

KONGUNADU ARTS AND SCIENCE COLLEGE

(AUTONOMOUS)

COIMBATORE – 641 029



DEPARTMENT OF COMPUTER SCIENCE

CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)

(2021 - 2022 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 the students admitted during the Academic Year 2021-2022 & Onwards)

Semester	Part	Subject code	Title of the Paper	Instruction Hours / Cycle	Exam. Marks			Duration of Exam.(hours)	Credits	
					CIA	ESE	Total			
I	I	21TML1A1	Language I	6	50	50	100	3	3	
	II	21ENG101	English I	6	50	50	100	3	3	
	III	21UCS101	C.P.1 – C Programming	4	50	50	100	3	4	
		21UCS1CL	C.Pr.1 – C Programming – Lab	6	50	50	100	3	2	
		21UCS1A1	Allied 1 –Discrete Mathematics and Statistics	6	50	50	100	3	5	
	IV	21EVS101	Environmental Studies **	2	-	50	50	3	2	
	Total Instruction Hours				30			550		19
II	I	21TML2A2	Language II	6	50	50	100	3	3	
	II	21ENG202	English II	6	50	50	100	3	3	
	III	21UCS202	C.P.2 - Object Oriented Programming with C++	4	50	50	100	3	4	
		21UCS2CM	C.Pr.2 – Object Oriented Programming with C++ - Lab	6	50	50	100	3	2	
		21UCS2A2	Allied 2 –Operations Research	6	50	50	100	3	5	
	IV	21VED201	Value Education – Moral and Ethics **	2	-	50	50	3	2	
	Total Instruction Hours				30			550		19
III	III	21UCS303	C.P.3 – Data Structures	5	50	50	100	3	4	
		21UCS304	C.P.4 – Database Management System	5	50	50	100	3	4	
		21UCS305	C.P.5 - Visual Basic and Oracle	5	50	50	100	3	5	
		21UCS3CN	C.Pr.3 – Visual Basic and Oracle Lab	6	50	50	100	3	2	
		21UCS3A3	Allied 3 –Business Accounting	5	50	50	100	3	5	
	IV	21UCS3S1	Skill Based Subject 1- Mobile Application Development - Lab	2	50	50	100	3	3	
		21TBT301/ 21TAT301/ 21UHR3N1	Basic Tamil */ Advanced Tamil **/ Non-Major Elective 1-Human Rights**	2	—	75	75	3	2	
	Total Instruction Hours				30			675		25

IV	III	21UCS406	C.P.6 – Operating Systems	5	50	50	100	3	4
		21UCS407	C.P.7 – Software Engineering and Testing	5	50	50	100	3	4
		21UCS408	C.P.8 – Java Programming	5	50	50	100	3	4
		21UCS4CO	C.Pr.4 – Java Programming -Lab	6	50	50	100	3	2
		21UCS4A4	Allied 4 –Digital Principles and Computer System Architecture	5	50	50	100	3	4
	IV	21UCS4SL	Skill Based Subject 2 – Software Testing Lab	2	50	50	100	3	3
		21T BT402/ 21T AT402/ 21UWR4N2	Basic Tamil*/ Advanced Tamil** / Non-Major Elective 2-Women’s Rights**	2	—	75	75	3	2
	Total Instruction Hours				30			675	
V	III	21UCS509	C.P.9 – Artificial Intelligence	6	50	50	100	3	4
		21UCS510	C.P.10 – Python Programming and IoT	5	50	50	100	3	5
		21UCS5CP	C.Pr.5 – Python Programming and IoT – Lab	6	50	50	100	3	2
		21UCS511	C.P.11 – Data Communication and Networking	6	50	50	100	3	4
		21UCS5E1	Major Elective I	5	50	50	100	3	5
	IV		EDC	2	50	50	100	3	3
	-	21UCS5IT	Internship Training ****	Grade					
Total Instruction Hours				30			600		23
VI	III	21UCS612	C.P.12 – Data Analytics	4	50	50	100	3	4
		21UCS613	C.P.13 –PHP Programming	4	50	50	100	3	4
		21UCS6CQ	C.Pr.6 –PHP Programming-Lab	6	50	50	100	3	2
		21UCS614	C.P.14 – Information Security	5	50	50	100	3	5
		21UCS6E2	Major Elective II	5	50	50	100	3	5
		21UCS6Z1	Project Work and Viva-Voce ***	4	50	50	100	3	5
	IV	21UCS6SM	Skill Based Subject 3 – Data Analytics – Lab	2	50	50	100	3	3
	-	-	SWAYAM-MOOC	-	-	-	-	-	2
Total Instruction Hours				30			700		30
V	21NCC/NSS/ YRC/PYE/EC C/RRC/WEC 101#	Co-Curricular 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 – 21HIN/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 – 35 marks; Viva voce – 15 marks; Internal-50 marks

**** The students shall undergo Internship training / field work for a minimum period of 2 weeks at the end of the fourth semester during summer vacation and submit the report in the fifth semester. The report will be evaluated for 100 marks along with the internal viva voce by the respective Faculty. 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

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

1. Cloud Computing
2. Network Security
3. Embedded Systems
4. Systems Software
5. Mobile Computing
6. Machine Learning

Non-Major Elective Papers

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

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

21UCS5XL - Web Designing using HTML

List of Co-Curricular 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	70
		SWAYAM-MOOC	-	2
		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	Co-Curricular Activities	50	1
		TOTAL	3800	140

- 50% CIA is applicable to all subjects except JOC, COP and SWAYAM Courses, which are considered as extra credit courses.
- The students should 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 (50 Marks)

Components		Marks	Total
Theory			
CIA I	75	(75+75) converted to 30	50
CIA II	75		
Problem based Assignment**		10	
Attendance		5	
Others*		5	
Practical			
CIA Practical		(50) converted to 30	50
Observation Notebook		15	
Attendance		5	
Project			
Review		45	50
Regularity		5	

* Class Participation, Case Studies Presentation, Field Work, Field Survey, Group Discussion, Term Paper, Workshop/Conference Participation. Presentation of Papers in Conferences, Quiz, Report/Content writing. Etc.

