Dr. AMBEDKAR GOVERNMENT ARTS COLLEGE
(AUTONOMOUS)
CHENNAI - 600 039

(Accredited by NAAC at level "B")

B. Sc (Computer Science)

FOR CANDIDATES ADMITTED FROM 2022-23 ONWARDS

Syllabus

Under Choice Based Credit System

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF)

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

Based on UGC – Learning Outcomes-Based Curriculum Framework
Course Structure under Outcomes-Based System

(For the candidates admitted from the academic year 2022-2023 onwards)

Sem. No	Part No.	Course	Subject code	Course Title	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		Total
								Int	Ext	
I	I	LC – I	22UAFTA1	General Tamil - I	6	3	3	25	75	100
	II	ELC - I	22UACEN1	Communicative English - I	4	3	3	50	50	100
	III	CC – I	22UACSC1	Programming in Python	5	4	3	25	75	100
	III	CCP - II	22UACSC2	**Python Programming Lab**	4	3	3	40	60	100
	III	AC – I	22UAMAA1	Allied Mathematics – I	7	5	3	25	75	100
	IV	NME - I		Non Major Elective-I Subjects offered by the other department	2	2	3	25	75	100
	IV	SBE - I	22UAPPS1	Professional English for Physical Science - I	2	3	3	50	50	100
				Total	**30**	**23**				
II	I	LC - II	22UBFTA2	General Tamil - II	6	3	3	25	75	100
	II	ELC - II	22UBCEN2	Communicative English - II	4	3	3	50	50	100
	III	CC - III	22UBCSC1	Digital Logic Fundamentals	5	4	3	25	75	100
	III	CCP - IV	22UBCSC2	**Digital Electronics lab**	4	3	3	40	60	100
	III	AC - II	22UBMAA2	Allied Mathematics – II	7	5	3	25	75	100
	IV	NME - II		Non Major Elective-II Subjects offered by the other department	2	2	3	25	75	100
	IV	SBE - II	22UBPPS2	Professional English for Physical Science - II	2	3	3	50	50	100
				Total	**30**	**23**				
III	I	LC - III	22UCFTA3	General Tamil - III	6	3	3	25	75	100
	II	ELC - III	22UCLTS1	Language Through Literature - I	4	3	3	50	50	100
	III	CC - V	22UCCSC1	Programming in Java and Data Structures	5	4	3	25	75	100
	III	CCP - VI	22UCCSC2	**Data Structure using Java Lab**	4	3	3	40	60	100
	III	AC - III	22UCPHA1	Allied Physics – I	4	3	3	25	75	100
	III	ACP**	Even Sem.	**Allied Physics Practical**	3	-	-	40	60	100
	IV	EVS	22UCEVS1	Environmental Studies	2	2	3	25	75	100
	IV	SBE - III	22UCSBE3	SS III – Personality Enrichment	2	3	3	40	60	100
				Total	**30**	**21**				

