireless LAN Security – WiFi versus 3G.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing ", Tata McGraw Hill Publishing Company Ltd, 2005.

Reference Books:

1. Jochen Schiller, (2004), **Mobile Communications**, Second Edition, AddisionWesely Publications.
2. UWE Hansmann, LotherMerk, Martin.S, (2006), **Principles of Mobile Computing,** Second Edition, Springer publications.
3. Jeyasri Arokiamary,(2005), **Mobile Communications**, First Edition, Anuradha Agencies.

Mapping

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	H	M	H	H
CO4	S	S	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

Programme Code : **09**	**B.Sc Computer Science**		
Batch : **2019-2020**	**Elective Paper – Internet of Things**		
	Hours / Week **5**	Total Hours **75**	Credits **5**

Course Objectives

1. To learn the concepts of IOT and its protocols.
2. To learn how to analysis the data in IOT.
3. To develop IOT infrastructure for popular applications.

Course Outcomes (CO)

K1	CO1	Analyzing and evaluate the data received through sensors in IOT.
K2	CO2	Designing and develop smart city in IOT
K3	CO3	Analyzing various protocols for IOT.
K4	CO4	Analyzing applications of IOT in real time scenario

Syllabus

UNIT I **[15 Hours]**

Introduction to IoT-Genesis of IoT-IoT and Digitization-IoT Impact-Convergence of IT and OT-IoT Challenges- IoT Network Architecture and Design-Drivers Behind New Network Architectures-Comparing IoT Architectures- Additional IoT Reference Models.

UNIT II **[15 Hours]**

The Core IoT Functional Stack- IoT Data Management and Compute Stack - Fog Computing-Edge Computing - The Hierarchy of Edge, Fog, and Cloud-Smart Objects- The Things in IoT-Sensors, Actuators, and Smart Objects- Sensor Networks-Wireless Sensor Networks-Communication Protocols for Wireless Sensor Networks.

UNIT III **[15 Hours]**

Connecting Smart Objects-Communications Criteria-IoT Access Technologies-Standardization and Alliances- -Competitive Technologies- IEEE 802.15.4- IEEE 802.15.4g and 802.15.4e- IEEE 1901.2a- IEEE 802.11ah- LoRaWAN- NB-IoT and Other LTE Variations

UNIT IV **[15 Hours]**

IP as the IoT Network Layer- The Business Case for IP- Optimizing IP for IoT- Authentication and Encryption on Constrained Nodes- *ACE- DICE*- Application Protocols for IoT- The Transport Layer- IoT Application Transport Methods- SCADA- Generic Web-Based Protocols- IoT Application Layer Protocols- CoAP

UNIT V **[15 Hours]**

IoT in Industry- Transportation- Transportation Challenges- IoT Use Cases for Transportation- An IoT Architecture for Transportation- Extending the Roadways IoT Architecture to Bus Mass Transit- Extending Bus IoT Architecture to Railways- **Public Safety-** Public and Private Partnership for Public Safety IoT- An IoT Blueprint for Public Safety Emergency Response IoT Architecture- **School Bus Safety- School Bus Safety Network Architecture ***

*** Self Study Topic and Questions for examinations may be taken from Self Study Portions also.**

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Text Book:

1**.** David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, ―IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

Reference Books:

1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Key applications and Protocols‖, Wiley, 2012 (for Unit 2).
3. Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand,David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2012.

Mapping

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	H	M	H	H
CO4	S	S	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

19UCS5X1

Programme Code : **09**		**B.Sc Computer Science**		
Course Code: **19UCS5X1**		**EDC – Web Designing using HTML**		
Batch **2019-2020**	Semester **V**	Hours / Week **2**	Total Hours **30**	Credits **3**

Course Objectives

1. The course introduces the basic concepts of the World Wide Web, principles and tools that are used to develop Web applications.
2. To develop an ability to design and implement static and dynamic website.
3. Design and develop a Web site using text, images, links, lists, and tables for navigation and layout.

Course Outcomes (CO)

K1	CO1	Remember the internet related concepts that are vital in understanding web development.
K2	CO2	Understand the important HTML tags for designing static pages
K3	CO3	Design and develop web pages using internal or external linking
K4	CO4	Develop interactive web applications through coding using HTML

LIST OF PRACTICAL PROBLEMS

1. Design a web page for a company using HTML Formatting Tags
2. Design a web page for library system using HTML Tags
3. Design a web page for your college using HTML Tags
4. Design a web page with the following components
    a. Image b. Hyperlink
5. Design a web page which shows your resume using HTML Tags
6. Design a web page to advertise a product using using HTML Tags
7. Create a web service for currency conversion with the client program.