** Two Assignments to be given. (Each 5 marks).

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

(K1-Remembering;K2-Understanding;K3-Applying;K4-Analyzing;K5-Evaluating)

Theory Examination – Part I, II, III & IV(SBS only)i) CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 – K2 Q1 to 20	A (Answer all)	20 x 1 = 20	MCQ-10/ Fill ups-5/ One word-5	75**
K2 – K5 Q21 to 28	B (5 out of 8)	5 x 5 = 25	Short Answers	
K2 – K5 Q29 to 33	C (3 out of 5)	3 x 10 = 30	Descriptive / Detailed	

**For ESE 75 marks converted to 50 marks.

ESE Practical Examination:

Knowledge Level	Section	Marks	Total
K3	Experiments	45	50
K4		Record Work	
K5			

ESE Project Viva Voce:

Knowledge Level	Section	Marks	Total
K3	Project Report	35	50
K4		Viva voce	
K5	15		

Programme Code : 09		B.Sc Computer Science		
		Core Paper 1 – C Programming		
Batch 2021-2022	Semester I	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To gain 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 get exposure to problem-solving through C programming.

Course Outcomes (CO)

K1 to K5	CO1	Remember various programming constructs and to develop C programs.
	CO2	Understand the fundamentals of C programming.
	CO3	Apply the right data representation formats based on the requirements of the problem.
	CO4	Analyze the different Operations on arrays, functions, pointers, structures, unions and files.
	CO5	Evaluate the concepts learnt through implementing and testing of the programs that are developed.

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.

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***. Structure and Union: Introduction – Declaration and initialization – **Union***.

UNIT V**[11 Hours]**

Files: Streams and File Types - Steps for File Operations – File I/O – Other File Function – Command Line Arguments – Application of Command Line Arguments. Programming embedded systems in C: Introduction - What is an embedded system? - Which programming language should you use? - Which operating system should you use? - How do you develop embedded software?

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

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

Text Book:

1. Ashok N Kamthane (2002), “**Programming with ANSI and Turbo C**”, 1st Edition, Pearson Education Publications.
2. Michael J. Pont (2002), “**Embedded C**”, Pearson Education Publications (Chapter 1 Only).

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

CO \ PSO	PSO 1	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
CO5	S	S	S	H	H

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Core Practical 1 – C Programming – Lab		
Batch 2021-2022	Semester I	Hours / Week 6	Total Hours 90	Credits 2

Course Objectives

1. To understand the field of programming using C language.
2. To familiarize the fundamental syntax and semantics of C language.
3. To enhance the analyzing and problem solving skills and use the same for writing programs in C.

Course Outcomes (CO)

K3 to K5	CO1	Develop programming skills using the fundamentals and basics of C Language.
	CO2	Develop programs using the basic elements like control statements, Arrays and Strings
	CO3	Enable effective usage of arrays, structures, functions and pointers.
	CO4	Implement files and command line arguments.
	CO5	Evaluate the ideas and concepts using testing of the programs

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.
[$x - x^3/3! + x^5/5! \dots$]
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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations:

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

MAPPING

PSO CO	PSO 1	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
CO5	S	S	H	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Core Paper 2 – Object Oriented Programming with C++		
Batch 2021-2022	Semester II	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To understand and differentiate the Procedure Oriented Paradigm and Object Oriented Paradigm .
2. To acquire knowledge about Classes, Objects, Inheritance and Polymorphism
3. To develop and implement the programs using Object Oriented concepts .

Course Outcomes (CO)

K1 to K5	CO1	Remember the characteristics of Procedure and Object Oriented Programming Languages
	CO2	Understand the fundamentals of C++ programming structure, function overloading and constructors.
	CO3	Apply C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc., to develop programs.
	CO4	Analyze the concepts of object oriented programming in terms of software reuse and managing complexity to solve real-world problems.
	CO5	Evaluate the concepts learnt through implementing and testing of the programs that are developed.

UNIT I

[12 Hours]

Introduction to C++ - Key concepts of OOP – advantages – OO languages – 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

[12 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 .

UNIT III

[12 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**[12 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**[12 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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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

CO \ PSO	PSO 1	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
CO5	S	S	S	H	H

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Core Practical 2 – Object Oriented Programming with C++ - Lab		
Batch 2021-2022	Semester II	Hours / Week 6	Total Hours 90	Credits 2

Course Objectives

1. To write programs using operators and data structure concepts .
2. To develop programs using Overloading of operators and Virtual functions.
3. To understand the implementation of File concepts.

Course Outcomes (CO)

K3 to K5	CO1	Apply the concepts of object oriented programming.
	CO2	Examine the string functions to perform operator overloading,
	CO3	Analyze the virtual functions and inheritance.
	CO4	Illustrate the file concepts and command line arguments.
	CO5	Evaluate the ideas and concepts using testing of the programs

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 above.

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 details 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, hra, 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 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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

MAPPING

PSO CO	PSO 1	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
CO5	S	S	H	S	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 09		B.Sc Computer Science		
Course Code: 21VED201		Part IV – Value Education – Moral and Ethics		
Batch 2021-2022	Semester II	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. To impart Value Education in every walk of life.
2. To help the students to reach excellence and reap success.
3. To impart the right attitude by practicing self introspection.
4. To portray the life and messages of Great Leaders.
5. To insist the need for universal brotherhood, patience and tolerance.
6. To help the students to keep them fit.
7. To educate the importance of Yoga and Meditation.

Course Outcomes (CO)

K1 to K5	CO1	Recognize Moral values, Ethics, contribution of leaders, Yoga and its practice
	CO2	Differentiate and relate the day to day applications of Yoga and Ethics in real life situations
	CO3	Emulate the principled life of great warriors and take it forward as a message to self and the society
	CO4	Analyze the Practical outcome of practicing Moral values in real life situation
	CO5	Evaluate and Rank the outcome of the pragmatic approach to further develop the skills

Syllabus

UNIT I **[4 Hours]**
Moral and Ethics: Introduction – Meaning of Moral and Ethics – Social Ethics – Ethics and Culture – Aim of Education.

UNIT II **[6 Hours]**
Life and Teachings of Swami Vivekananda: Birth and Childhood days of Swami Vivekananda – At the Parliament of Religions – Teachings of Swami Vivekananda.

UNIT III **[4 Hours]**
Warriors of our Nation: Subhas Chandra Bose – Sardhar Vallabhbhai Patel – Udham Singh – V. O. Chidambaram Pillai – Bhagat Singh – Tiruppur Kumaran – Dheeran Chinnamalai – Thillaiyadi Valliammai – Velu Nachiyar – Vanchinathan.