IV	I	LC - IV	22UDFTA4	General Tamil - IV	6	3	3	25	75	100
	II	ELC - IV	22UDLTS2	Language Through Literature - II	4	3	3	50	50	100
	III	CC - VII	22UDCSC1	Web Technology	4	4	3	25	75	100
	III	CC - VIII	22UDCSC2	**Web Technology Lab**	5	3	3	40	60	100
	III	AC - IV	22UDPHA2	Allied Physics – II	4	3	3	25	75	100
	III	ACP - V	22UDPHA3	**Allied Physics Practical**	3	4	3	40	60	100
	IV	VBE	22UDVBE1	Value Based Education	2	2	3	25	75	100
	IV	SBE - IV	22UDSBE5	SS IV – Introduction to Shell Programming	2	3	3	25	75	100
	V	Extension	22UDEXT1	Extension Activities	-	1	-	-	-	-
				Total	**30**	**26**				
V	III	CC - IX	22UECSC1	Operating Systems	5	4	3	25	75	100
	III	CC - X	22UECSC2	Relational Database Management Systems	4	4	3	25	75	100
	III	CC - XI	22UECSC3	Computer Graphics	4	4	3	25	75	100
	III	CC - XII	22UECSC4	Mobile Application Development	4	4	3	25	75	100
	III	CCP-XIII	22UECSC5	**SQL and PL/SQL Lab**	4	2	3	40	60	100
	III	CCP-XIV	22UECSC6	**Mobile Application Development Lab**	4	2	3	40	60	100
	III	CEC - I	*	One from the Elective-I Subjects	5	5	3	25	75	100
				Total	**30**	**25**				
VI	III	CC - XV	22UFCSC1	Data Communication Networks	5	4	3	25	75	100
	III	CC - XVI	22UFCSC2	Data Science using Python	5	4	3	25	75	100
	III	CC - XVII	22UFCSC3	Network Security	5	4	3	25	75	100
		CCP-XVIII	22UFCSC4	**Data Science using Python Lab**	5	2	3	40	60	100
	III	CCP-XIX	22UFCSP1	**Mini Project**	5	5	3	40	60	100
	III	CEC - II	**	One from the Elective-II Subjects	5	5	3	25	75	100
				Total	**30**	**24**				
				Total Credits		**142**				

CORE ELECTIVE COURSES:

Elective-I (Any one subject of the following Core Elective chosen by the candidate)		**Elective-II** (Any one subject of the following Core Elective chosen by the candidate)	
***Sub. Code**	**Core Elective Courses**	****Sub. Code**	**Core Elective Courses**
22UECSE1A	Software Engineering	22UFCSE2A	PHP Programming
22UECSE1B	System Software	22UFCSE2B	Software Testing
22UECSE1C	AI and Expert System	22UFCSE2C	Micro Processor and its applications

The following Non-Major Elective Courses offered by the Computer Science Department to other departments.

NON MAJOR ELECTIVE COURSE:

I Semester (Any one subject of the following Non Major Elective chosen by the candidate)		**II Semester** (Any one subject of the following Non Major Elective chosen by the candidate)	
@Sub. Code	**Non Major Elective**	**@@Sub. Code**	**Non Major Elective**
22UACSN1A	Fundamentals of Computers	22UBCSN2A	HTML Programming
22UACSN1B	Fundamentals of Internet	22UBCSN2B	Flash Animation

SEMESTER-I

B.Sc Degree Programme in Computer Science

First Semester				
Course Title		**PROGRAMMING IN PYTHON**		
Course Code		**22UACSC1**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CC –I	**Core**	**4**	**5**	**25+75**

COURSE OBJECTIVES:

- To make students understand the basic concepts of Python programming.
- To make the students understand looping, control statements, functions and string handling in Python programming.
- To make the students understand the difference between lists, tuples and dictionaries in Python programming
- To make the students learn file handling in Python programming.

UNIT - I **(15 Hours)**

Basics of Python Programming: History of Python-Features of Python-Literal constants-Variables - Identifiers– Keywords-Built-in Data types-Output Statements – Input Statements-Comments – Indentation-Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays – Array methods.

UNIT - II **(15 Hours)**

Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.

UNIT – III **(15 Hours)**

Functions: Function Definition – Function Call – Variable Scope and its lifetime-Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments-Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.

UNIT - IV **(15 Hours)**

Lists: Creating a list -Access values in list-Updating values in lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.

UNIT - V **(15 Hours)**

Python File Handling: Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods -File Positions- Renaming and deleting files.

TEXT BOOK

1. Reema Thareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.
2. Dr. R. Nageswara Rao, "Core Python Programming", First Edition, 2017, Dreamtech Publishers.

REFERENCE BOOKS

1. Vamsi Kurama, "Python Programming: A Modern Approach", Pearson Education.
2. Mark Lutz,"Learning Python", Orielly.
3. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication.