19UCS5X1

Teaching Methods

Chalk and Talk Method / Demonstration / Powerpoint Presentation / Seminar / Quiz / Discussion /Assignment

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours/60 marks)

Record : **10 marks**

	Program1 (marks)	**Program2 (marks)**
Algorithm	**10**	**10**
Program Coding	**10**	**10**
Execution	**5**	**5**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	H	S	M
CO2	H	S	S	S	S
CO3	S	H	H	S	S
CO4	S	S	S	M	S

S – Strong **H** – High **M** – Medium **L** – Low

19EVS101

Programme Code: 09		**B.Sc Computer Science**		
Course Code: 19EVS101		**Part IV – Environmental Studies**		
Batch 2019-2020	Semester I	Hours / Week 2	Total Hours 30	Credits 2

Objectives

1. To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
2. To shape students into good "eco citizens" thereby catering to global environmental needs.

Syllabus

Unit I **[6 hours]**

Multidisciplinary Nature of Environment

Definition : scope and importance – Need for public awareness - Natural resources – Types of resources – Forest Resources – Water Resources – Mineral Resources – Food Resources – Energy Resources – Land Resources.

Unit II **[6 hours]**

Ecosystems

Concept of an ecosystem – Structure and functions of an ecosystem – Procedures, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food web and ecological pyramids – Structure and function of the following ecosystem – Forest Ecosystem –Grassland Ecosystem – Desert Ecosystem – Aquatic Ecosystem.

Unit III **[6 hours]**

Biodiversity and its Conservation

Introduction – Definition – Genetic – Species and ecosystem diversity- Bio geographical classification of India – Value of biodiversity – Biodiversity at global, national and local levels – India as a mega - diversity Nation - Hot spot of biodiversity – Threats to biodiversity - Endangered and endemic species of India – Conservation of Biodiversity – insitu Conservation of Biodiversity – exsitu Conservation of Biodiversity

Unit IV **[6 hours]**

Environmental Pollution

Definition - Causes, effects and control measures of : Air Pollution – Water Pollution – Soil Pollution – Marine Pollution – Noise Pollution – Thermal Pollution – Nuclear Pollution – Solid Waste Management: Causes, effects, control measures of urban and industrial wastes – Role of individual in prevention of pollution – Pollution case studies – domestic waste water, effluent from paper mill and dyeing, cement pollution – Disaster Management – Food, Drought, Earthquake, Tsunami, Cyclone and Landslide.

Unit V **[6 hours]**

Social Issues and the Environment

Sustainable Development – Urban problems related to energy – Water Conservation: Rain Water Harvesting and Watershed Management – Resettlement and rehabilitation of people, its problems and concerns, case studies Narmatha Valley Project – Environmental ethics, issues and possible solutions – Climate change, global warming, ozone layer depletion, acid rain, nuclear accidents and holocaust, case studies – Hiroshima and Nagasaki, Chernobyl – Consumerism and waste products – Environmental

19EVS101

Protection Act – Air Pollution Act (Prevention and Control) – Water Pollution Act (Prevention and control) – Wild Life Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness – Human Population and the environment – Population Growth and Distribution – Population Explosion – Family Welfare Programme – Environment and Human Health – Human Rights – Value Education – HIV/ AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health –

Text Book

1. P.Arul, "**A Text Book of Environmental Studies**", Environmental Agency, No 27, Nattarstreet, Velacherry main road, Velacheery, Chennai – 42, First Edition, Nov. 2004.

Reference Books

1. PurohitShammi Agarwal, **"A Text Book of Environmental Sciences"**, Publisher Mrs. SaraswatiProhit, Student Edition, Behind Naswan Cinema Chopansi Road, Jodhpur.

2. Dr.Suresh and K.Dhameja, "**Environmental Sciences and Engineering"**, Publisher S.K.Kataria& Sons, 424/6, Guru Nanak Street, Vaisarak, Delhi – 110 006.
3. J.Glynn Henry and Gary W Heinke, "**Environmental Science and Engineering"**, Prentice Hall of India Private Ltd., New Delhi – 110 001.