UNIT IV **[8 Hours]**
Physical Fitness and Mental Harmony: Simplified Physical Exercise – Hand Exercises – Leg Exercises – Neuro Muscular Breathing Exercises – Eye Exercises – Kabalabathi – Maharasana A & B – Massage - Acupressure – Relaxation – Kayakalpa Yogam - LifeForce – Aim & Objectives – Principle – Methods. Introspection – Analysis of Thoughts – Moralization of Desires – Neutralization of Anger – Eradication of Worries.

UNIT V**[8 Hours]**

Yoga and Meditation – The Asset of India: Yogasanam – Rules & Regulations – Surya Namaskar – Asanas – Sitting – Stanging – Prone - Supine - Pranayama – Naadi Sudhi – Ujjayi – Seethali – Sithkari - Benefits. Meditation – Thanduvasadhi - Agna – Shanthi – Thuriyam – Benefits.

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

Text Book

1. Value Based Education – Moral and Ethics – Published by Kongunadu Arts and Science College (Autonomous), First Edition (2020).

Reference Books

1. Swami Vivekananda – A Biography, Swami Nikhilananda, Advaita Ashrama, India, 24th Reprint Edition (2010).
2. Gandhi, Nehru, Tagore and other eminent personalities of Modern India, Kalpana Rajaram, Spectrum Books Pvt. Ltd., revised and enlarged edition(2004).
3. Freedom Fighters of India, Lion M.G. Agrawal, Isha Books Publisher, First Edition (2008).
4. Easy steps to Yoga by Swami Vivekananda, A Divine Life Society Publication (2000).
5. Yoga Practices - 1 – The World Community Service Centre – Vethathiri Publications, Sixth Edition (2017), Erode.
6. Yoga Practices - 2 – The World Community Service Centre – Vethathiri Publications – Eighth Edition (2017), Erode.

Question paper pattern**(External only)**

Duration: 3 hrs

Total Marks: 50

Answer all Questions (5 x 10 = 50 Marks)

Essaytype, either or type questions from each unit.

Programme Code : 09		B.Sc Computer Science		
		Core Paper 3 – Data Structures		
Batch 2021-2022	Semester III	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To know 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 to K5	CO1	Remember the concepts of algorithms for searching, sorting and dynamic programming.
	CO2	Understand the representations of data and various algorithm
	CO3	Apply appropriate algorithms and data structures for real time applications.
	CO4	Analyze the complexity of different algorithms
	CO5	Evaluate the special trees and Hashing Techniques

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** *.

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

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

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

CO \ PSO	PSO 1	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
CO5	S	S	S	H	H

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

Programme Code : 09		B.Sc Computer Science		
		Core Paper 4 – Operating Systems		
Batch 2021-2022	Semester III	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To gain knowledge on the basic operating system concepts.
2. To attain an in-depth understanding of process concepts, deadlock and memory management.
3. To get an exposure to scheduling algorithms, devices and information management.

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic concepts of operating system.
	CO2	Understand the concepts like interrupts, deadlock , memory management and file management.
	CO3	Apply the different algorithms used for representation, scheduling,allocation in DOS and UNIX operating system.
	CO4	Analyze the need for scheduling algorithms.
	CO5	Evaluate the storage management policies with respect to different storage Management techniques

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**[15 Hours]****CASE STUDIES**

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: The Kernel Layer - **Processes and Threads: Fundamental Concepts*** - Caching in Windows Vista – **Security: Fundamental Concepts***.
What is Android? - Features of Android -Architecture of Android.

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

Teaching Methods

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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	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO					
CO1	S	S	S	H	H
CO2	H	S	S	S	S
CO3	S	S	H	S	H
CO4	S	H	S	S	M
CO5	S	H	S	S	M

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

Programme Code : 09		B.Sc Computer Science		
		Core Paper 5 – Java Programming		
Batch 2021-2022	Semester III	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To 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. To understand the fundamentals of object-oriented programming in Java, including managing classes, objects, invoking methods and exception handling mechanisms.
3. To know the concepts of inheritance, packages, interfaces and multithreading are introduced.

Course Outcomes (CO)

K1 to K5	CO1	Remember the fundamentals of programming such as variables, conditional statements and iterative execution statements.
	CO2	Understand the concepts of arrays, strings, packages and multithreading.
	CO3	Apply the concepts of applet programming, graphics programming and files.
	CO4	Analyze a software application using the Java programming language
	CO5	Evaluate the concepts learnt through implementing and testing of the programs that are developed.

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 Errors and Exceptions–Applet programming–**Graphics programming** *.

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

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

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

CO \ PSO	PSO 1	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
CO5	S	S	S	S	M

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

Programme Code : 09		B.Sc Computer Science		
		Core Practical 3 – Java Programming - Lab		
Batch 2021-2022	Semester III	Hours / Week 6	Total Hours 90	Credits 2

Course Objectives

1. To understand the object-oriented programming principles implemented through JAVA programs.
2. To know the event-driven programming methods, including creating and manipulating objects, classes, graphics concepts and applet programming.
3. To design, code, debug and implement JAVA programs.

Course Outcomes (CO)

K3 to K5	CO1	Apply the fundamentals of Java programming language in software development.
	CO2	Examine the basics of Java programming, multi-threaded programs and Exception handling.
	CO3	Analyze and use Java in a variety of applications.
	CO4	Illustrate a software application using the Java programming language.
	CO5	Evaluate the ideas and concepts using testing of the programs.

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.

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 pay out of bounds 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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations:

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

MAPPING

PSO \ CO	PSO 1	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
CO5	S	S	M	S	S

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Skill Based Subject 1 – HTML and CSS Lab		
Batch 2021-2022	Semester III	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To develop the ability to build the web site using HTML
2. To learn the basic constructs in CSS.
3. To utilize the concepts of CSS to build the web based applications.

Course Outcomes (CO)

K3 to K5	CO1	Apply the internet related concepts that are vital in understanding web site development.
	CO2	Examine the important HTML tags for designing web pages and separate design from content using Cascading Style Sheet.
	CO3	Analyze the interactive web applications through coding using HTML, CSS.
	CO4	Illustrate the creation of static webpage using HTML, CSS.
	CO5	Evaluate the results on creativity and innovation of web pages developed using HTML tags and CSS.