E- REFERENCES:

1. https://www.programiz.com/python-programming.
2. https://www.guru99.com/python-tutorials.html

METHODOLOGY OF TEACHING

- Class Lecturers, Assignments, Lab exercises, Discussions, seminars and assessments.

COURSE OUTCOMES (COs)

Code	Course Outcomes	K-LEVELS
CO1	Learn the basics of python Do simple programs in python Learn the concept of arrays.	**K1, K2, K3**
CO2	Develop program using control and looping statements.	**K1,K2, K3, K4**
CO3	Learn the Concept of function, function arguments. Implementing the concept strings in various application.	**K1,K2, K3, K4**
CO4	Compare List, tuples and dictionary based on its usage and Write program using list, tuples and dictionary.	**K1, K2,K3,K5**
CO5	Learn the concept of File handlings in python , Concept of reading and writing files and develop programs using files.	**K1,K2,K3, K4**
K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**–Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**2**	**1**
CO2	**1**	**2**	**1**	**3**	**2**	**1**
CO3	**3**	**3**	**1**	**2**	**2**	**1**
CO4	**3**	**3**	**2**	**3**	**3**	**1**
CO5	**3**	**3**	**2**	**2**	**2**	**3**
Total	**13**	**16**	**7**	**12**	**11**	**10**
Average	**2.6**	**3.2**	**1.4**	**2.4**	**2.2**	**2**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

First Semester				
Course Title		**PYTHON PROGRAMMING LAB**		
Course Code		**22UACSC2**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal+External)**
CCP – II	Core	**3**	**4**	**40 + 60**

COURSE OBJECTIVES

- To make students understand the basic concepts of Python programming.
- To make the students understand looping, control statements, functions and string handling in Python programming.
- To make the students understand the difference between lists, tuples and dictionaries in Python programming.
- To make the students learn file handling in Python programming.

LIST OF EXERCISES

1. Program using variables, constants, I/O statements in Python.
2. Program using Operators in Python.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions.
7. Program using Recursion.
8. Program using Arrays.
9. Program using Strings.
10. Program using Modules.
11. Program using Lists.
12. Program using Tuples.
13. Program using Dictionaries.
14. Program for File Handling.

METHODOLOGY OF TEACHING

- Class Lecturers, Lab hands on Experience.

COURSE OUTCOMES (COs)

Upon completion of this course, the students will

CO	COURSE OUTCOMES	K-LEVELS
CO1	Be able to design and program Python applications.	**K1, K2, K3**
CO2	Be able to create loops and decision statements in Python. Be able to work with functions and pass arguments in Python.	**K1,K2, K3, K4**
CO3	Be able to build and package Python modules for reusability. Be able to read and write files in Python.	**K1, K2, K3, K4**
K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**– Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**1**	**3**	**2**	**2**	**2**	**1**
CO2	**2**	**3**	**1**	**3**	**2**	**1**
CO3	**3**	**3**	**2**	**2**	**2**	**1**
Average of CO J PSO mapping	**2**	**3**	**1.6**	**2.3**	**2**	**1**
Total of CO J PSO mapping	**6**	**9**	**5**	**7**	**6**	**3**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

SEMESTER-II

B.Sc Degree Programme in Computer Science

Second Semester				
Course Title		**DIGITAL LOGIC FUNDAMENTALS**		
Course Code		**22UBCSC1**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal+External)**
CC-III	**Core**	**4**	**5**	**25+75 = 100**

COURSE OBJECTIVES

- To train the students in the basic concepts of Digital Computer Fundamentals.
- To explore the various types of number systems and its conversions.
- To impart the in-depth knowledge of logic gates and Boolean algebra.
- To know the working and importance of combinational logic circuits and sequential logic circuits.

UNIT – I: Number Systems Basics and Digital Logic Gates **15 Hours**

Number Systems and Codes: Number System – Base Conversion – Binary Codes – Code Conversion (Binary to BCD, BCD to Binary, BCD to Excess-3, Excess-3 to BCD, Binary to Gray, Gray to Binary). Digital Logic: Logic Gates – Truth Tables – Universal Gates.