* Self Study (Questions may be asked from these portions also)

Question Paper Pattern
(External only)

Duration: 3 hours Total Marks : 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

19VED201

Programme Code: 09		**B.Sc Computer Science**		
Course Code: 19VED201		**Part IV – Value Education – Moral and Ethics**		
Batch 2019-2020	Semester II	Hours / Week 2	Total Hours 30	Credits 2

Objectives

1. To impart the value education in every walk of life.
2. To make them understand the relationship between Moral and Ethics.
3. To impart the right attitude by practicing self introspection.
4. To make them realize about their hidden power within them.
5. To develop a knowledge for the steps of upliftment.
6. To know about their goal of life.
7. To make them understand the importance of yoga and meditation.
8. To realize what is the real peace.
9. To understand what are the ways to contribute peace to the whole world
10. To goad youth to reach excellence and reap success.

Syllabus

Unit I **[6 hours]**

Introduction – Meaning of Moral and Ethics – Ethics and culture – Aim of Education.

Unit II **[6 Hours]**

Swami Vivekananda – A biography.

Unit III **[6 Hours]**

The Parliament of Religions – Teachings of Swami Vivekananda.

Unit IV **[6 Hours]**

Steps for Human Excellence.

Unit V **[6 Hours]**

Yoga & Meditation.

Text Book:

1. Value Based Education – **Moral and Ethics**– Published by Kongunadu Arts and Science College (Autonomous), First Edition, 2015.

Reference Books :

1. Easy steps to Yoga by Swami Vivekananda, A Divine Life Society Publication, 2000.

Question Paper Pattern

(External only)

Duration: 3 hours Total Marks: 50

Answer all Questions (5 x 10 = 50 Marks)
Essay type, either or type questions from each unit.

19UHR3N1

Programme Code : 09		**B.Sc Computer Science**		
Course Code: 19UHR3N1		**Part IV - Non - Major Elective – 1 Human Rights**		
Batch 2019-2020	Semester III	Hours / Week 2	Total Hours 30	Credits 2

Objectives

1. To prepare for responsible citizenship with awareness of the relationship between Human Rights, democracy and development.
2. To impart education on national and international regime on Human Rights.
3. To sensitive students to human suffering and promotion of human life with dignity.
4. To develop skills on human rights advocacy
5. To appreciate the relationship between rights and duties
6. To foster respect for tolerance and compassion for all living creature.

Syllabus

Unit I **[6 Hours]**

Definition, Meaning, Concept ,Theories and Kinds of Human Rights- Evaluation and Protection of Human Rights in India- Development of Human Rights under the United Nations.

Unit II **[6 Hours]**

United Nations Charter and Human Rights - U. N. Commission on Human Rights- Universal Declaration of Human Rights - International Covenant on

- Civil & Political Rights
- Economic, Social and Cultural Rights

Unit III **[6 Hours]**

Human Rights and Fundamental Rights (Constitution) - Enactments regarding Human Rights Laws in India - National Human Rights Commission and State Human Rights Commission.

Unit IV **[6 Hours]**

Aged persons and their Human Rights - Human Rights of Persons with Disabilities - Tribal Human Rights in India - Three Generation Human Rights -Social Awareness and Responsibilities of Individuals.

Unit V: Human Rights **[6 Hours]**

Rights of Women, Child, Refugees and Minorities – Social media and Human Rights - NGO's in protection of Human Rights - Right to Election

Books for Study:

1. Human Rights (2019) Published by Kongunadu Arts and Science College, Coimbatore –29.

Book for Reference:

1.Human Rights, (2018) Humanitarian Law and Refugee Law — Jaganathan,MA.,MBA.,MMM.,ML.,ML., J.P.Arjun Proprietor,Usha Jaganathan law series, 1st floor, Narmatha Nanthi Street, Magathma Gandhi Nagar

19UHR3N1

Question Paper Pattern

Duration : 3 hrs Max : 75 marks

Section A (5x5=25)

Short notes
Either – Or/ Type - Question from each unit

Section B (5X10=50)

Essay type
Either – Or/ Type - Question from each unit

19UWR4N2

Programme Code: 09		**B.Sc Computer Science**		
Course Code: 19UWR4N2		**Part IV - Non- Major Elective – 2 Women's Rights**		
Batch 2019-2020	Semester IV	Hours / Week 2	Total Hours 30	Credits 2

Objectives

1. To know about the laws enacted to protect women against violence.
2. To impart awareness about the hurdles faced by women.
3. To develop a knowledge about the status of all forms of women to access to justice.
4. To create awareness about women's rights.
5. To know about laws and norms pertaining to protection of women.
6. To understand the articles which enables the women's rights.
7. To understand the Special Women Welfare laws.
8. To realize how the violence against women puts an undue burden on healthcare services.