List of Practical Programs

1. Develop a Webpage for a Company using HTML formatting Tags.
2. Develop a Webpage for a Department using Images and Hyperlinks.
3. Design a web page that illustrate ordered and unordered list.
4. Design a web page to create Student Mark sheet Entry Form.
5. Develop a Webpage to display the library system using HTML tables.
6. Design an application for pay slip through HTML forms.
7. Design a HTML page to demonstrate the usage of Frames.
8. Develop a webpage to display Resume using CSS.
9. Develop a webpage for product advertisement using CSS.
10. Create a web service for currency conversion with the client program.

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations:

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

MAPPING

PSO CO	PSO 1	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	H	S	S
CO5	H	S	S	S	S

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

Programme Code : 09		B.Sc Computer Science		
		Core Paper 6 – Database Management System		
Batch 2021-2022	Semester IV	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To understand the different issues involved in the design of a database system.
2. To know the essential DBMS concepts such as: database security, integrity and normalization.
3. 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 to K5	CO1	Remember data independence, data models for database systems, database schema and database instances.
	CO2	Understand and use data manipulation language to query and manage a database.
	CO3	Analyze and design a real database application.
	CO4	Apply normalization concepts for designing a good database with integrity constraints.
	CO5	Evaluate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.

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.

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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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	PSO 1	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
CO5	S	H	S	S	S

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Core Paper 7 – Software Engineering and Testing		
Batch 2021-2022	Semester IV	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To understand the basic software engineering methods and practices.
2. To familiarize the techniques for developing software systems.
3. To enrich the knowledge about object oriented design and software testing approaches.

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic concepts of software engineering
	CO2	Understand the software engineering models in developing software applications.
	CO3	Apply the object oriented design in various projects
	CO4	Analyze the various software testing approaches
	CO5	Evaluate the Software testing Plan and Reporting

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.

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

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

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	PSO 1	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
CO5	S	S	H	S	H

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

Programme Code : 09		B.Sc Computer Science		
Subject Code: 21UCS408		Core Paper 8 – Visual Basic and Oracle		
Batch 2021-2022	Semester IV	Hours / Week 5	Total Hours 75	Credits 5

Course Objective

1. To acquire GUI skills required for modern software development.
2. To understand the advantages of Controls available with visual basic.
3. To gain basic understanding of database access and management using data controls.

Course Outcomes (CO)

K1 to K5	CO1	Remember the fundamental skills in utilizing the tools of a visual environment such as menus and toolbars.
	CO2	Understand the SDI and MDI applications using forms, dialogs, and other types of GUI components.
	CO3	Apply the connectivity between VB with MS-ACCESS, ORACLE and SQL and SQL database
	CO4	Analyze the methods and techniques to develop VB projects.
	CO5	Evaluate the concepts learnt through implementing and testing of the programs that are developed.

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.

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. What Is SQLite?- Uses of SQLite.

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

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

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).
3. Jay A. Kreibich (2010), "Using SQLite", O'Reilly Media, Inc.

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.

MAPPING

PSO CO	PSO 1	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
CO5	S	S	H	S	S

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

Programme Code : 09		B.Sc Computer Science		
		Core Practical 4 – Visual Basic and Oracle - Lab		
Batch 2021-2022	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)

K3 to K5	CO1	Apply the concepts of Visual Basic
	CO2	Examine the various Controls in Visual Basic
	CO3	Analyze how to design and develop the event- driven applications using Visual Basicframework.
	CO4	Illustrate the applications using the components of toolbox
	CO5	Evaluate the ideas and concepts using implementation and testing of the programs

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.

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

Smart ClassRoom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations:

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

MAPPING

PSO CO	PSO 1	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
CO5	S	S	S	H	H

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Allied 4 – Digital Principles and Computer System Architecture		
Batch 2021-2022	Semester IV	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To know 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 understand the concepts of memory hierarchy and compare different methods for computer architecture.

Course Outcomes (CO)

K1 to K5	CO1	Remember basic structure of computer, numbering methods, arithmetic and logical operations performed by computers.
	CO2	Understand various data transfer techniques in digital computer and control unit operations.
	CO3	Apply performance issues in processor and memory design of a digital computer various data representations.
	CO4	Analyze architectures and computational designs and computer architecture concepts related to design of modern processors, memories and I/Os.
	CO5	Evaluate the performance of commercially available computers.

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.

UNIT – III**[15 Hours]**

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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Text Books:

1. Albert Malvino, Donald P. Leach (1995), “**Digital Principles and Applications**”, Third Edition, McGrawHill 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	PSO 1	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
CO5	S	S	S	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Skill Based Subject 2 – Mobile Application Development Lab		
Batch 2021-2022	Semester IV	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To understand the Android application development environment
2. To know the user interfaces for interacting with apps and triggering actions
3. To realize the tasks used in handling multiple activities

Course Outcomes (CO)

K3 to K5	CO1	Apply the skills for designing and implementing basic mobile apps
	CO2	Examine the basic programming skills needed for developing mobile apps for a specific platform.
	CO3	Analyze the options to save persistent application data
	CO4	Illustrate the role of security and performance in Android applications
	CO5	Evaluate the functionality of mobile application using android sdk

List of Practical Programs

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application using UI Widgets.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that uses Multiple Font and Colors using UI Widgets.
6. Develop a native application that uses GPS location information.
7. Implement an application that writes data to the SD card using UI Widgets.
8. Implement an application that creates an alert upon receiving a message.
9. Write a mobile application that creates alarm clock using UI Widgets.
10. Develop a mobile application to send an email.

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations:

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

MAPPING

PSO CO	PSO 1	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	H	S
CO5	S	S	H	S	S

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

Programme Code : 09		B.Sc Computer Science		
		Core Paper 9 – Artificial Intelligence		
Batch 2021-2022	Semester V	Hours / Week 6	Total Hours 90	Credits 4

Course Objectives

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

Course Outcomes (CO)

K1 to K5	CO1	Remember the nature of AI problems and task domains of AI.
	CO2	Understand the appropriate search procedures to solve the problems.
	CO3	Apply the suitable knowledge representation method.
	CO4	Analyze the acquired knowledge and infer new knowledge.
	CO5	Evaluate the AI techniques for encoding and accessing the knowledge in the development of AI systems.

UNIT I

[18 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

[18 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

[18 Hours]

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

UNIT IV

[18 Hours]

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

UNIT V**[18 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.