UNIT – II: Boolean Algebra and Binary Arithmetic **15 Hours**

Boolean Algebra: Laws and Theorems – SOP, POS Methods – Simplification of Boolean Functions using Theorems, Simplification of Boolean Functions using K-Map (upto 4-variables only) – Binary Arithmetic: Binary Addition – Binary Subtraction – Various Representations of Binary Numbers – Arithmetic Building Blocks: Half-Adder, Full-Adder – Half- Subtractor, Full- Subtractor – Parallel Binary Adder.

UNIT – III: Combinational Logic Circuits **15 Hours**

Combinational Logic: Multiplexers – Demultiplexers – Decoders – Encoders – Code Converters (Binary to BCD, BCD to Binary, BCD to Excess-3, Excess-3 to BCD, Binary to Gray, Gray to Binary) – Parity Generators and Checkers.

UNIT – IV: Sequential Logic Circuits **15 Hours**

Sequential Logic: RS, JK, D, and T Flip-Flops – Master-Slave Flip-Flops. Registers: Shift Registers – Types of Shift Registers.

UNIT – V: Counters and Memory **15 Hours**

Counters: Asynchronous and Synchronous Counters - Ripple, Mod, Up-Down Counters– Ring Counters. Memory: Basic Terms and Ideas –Types of ROMs – Types of RAMs.

TEXT BOOKS

1. V.Rajaraman and T.Radhakrishnan, An Introduction to *Digital Computer Design*, Fifth Edition, Prentice Hall of India, 2001

REFERENCE BOOKS

1. D.P.Leach and A.P.Malvino, *Digital Principles and Applications* – TMH – Fifth Edition – 2009.
2. M. Moris Mano, *Digital Logic and Computer Design*, PHI, 2001.
3. T.C.Bartee, *Digital Computer Fundamentals*, 6th Edition, Tata McGraw Hill, 1991.

WEB REFERENCES

1. https://nptel.ac.in/courses/108105132
2. https://nptel.ac.in/courses/108105113

METHODOLOGY OF TEACHING

- Class lectures, Group Discussions, Assignments, Quiz.

COURSE OUTCOMES (COS)

Upon completion of this course, the students able to

CO	COURSE OUTCOME	K-LEVELS
CO1	What are the foundation codes of Binary Systems, why to study about the concepts of Logic Gates, illustrate the working of logic gates.	**K1,K2**
CO2	Show and illustrate the concepts of Boolean Functions, construct K-Maps and building blocks of Arithmetic Circuits.	**K1,K2,K3**
CO3	Demonstrating the conversion circuits and developing the nature of Combinational Logic Circuits.	**K2,K3**
CO4	Classify the types of Registers and their applications and Experiment with Flip-flops.	**K2,K3**
CO5	List the categories of Counters and analyze their working. Examination of Memory and its types.	**K4**
K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**– Creating		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**2**	**1**
CO2	**3**	**2**	**2**	**3**	**1**	**1**
CO3	**3**	**3**	**3**	**2**	**2**	**-**
CO4	**2**	**3**	**3**	**2**	**3**	**2**
CO5	**3**	**2**	**1**	**3**	**2**	**1**
Total	**14**	**13**	**12**	**12**	**10**	**5**
Average	**2.8**	**2.6**	**2.4**	**2.4**	**2**	**1**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Second Semester				
Course Title		**DIGITAL LAB**		
Course Code		**22UBCSC2**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CCP-IV	**Core**	**3**	**4**	**40+60 = 100**

COURSE OBJECTIVES

- To impart the practical knowledge of Logic Gates and Boolean Algebra.
- To construct the Combinational and Sequential circuits.

LIST OF EXERCISES

I: Study of Logic Gates

1. Verification of truth table for AND, OR, NOT, NAND, NOR and XOR gates.
2. NAND as Universal Gate.
3. NOR as Universal Gate.