Syllabus

Unit I **[6 Hours]**

Women Studies:

Basic concepts of Women's studies in Higher education, Women's studies perspectives - Socialisation- Patriarchy- Women's studies as an academic discipline- Growth and development of Women's studies as a discipline internationally and in India.

Unit II **[6 Hours]**

Socio-economic Development of Women:

Family welfare measures, role of women in economic development, representation of women in media status of women land rights, women entrepreneurs, National policy for the empowerment of women.

Unit III **[6 Hours]**

Womens' rights – Access to Justice:

Crime against women, domestic violence – physical abuse- verbal abuse – emotional abuse - economic abuse – minorities, dowry- harassment and death, code of conduct for work place, abetment of suicide.

Unit IV **[6 Hours]**

Women protective acts:

Protective legislation for women in the Indian constitution - Anti dowry, SITA, PNDT, and Prevention Sexual Harassment at Workplace (Visaka case), Domestic violence (Prevention) Act

19UWR4N2

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Unit V **[6 Hours]**

Women and Child welfare:

Safety provisions - various forms of mass media, radio, visual, internet, cyber space, texting, SMS and smart phone usage.

Healing measures for the affected women and child society by private and public sector, NGO and society.

Book for study :

1. Women's Rights (2019) Published by Kongunadu Arts & Science College, Coimbatore – 641 029.

References

1. "Rights of Indian women" by Vipul Srivatsava. Publisher: Corporate Law Advisor , 2014.
2. "Women's security and Indian law" by Harsharam Singh. Publisher : Aabha Publishers and Distributors, 2015
3. "Women's Property Rights in India" by Kalpaz publications, 2016.

Question Paper Pattern

Duration : 3 hrs Max : 75 marks

Section A(5x5=25)

Short notes

Either – Or/ Type - Question from each unit

Section B(5X10=50)

Essay type

Either – Or/ Type - Question from each unit

Programme Code : 09	**B.Sc Computer Science**		
Non- Major Elective – Consumer Affairs			
Batch 2019-2020	**Hours/Week** 2	**Total Hours** 30	**Credits** 2

Course Objectives

1. To familiarize the students with their rights and responsibilities as a consumer.
2. To understand the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards.
3. To have a handle the business firms' interface with consumers and the consumer related regulatory and business environment.

Course Outcomes (CO)

K1	CO1	Able to know the rights and responsibility of consumers.
K2	CO2	Understanding the various procedure of redress.
K3	CO3	plying the role of different agencies in establishing product and service standards.
K4	CO4	To enable them to handle the business firms' interface with consumers.

Syllabus

Unit I **[6 Hours]**

Conceptual Framework - Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology. Experiencing and Voicing Dissatisfaction: Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000 suite

Unit II **[6 Hours]**

The Consumer Protection Law in India - Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, restrictive trade practice.
Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection

Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State

Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and

Territorial), Role of Supreme Court under the CPA with important case law.

Unit III **[6 Hours]**

Grievance Redressal Mechanism under the Indian Consumer Protection Law - Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.
Leading Cases decided under Consumer Protection law by Supreme Court/National Commission: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

Unit IV **[6 Hours]**

Role of Industry Regulators in Consumer Protection

i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance Ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI
v. Electricity Supply: Electricity Regulatory Commission
vi. Real Estate Regulatory Authority

Unit V **[6 Hours]**

Contemporary Issues in Consumer Affairs - Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview.

Note: Unit 2 and 3 refers to the Consumer Protection Act, 1986. Any change in law would be added appropriately after the new law is notified.

SUGGESTED READINGS:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) Consumer Affairs, Universities Press.
2. Choudhary, Ram Naresh Prasad (2005). Consumer Protection Law Provisions and Procedure, Deep and Deep Publications Pvt Ltd.
3. G. Ganesan and M. Sumathy. (2012). Globalisation and Consumerism: Issues and Challenges, Regal Publications
4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, New Delhi
5. Rajyalaxmi Rao (2012), Consumer is King, Universal Law Publishing Company
6. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.

7. E-books :- www.consumereducation.in
8. Empowering Consumers e-book, www.consumeraffairs.nic.in
9. ebook, www.bis.org
10. The Consumer Protection Act, 1986 and its later versions.

Mapping

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	S	S
CO2	H	H	M	H	H
CO3	H	S	S	S	S
CO4	S	M	H	S	M

S – Strong **H** – High **M** – Medium **L** – Low

Question Paper Pattern

Duration : 3 hrs Max : 75 marks

Section A(5x5=25)

Short notes
Either – Or/ Type - Question from each unit

Section B (5X10=50)

Essay type
Either – Or/ Type - Question from each unit