Introduction to Neural Networks, Fuzzy Logic and Genetic Algorithms

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

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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.
3. S.Rajasekaran and G.A.Vijayalakshmi Pai, "**Neural Networks, Fuzzy Logic and Genetic Algorithms:Synthesis and Applications**", PHI Learning Pvt.Ltd , New Delhi,2011 (chapter-1 only)

Reference Books :

1. George FLuger (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	PSO 1	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
CO5	S	S	S	S	H

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Core Paper 10 – Python Programming and IoT		
Batch 2021-2022	Semester V	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To understand the fundamentals of Python Programming and IOT
2. To get exposure to Programming Raspberry Pi with Python.
3. To acquire knowledge about IOT Enabling Technologies.

Course Outcomes (CO)

K1 to K5	CO1	Remember the concept of operators, data types, looping statements in python programming.
	CO2	Understand the concepts of Input / Output operations in file.
	CO3	Apply the various protocols for IOT.
	CO4	Analyze the applications of IOT in real time scenario.
	CO5	Evaluate the concept of Python's web Application

UNIT I

[16 Hours]

Python: Introduction- **Data Types*** and Data Structures-Type Conversions-**Control Flow***- Functions-Modules-Packages-File Handling-Classes-Python Packages of Interest for IOT.

UNIT II

[15 Hours]

Introduction to Internet of Things: Physical Design of IOT-Things in IOT-IOT Protocols-Logical Design of IOT-IOT Functional blocks-IOT Communication models- IOT Communication APIs-IOT Enabling Technologies, IOT Levels. Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

UNIT III

[14 Hours]

IOT and M2M: M2M-Difference between IOT and M2M- SDN and NFV for IOT. IOT System Management with NETCONF-YANG: Need for IOT Systems Management- Simple Network Management Protocol (SNMP) - Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

UNIT IV**[16 Hours]**

IOT Physical Devices & Endpoints: Basic Building Blocks of an IOT Device-Exemplary Device: Raspberry Pi- Raspberry Pi Interfaces-Programming Raspberry Pi with Python-Other IOT Devices.

UNIT V**[14 Hours]**

IOT Physical servers and cloud offerings: Introduction to cloud storage Models and communication APIs- WAMP Autobahn for IOT-Xively cloud for IOT-Python Web application Framework-Django-Designing a RESTful web API-Amazon web services for IOT-SkyNet IOT Messaging Platform.

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

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

TEXT BOOK:

1. Arshdeep Bahga, Vijay Madisetti, (2016), “**Internet of Things A Hands on Approach**”, Universities Press (India), Private Limited.

REFERENCE BOOK:

1. E. Balagurusamy (2017), “**Problem Solving and Python Programming**”, McGraw-Hill, FirstEdition.
2. Gaston C.Hillar ,(2016), “**Internet of Things with Python**”, Packt Publishing.

MAPPING

CO \ PSO	PSO 1	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
CO5	S	S	S	M	S

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

Programme Code : 09		B.Sc Computer Science		
		Core Practical 5 – Python Programming and IoT- Lab		
Batch 2021-2022	Semester V	Hours / Week 6	Total Hours 90	Credits 2

Course Objectives

1. To gain knowledge on the concepts of python programming.
2. To design IoT applications in different domain and be able to analyze their performance
3. To know the various hardware and sensing technologies to build IoT applications.

Course Outcomes (CO)

K3 to K5	CO1	Apply the basic concepts of python programming with IOT.
	CO2	Examine the IOT Enabling Technologies and Domain Specific IOTs.
	CO3	Analyze Programming Raspberry Pi with Python.
	CO4	Illustrate the Python Packages for IOT.
	CO5	Evaluate the ideas and concepts using Python with IOT.

LIST OF PRACTICAL PROBLEMS

1. Write a python program that displays the following information: Your name, Full address
Mobile number, College name, Course subject.
2. Write a python program to find the largest three integers using if-else and conditional operator.
3. Write recursive functions for the factorial of positive integer.
4. Write recursive functions for Fibonacci Sequence up to given number n.
5. Write a python program that writes a series of random numbers to a file from 1 to n and display.
6. (i)Write a Python program for Switching LED on/off from Raspberry Pi console.
(ii)Write a Python program for blinking LED.
7. Write a python program on Raspberry Pi to publish temperature data to MQTT broker.
8. To interface Bluetooth with Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
9. Write a Python program for sending an E-mail on switch press with Raspberry Pi.
10. To interface LED and Switch with Raspberry Pi and write a python program to control an LED with a switch.

11. Write a python program to create TCP server on Raspberry Pi and respond with humidity data to TCP client when requested
12. To interface motor using relay with Raspberry Pi and write a program to turn ON motor when push button is pressed.
13. Write a Python program for implementation of the intrusion detection service that runs on Raspberry Pi.
14. Write a Python program for implementation of the Smart Parking service that runs on Raspberry Pi.
15. Write a Python program for weather reporting bot that tweets weather updates to Twitter

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations:

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

MAPPING

CO \ PSO	PSO 1	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
CO5	S	S	S	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Core Paper 11 – Data Communication and Networking		
Batch 2021-2022	Semester V	Hours / Week 6	Total Hours 90	Credits 4

Course Objectives

1. To know the OSI reference model and the TCP/IPreference model and protocols such as TCP, UDP and IP.
2. To familiarize the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
3. To understand the concepts of transmission media, routing algorithms and collision control.

Course Outcomes (CO)

K1 to K5	CO1	Remember the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.
	CO2	Understand the Internet structure and can see how standard problems are solvedand the use of cryptography and network security
	CO3	Apply the knowledge of different techniques of error detection and correction to detectand solve error bit during data transmission.
	CO4	Analyze the requirements for a given organizational structure and select the mostappropriate networking architecture and technologies
	CO5	Evaluate the different types of network devices and their functions within a network. Identify the different types of network topologies and protocols.

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.

UNIT III

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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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

MAPPING

PSO CO	PSO 1	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
CO5	S	S	S	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		EDC – Web Designing using HTML		
Batch 2021-2022	Semester V	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

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

Course Outcomes (CO)

K3 to K5	CO1	Apply the internet related concepts that are vital in understanding web site development.
	CO2	Examine the important HTML tags for designing web pages.
	CO3	Analyze the interactive web applications through coding using HTML.
	CO4	Illustrate the creation of static webpage using HTML.
	CO5	Evaluate the results on creativity and innovation of web pages developed using HTML tags.