II: Implementation of logic circuits

1. Verification of Associative law for AND, OR gates.
2. Verification of Demorgan's Laws.
3. Karnaugh's Map reduction and logic circuit implementation.

III: Adder and Subtractor

1. Implementation of Half-Adder and Half-Subtractor.
2. Implementation of Full-Adder and Full-Subtractor.
3. Implementation of Four bit binary Adder/Subtractor.

IV: Multiplexers and Encoders

1. Implementation of 4:1 Multiplexer
2. Implementation of 1:4 DeMultiplexer
3. Implementation of 2 to 4 Decoder
4. Implementation of 4 to 2 Priority Encoder

V: Registers and Counters

1. Implementation of R-S Flip-Flop and J-K Flip-Flop
2. Implementation of Shift Register-Serial Transfer.
3. Implementation of binary Up/Down Counter.

METHODOLOGY OF TEACHING

- Class Lecturers, Lab hands on Experience

COURSE OUTCOMES (COS)

Upon completion of this course, the students able to

CO	COURSE OUTCOME	K-LEVELS
CO1	Recall the basic digital circuits and summarize their operations	K1, K2
CO2	Apply the logic of basic combinational circuits and experiment their functionalities.	K3
CO3	Analyze the design procedures to design basic sequential circuits.	K4
K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**– Creating		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**2**	**1**
CO2	**3**	**2**	**2**	**3**	**1**	**1**
CO3	**3**	**3**	**3**	**2**	**2**	**-**
Total	**9**	**8**	**8**	**7**	**5**	**2**
Average	**3**	**2.7**	**2.7**		**2.3**	**0.66**

Level of Correlation between PSO's and CO's

Low : 1

Medium : 2

High : 3

No Correlation: 0

SEMESTER-III

B.Sc Degree Programme in Computer Science

Third Semester				
Course Title		**PROGRAMMING IN JAVA AND DATA STRUCTURES**		
Course Code		**22UCCSC1**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CC-V	**Core**	**4**	**5**	**25+75 = 100**

COURSE OBJECTIVES

- To enable the students to learn the basic concepts of Java programming
- To use class and objects to create applications
- To have an overview of interfaces, packages, multithreading and exceptions.
- To familiarize students with basic data structures and their use in algorithms.

UNIT – I **15 Hours**

History and Evolution of Java - Features of Java - Object Oriented Concepts – Byte code - Lexical Issues -Data Types – Variables- Type Conversion and Casting- Operators - Arithmetic Operators - Bitwise - Relational Operators - Assignment Operator - The conditional Operator - Operator Precedence- Control Statements – Arrays.

UNIT – II **15 Hours**

Classes - Objects - Constructors - Overloading method - Static and fixed methods - Inner Classes – String Class- Overriding methods - Using super-Abstract class - this keyword – finalize() method – Garbage Collection.

UNIT – III **15 Hours**

Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws-The Java Thread Model- Creating a Thread and Multiple Threads - Thread Priorities Synchronization-Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads – Multithreading-I/O Streams - File Streams - Applets .

UNIT – IV **15 Hours**

Abstract Data Types(ADTs)-List ADT-Array based implementation-linked list implementation-singly linked list-doubly linked list-circular linked list-Stack ADT operations-Applications-Evaluating arithmetic expressions-Conversion of infix to postfix expression-Queue ADT-operations-Applications of Queues.

UNIT – V **15 Hours**

Trees-Binary Trees- representation - Operations on Binary Trees- Traversal of a Binary Tree -Binary Search Trees, Graphs-Representation of Graphs - Traversal in Graph -Dijkstra's Algorithm, Depth-First vs Breadth-First Search.

TEXT BOOKS

1. E.Balagurusamy," Programming with Java: A Primer", Tata McGraw Hill 2014, 5th Edition.
2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms ", Pearson Education 2003.