LIST OF PRACTICAL PROBLEMS

1. Design a web page for a company using HTML formatting tags.
2. Design a web page that illustrate ordered and unordered list.
3. Design a web page with the following components
 - a. Image
 - b. Hyperlink
4. Design a web page for Library system using HTML tags.
5. Design a web page for your college using HTML tags.
6. Create a class Time table using Table tag
7. Design a web page which shows your resume using HTML tags.
8. Design a web page to advertise a product using HTML tags.
9. Design a web page to create Student Mark sheet Entry Form.
10. Create a web service for Currency conversion with the client program.

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations:

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

MAPPING

PSO CO	PSO 1	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
CO5	S	S	H	S	S

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Core Paper 12 – Data Analytics		
Batch 2021-2022	Semester VI	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To understand the fundamental concepts in data science.
2. To familiarize Data Classification, Sources of Data, Data Science user- roles and skills.
3. To acquire knowledge in Basics of R tool and statistical measures.

Course Outcomes (CO)

K1 to K5	CO1	Understand data classification, process of big data technology, user roles and skills in data science.
	CO2	Apply the fundamental concepts and techniques of data science in 360 view of Customer
	CO3	Analyze the methodologies of data science
	CO4	Implement the statistical measures using R
	CO5	Evaluate the data analysis techniques for applications handling large data.

UNIT I

[12 Hours]

Data Evolution: Data Development Time Line – ICT Advancement-a Perspective – Data Growth-a Perspective – IT Components-Business Process – Landscape-Data to Data Science.

UNIT II

[12 Hours]

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

UNIT III

[12 Hours]

Data Science: Data Science-A Discipline – Data Science vs Statistics, Data Science vs Mathematics, Data Science vs Programming Language, Data Science vs Database, Data Science vs Machine Learning. Data Analytics – Relation: Data Science, Analytics, Big Data Analytics. Data Science. Components: Data Engineering, Data Analytics-Methods and Algorithm, Data Visualization

UNIT IV**[12 Hours]**

Exploring R Basics: Introduction – Getting started – R Features – R Studio – Packages and Library – Installing and Loading Packages – Starting R – R Basic Data types - R Basic operators – R Objects – R File formats 0 Importing and Exporting files.

Data Visualization in R : Introduction – Exploratory data analytics – Lattice package – Datasets – Histogram – Density plot – Box plot – Bar chart – Strip plot – Theoretical Quantile plot – **Dot plot***– Scatter plot.

UNIT V**[12 Hours]**

Statistical Measures – Introduction – Understanding data distribution – Usecase: Central tendency measure – Measure of variability – Range – Inter Quartile Range – Variability Analysis using Mean – Median Absolute deviation – Data Standardizing – **Sampling Distribution** – **Probability distribution *** – Hypothesis Tests.

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

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

TEXT BOOKS:

1. V. Bhuvanewari, T. Devi (2016) “**Big Data Analytics: A Practitioner’s Approach**”.
2. V. Bhuvanewari (2018), “**Data Analytics with R Programming**”, Scitech Publications.

REFERENCE BOOKS:

1. Nina Zumal, John Mount (2014). Practical Data science in R, Managing Publication Company.
2. Bernard Kolman, Robert C. Busby and Sharon Ross (2004). Discrete Mathematical Structures, New Delhi: Prentice Hall.

MAPPING

CO \ PSO	PSO 1	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
CO5	S	S	S	S	H

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

Programme Code : 09		B.Sc Computer Science		
		Core Paper 13 – PHP Programming		
Batch 2021-2022	Semester VI	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

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

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic syntax of PHP
	CO2	Understand Arrays and Strings in PHP
	CO3	Apply the concepts of files and directories
	CO4	Analyze the database connectivity using PHP and SQL
	CO5	Evaluate the effectiveness of PHP programming concepts in developed applications.

UNIT - I

[11 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-II

[13 Hours]

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

UNIT-III

[12 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-IV**[12 Hours]**

Using functions and classes: Creating user defined functions –Creating classes - Working with Files and Directories: Reading Files – Writing Files – Processing Directories.

UNIT-V**[12 Hours]**

Working with Databases and SQL: Creating and populating a Database with MySQL and MySLi —Working with Cookies, Sessions – IOS and Android services.

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

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

Text Books:

1. Vikram Vaswani, (2008), **PHP – A Beginner’s Guide**, First Edition, Tata McGraw–Hill publications.
2. J.F. DiMarzio, (2008), **Android: A Programming Guide**, McGraw Hill Education India
3. Matt Neuburg, (2016), **iOS 10 Programming Fundamentals with Swift** , O'Reilly Media Pub

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	PSO 1	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
CO5	S	S	S	S	H

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

Programme Code : 09		B.Sc Computer Science		
		Core Practical 6 – PHP Programming Lab		
Batch 2021-2022	Semester VI	Hours / Week 6	Total Hours 90	Credits 2

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.

Course Outcomes (CO)

K3 to K5	CO1	Apply the concepts of PHP programming fundamental features
	CO2	Examine string functions and arrays to develop the applications.
	CO3	Analyze file system functions.
	CO4	Illustrate SESSION and COOKIE concepts in PHP applications.
	CO5	Evaluate the web pages implemented containing PHP and MySQL.

List of Practical Programs

1. Develop a PHP program using controls and functions.
2. Design a simple web page to generate multiplication table for a given number.
3. Develop a PHP program and Check message passing mechanism between pages.
4. Develop a PHP program using String functions and Arrays.
5. Design a web page that should compute one's age on a given date.
6. Develop a PHP program using parsing functions (use Tokenizing)
7. Develop a PHP program to find the GCD of two numbers using user defined functions.
8. Develop a PHP program to check File System Functions.
9. Write a program to download a file from the server
10. Develop a PHP program to generate mark statement
11. Develop a PHP program for mail ID creation.
12. Develop a PHP program to design a college application form using MYSQL table.
13. Design an authentication web page in PHP with MySQL to check username and password.
14. Write a program to store page views count in SESSION, to increment the count on each refresh and to show the count on web page.
15. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations:

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

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CO1	S	S	H	S	M
CO2	H	S	S	S	S
CO3	S	H	H	S	S
CO4	S	S	H	S	S
CO5	S	S	S	H	S

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

Programme Code : 09		B.Sc Computer Science		
		Core Paper 14 – Information Security		
Batch 2021-2022	Semester VI	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To understand the 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 to K5	CO1	Remember the basics of computer security and its terminology.
	CO2	Understand the various Attacks, Threats and Vulnerabilities in the system.
	CO3	Apply cyber security risk management policies in order to adequately protect critical information and assets.
	CO4	Analyze the needs of the Information security of data.
	CO5	Evaluate the 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- Non malicious 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. Web Security: Web Application (In) Security – Mobile Security: Rethinking Mobile Security.

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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Text Book:

1. Charles P Pfleeger and Shai Lawrence Pfleeger, (2007), “**Security in Computing**”, Fourth Edition, Prentice Hall.
2. Dafydd Stuttard and Marcus Pinto, (2011), “**The Web Application Hacker’s Handbook: Finding and Exploiting Security Flaws**”, 2nd Edition, Wiley.
3. Lawrence C. Miller, CIISP , “**Mobile Security for Dummies**”, Palo Alto Networks Edition.

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	PSO 1	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
CO5	S	S	H	S	S

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

Programme Code : 09		B.Sc Computer Science		
		Project Work and Viva-Voce		
Batch 2021-2022	Semester VI	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To understand and select the task based core skills.
2. To get 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 to K5	CO1	Apply the domain specific knowledge and define the project.
	CO2	Analyze the achievable goals and choose the right software for project development
	CO3	Estimate the resources and create the project schedule
	CO4	Test the deliverables
	CO5	Evaluate the project results.

MARK DISTRIBUTION :

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

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

MAPPING

PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO					
CO1	S	M	H	H	H
CO2	M	H	H	H	H
CO3	H	H	H	M	M
CO4	S	S	H	M	M
CO5	S	S	H	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09		B.Sc Computer Science		
		Skill Based Subject 3 – Data Analytics Lab		
Batch 2021-2022	Semester VI	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To get exposure to the fundamental concepts of R Programming
2. To analyze large amount of data using algorithms and mathematical models.
3. To know the fundamental techniques and principles of big data analytics.

Course Outcomes (CO)

K3 to K5	CO1	Apply the basics in R programming in terms of constructs, control statements, string functions
	CO2	Examine the use of Scilab, SPSS and R tool for Big Data analytics
	CO3	Analyze the concepts and metrics to evaluate and optimize digital marketing efforts
	CO4	Illustrate R programming from a statistical perspective
	CO5	Evaluate the tools required to manage and analyze big data like Hadoop, NoSql MapReduce

LIST OF PRACTICAL PROBLEMS

1. Exercise to implement the matrix addition and subtraction operations in Scilab.
2. Exercise to find the Eigenvalues and eigenvectors in Scilab.
3. Exercise to solve equations by Gauss elimination in Scilab.
4. Exercise to implement the associative and commutative property in a matrix in Scilab.
5. Exercise to find the reduced row echelon form of a matrix in Scilab.
6. Exercise to plot the functions and to find its first and second derivatives in Scilab.
7. Exercise to present the data as a frequency table in SPSS.
8. Exercise to find the outlier detection in a dataset in SPSS.
9. Exercise to find the most risky project out of two mutually exclusive projects in SPSS
10. Exercise to draw a scatter diagram, residual plots, outliers leverage and influential data points using R
11. Exercise to calculate correlation using R
12. Exercise to implement Time series Analysis using R.
13. Exercise to implement linear regression using R.
14. Exercise for implementing sorting technique and mining weather data using Map reduce.
15. Setting up a Hadoop environment

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

Guidelines to the distribution of marks for Practical Examinations:

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

1. Record : **5 Marks**
2. Algorithm, Programme, Typing and Execution : **45 Marks**

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	10
Execution & Modifications	5	5

MAPPING

PSO CO	PSO 1	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	H	S	S	S	S
CO5	S	H	H	S	S

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

Programme Code : 09	B.Sc Computer Science		
Batch : 2021-2022	Elective Paper – Cloud Computing		
	Hours / Week 5	Total Hours 75	Credits 5

Course Objective

1. To understand the basics of cloud computing and its architecture.
2. To acquire the knowledge on accessing the cloud and cloud storage.
3. To familiarize the concepts of cloud applications, cloud services and cloud security.

Course Outcomes (CO)

K1 to K5	CO1	Remember the concepts of cloud Architecture and its services.
	CO2	Understand the different services providers and its services, tools.
	CO3	Apply the various web based applications for collaborating everyone inthe cloud computing.
	CO4	Analyze the best service provider for cloud computing in terms of storage, services.
	CO5	Evaluate the appropriate cloud computing solutions and recommendations according to application use

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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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	PSO 1	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
CO5	S	S	S	S	H

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

Programme Code : 09	B.Sc Computer Science		
Batch : 2021-2022	Elective Paper – Network Security		
	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

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

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic concept of Cryptography and various types of attacks.
	CO2	Understand about various types of protocols for Internet Security.
	CO3	Apply the various algorithms for Cryptography
	CO4	Analyze the Firewall and IP security
	CO5	Evaluate the strengths and limitations of network security in real time scenarios.

Syllabus

UNIT I

[15 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

[14 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

[16 Hours]

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

UNIT IV**[15 Hours]**

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

UNIT V**[15 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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

Text Book:

1. Atul Kahate, (2008), **Cryptography 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

CO \ PSO	PSO 1	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
CO5	S	S	S	S	H

S – Strong

H – High

M – Medium

L – Low

Programme Code : 09	B.Sc Computer Science		
Batch : 2021-2022	Elective Paper – Embedded Systems		
	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To familiarize all aspects of design and development of an embedded System.
2. To understand hardware and software requirements for developing a system.
3. To know the basic concepts of operating systems and embedded system project management.

Course Outcomes (CO)

K1 to K5	CO1	Remember the basics about microcontrollers, embedded processors and their applications.
	CO2	Understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
	CO3	Apply key concepts of embedded systems like interrupts interaction, drivers, and ports with peripheral devices.
	CO4	Analyze the design concept of embedded systems.
	CO5	Evaluate the requirements of programming Embedded Systems, related software architectures and tool chain for Embedded Systems.

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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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	PSO 1	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
CO5	S	H	S	S	S

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

Programme Code : 09	B.Sc Computer Science		
Batch : 2021-2022	Elective Paper – Systems Software		
	Hours / Week 5	Total Hours 75	Credits 5

Course Objective

1. To comprehend the processing of programs on a computer system.
2. To understand the design and implementation of language processors.
3. To gain knowledge about code optimization and software tools.

Course Outcomes (CO)

K1 to K5	CO1	Remember the program generation and program execution activities.
	CO2	Understand the design of an assembler
	CO3	Apply the concept of macro expansion
	CO4	Analyze the process of compilation
	CO5	Evaluate the phases of program development by applying software tools.