REFERENCE BOOKS

1. Behin Sam S &Sekar G, "Java and Data Structures", VR1 Publications.
2. Herbert Schildt, "JAVA 2: The Complete Reference", McGraw Hill 2018, 11th Edition.
3. S. Sahni, "Data Structures, Algorithms and Applications in JAVA", Universities Press 2005, 2nd Edition

WEB REFERENCES

1. NPTEL & MOOC courses titled Java and Data Structures
2. https://nptel.ac.in/courses/106106127/
3. https://nptel.ac.in/courses/106105191/

METHODOLOGY OF TEACHING

- Class lectures, Group Discussions, Assignments, Quiz, Seminar

COURSE OUTCOMES (COS)

Upon completion of this course, the students are able to

CO	COURSE OUTCOME	K-LEVELS
CO1	Should be able to Define and Tell the syntax and semantics of java programming language and Explain the basic concepts of OOPs.	**K1,K2**
CO2	Distinguish the basic concepts of OOPs and Develop reusable programs using the concepts of polymorphism, inheritance. Make use of Garbage Collection.	**K3,K4**
CO3	Develop reusable programs using the concepts of interfaces and packages. Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.	**K3,K4**
CO4	Demonstrate and implement abstract data types using arrays and linked list. Apply the different linear data structures like stack and queue to various computing problems.	**K1,K2,K3,K4,K5**
CO5	Demonstrate and implement different types of trees and apply them to problem solutions. Discuss graph structure and understand various operations on graphs and their applicability. Analyze the various sorting and searching algorithms.	**K1,K2,K3,K4,K5**
K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**–Creating		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**1**	**3**	**-**
CO2	**3**	**3**	**2**	**1**	**3**	**-**
CO3	**3**	**3**	**2**	**1**	**3**	**-**
CO4	**3**	**3**	**2**	**1**	**3**	**-**
CO5	**3**	**3**	**2**	**1**	**3**	**-**
Total	**15**	**15**	**10**	**5**	**15**	**0**
Average	**3**	**3**	**2**	**1**	**3**	**0**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Third Semester				
Course Title		**DATA STRUCTURE USING JAVA**		
Course Code		**22UCCSC2**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal+External)**
CCP-VI	**Core**	**3**	**4**	**40 + 60 = 100**

COURSE OBJECTIVES

- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph traversal algorithms

LIST OF EXERCISES

1. Write a Java program to implement the Stack ADT using a singly linked list.
2. Write a Java program to implement the Queue ADT using a singly linked list.
3. Write a Java program for the implementation of circular Queue.
4. Write a Java program that reads an infix expression, converts into postfix form
5. Write a Java program to evaluate the postfix expression (use stack ADT).
6. Write a Java program to an Insert an element into a binary search tree.
7. Write a Java program to delete an element from a binary search tree.
8. Write a Java program to search for a key element in a binary search tree.
9. Write a Java program for the implementation of BFS for a given graph.
10. Write a Java program for the implementation of DFS for a given graph.

METHODOLOGY OF TEACHING

- Lab Demonstrations, Assignments& Exercise, Debugging Sessions

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to

CO	COURSE OUTCOME	K-LEVELS
CO1	Develop and Evaluate the functions to implement linear and data structure operations.	K1, K2,K3
CO2	Develop and Evaluate the functions to implement non-linear data structure operations.	K1, K2,K3
CO3	Apply and analyze linear and non-linear data structure and construct and determine the results on various trees and graphs.	K3,K4,K5
K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**– Creating		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	1	3	-
CO2	3	3	2	1	3	-
CO3	3	3	2	1	3	-
Total	9	9	6	3	9	0
Average	3	3	2	1	3	0

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

SEMESTER-IV

B.Sc Degree Programme in Computer Science

Fourth Semester				
Course Title		**WEB TECHNOLOGY**		
Course Code		**22UDCSC1**		
Prerequisite		**HTML** and **CSS**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal+External)**
CC – VII	**Core**	**4**	**5**	**25+75**

COURSE OBJECTIVES

- To gain ability to develop responsive web applications using JavaScript.
- To introduce basic concepts and functions of client-server technology using .NET framework.
- To explore .NET technologies for designing and developing dynamic, interactive and responsive web applications using HTML and Web server controls.
- To understand the navigation of data from one page to another page using Response, Request and Cookies
- To inculcate the depth knowledge of database connectivity using SQL Server and Server Controls.