UNIT I

[14 Hours]

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

UNIT II

[15 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

[16 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 .

UNIT IV**[15 Hours]**

Compilers 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**[15 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

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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	PSO 1	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
CO5	S	S	H	S	S

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

Programme Code : 09	B.Sc Computer Science		
Batch : 2021-2022	Elective Paper – Mobile Computing		
	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

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

Course Outcomes (CO)

K1 to K5	CO1	Remember the concept of Wireless LANs, PAN, Mobile Networks
	CO2	Understand positioning techniques of location-based services and applications
	CO3	Apply all techniques used in the GSM and GPRS
	CO4	Analyze CDMA and wireless LANS.
	CO5	Evaluate the infrastructures and technologies of mobile computing.

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

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class

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, AddisonWesely Publications.
2. UWE Hansmann, LotharMerk, Martin.S, (2006), **Principles of Mobile Computing**, Second Edition, Springer publications.
3. Jeyasri Arokiamary,(2005), **Mobile Communications**, First Edition, Anuradha Agencies.

MAPPING

CO \ PSO	PSO 1	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
CO5	S	S	H	S	S

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

Programme Code : 09	B.Sc Computer Science		
Batch : 2021-2022	Elective Paper – Machine Learning		
	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To know the basic concepts of machine learning.
2. To apply the appropriate machine learning strategy for any given problem
3. To distinguish between, supervised, unsupervised and semi-supervised learning

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic concepts and techniques of Machine Learning.
	CO2	Understand supervised, unsupervised or semi-supervised learning algorithms
	CO3	Apply the appropriate machine learning strategy for any given problem
	CO4	Analyze the uses of appropriate graph models of machine learning
	CO5	Evaluate the existing machine learning algorithms to improve its efficiency

UNIT I

[16 Hours]

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

UNIT II

[15 Hours]

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT III

[14 Hours]

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

UNIT IV**[15 Hours]**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process 59

UNIT V**[15 Hours]**

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

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

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

TEXT BOOKS

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.

REFERENCE BOOKS

2. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
3. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014

MAPPING

CO \ PSO	PSO 1	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
CO5	S	S	H	S	S

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

Programme Code: 09		B.Sc Computer Science		
		Part IV - Non - Major Elective 1– Environmental Studies		
Batch 2021-2022	Semester I	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. The course will provide students with an understanding and appreciation of the complex interactions of man, health and the environment. It will expose students to the multi-disciplinary nature of environmental health sciences
2. To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
3. To shape students into good “Ecocitizens” thereby catering to global environmental needs.
4. This course is designed to study about the types of pollutants including gases, chemicals petroleum, noise, light, global warming and radiation as well as pollutant flow and recycling and principles of environmental pollution such as air, water and soil
5. The course will address environmental stress and pollution, their sources in natural and workplace environments, their modes of transport and transformation, their ecological and public health effects, and existing methods for environmental disease prevention and remediation.

Course Outcomes (CO)

K3 to K5	CO1	Understand how interactions between organisms and their environments drive the dynamics of individuals, populations, communities and ecosystems
	CO2	Develop an in depth knowledge on the interdisciplinary relationship of cultural, ethical and social aspects of global environmental issues
	CO3	Acquire values and attitudes towards complex environmental socio-economic challenges and providing participatory role in solving current environmental problems and preventing the future ones
	CO4	Gain inherent knowledge on basic concepts of biodiversity in an ecological context and about the current threats of biodiversity
	CO5	Appraise the major concepts and terminology in the field of environmental pollutants, its interconnections and direct damage to the wildlife, in addition to human communities and ecosystems

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**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**Environmental Pollution****[6 hours]**

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**Social Issues and the Environment****[6 hours]**

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 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.

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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.

Question Paper Pattern**(External only)**

Duration: 3 hours

Total Marks : 50

Answer all Questions (5 x 10 = 50 Marks)

Essaytype, either or type questions from each unit.

Programme Code : 09		B.Sc Computer Science		
		Part IV - Non - Major Elective – 2 Human Rights		
Batch 2021-2022	Semester III	Hours / Week 2	Total Hours 30	Credits 2

Course 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.

Course Outcomes (CO)

K1 to K5	CO1	Understand the hidden truth of Human Rights by studying various theories.
	CO2	Acquire overall knowledge regarding Human Rights given by United Nation Commission. (UNO)
	CO3	Gain knowledge about various organs responsible for Human Rights such as National Human Rights Commission and state Human Right commission (UNHCR)
	CO4	Get habits of how to treat aged person, others and positive social responsibilities
	CO5	Treat and confirm, child, refugees and minorities with positive social justice.

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.

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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

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)

Essaytype

Either – Or/ Type - Question from each unit

Programme Code: 09		B.Sc Computer Science		
		Part IV - Non-Major Elective – 3 Women's Rights		
Batch 2021-2022	Semester IV	Hours / Week 2	Total Hours 30	Credits 2

Course 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.

Course Outcomes (CO)

K1 to K5	CO1	Appraise the importance of Women's Studies and incorporate Women's Studies with other fields.
	CO2	Analyze the realities of Women Empowerment, Portrayal of Women in Media, Development and Communication.
	CO3	Interpret the laws pertaining to violence against Women and legal consequences.
	CO4	Contribute to the study of the important elements in the Indian Constitution, Indian Laws for Protection of Women.
	CO5	Spell out and implement Government Developmental schemes for women and create awareness on modernization and impact of technology on Women.

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]

Women's 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

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.

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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)

Essaytype

Either – Or/ Type - Question from each unit

Programme Code : 09	B.Sc Computer Science		
Non- Major Elective 4– Consumer Affairs			
Batch 2021-2022	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.
3. To know more about decisions on Leading Cases by Consumer Protection Act.
4. To get more knowledge about Organizational set-up under the Consumer Protection Act.
5. To impart awareness about the Role of Industry Regulators in Consumer Protection.
6. To understand Contemporary Issues in Consumer Affairs.

Course Outcomes (CO)

K1 to K5	CO1	Able to know the rights and responsibility of consumers.
	CO2	Understand the importance and benefits of Consumer Protection Act.
	CO3	Apply the role of different agencies in establishing product and service standards.
	CO4	Analyze to handle the business firms' interface with consumers.
	CO5	Assess Quality and Standardization of consumer affairs

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.

Teaching Methods

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class

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.

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)

Essaytype

Either – Or/ Type - Question from each unit