UNIT – I: **15 Hours**

Introduction to JavaScript: Advantages of JavaScript – JavaScript syntax – Data type – Variable - Array – Operator & Expression – Looping – control structures – Constructor Function – user defined function – Dialog Box.

UNIT – II **15 Hours**

JavaScript document object model: Introduction – Object in HTML – Event Handling – Window object – Document object – Browser object – Form object – Navigator object – Screen object – Build in object – User defined object – Cookies.

UNIT – III **15 Hours**

ASP.NET Language Structure: Page Structure – Page event, Properties – Compiler Directives. HTML server controls: Anchor, Tables, and Forms. Basic Web server Controls: Label, Text box, Button, Image Links, Check & Radio Button, Hyperlink.

UNIT – IV **15 Hours**

Data List Web Server Controls: Check box list, Radio button list, Drop down list, List box, Data Grid, Repeater , Grid View, Validation Controls. Request and Response Objects, Cookies.

UNIT – V **15 Hours**

Working with Data: Sql Connection class – Sql Command class – Sql Data Reader class – Sql Data Adaptor class – Data Set class – Data Table class. **Error handling**: No Error Handling – Resume Next - On Error Goto Handler – Try/Catch Code Block – Err Object . **Application Issues**: Maintaining Session State - Maintaining Application State.

TEXT BOOK

1. I. Bayross, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Pearl CGI, BPB Publications **(Unit-I, II).**
2. Greg Buczek–ASP.NET Developers Guide– Tata McGraw–Hill Edition **(Unit-III, IV, V)**.

REFERENCES

1. J. Jaworski, Mastering Javascript, BPB Publications, 1999
2. HTML and Web designing - Kris Jama and Konrad King, Tata McGraw Hill Publishing Ltd.
3. Teach yourself web Technologies - Ivon Bayross , BPB publications – 2002.
4. Stephen Walther, Kevin Hoffman and Nate Dudek,"ASP.Net 4 Unleashed", 2011,Pearson Education.

WEB REFERENCES

1. NPTEL: https://www.youtube.com/watch?v=uUhOEj4z8Fo
2. https://www.google.co.in/books/edition/Asp_Net_Developer_S_Guide/uA80rGFf2D4C?hl=en&gbpv=1&dq=Asp.net+developer%27s+guide
3. https://www.nptelvideos.com/video.php?id=1775&c=21
4. http://books.google.co.in/books?id=BrASwbtAGGUC&pg=PA69&source=gbs_selected_pages&cad=2#v=onep age&q&f=false

METHODOLOGY OF TEACHING

- Lectures, Assignments, Group discussions, Seminar , Quiz, Home work

COURSE OUTCOMES (COs)

At the end of the Course, the Student will be able to:

CO	COURSE OUTCOME	KJ LEVELS
CO2	**Demonstrate** the JavaScript DOM and **choose** the right events. **Analyze** the problem to **develop** client side validation program using JavaScript.	K1, K2,K3,K4
CO3	**Compare** the HTML and Web Server control and select best one to **develop** web applications.	K2, K3, K4
CO4	**Summarize** the advantages of the data bound controls and data navigation object. **Analyze** the controls among which are suitable to **apply** to design web applications.	K2,K3,K4
CO5	**Justify** the **importance** of database connectivity to develop real-time user interactive web application and website using ADO.NET with SQL Server.	K5
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	2	1
CO2	3	3	2	3	2	1
CO3	3	2	3	2	1	1
CO4	3	2	2	3	2	1
CO5	3	3	3	3	3	1
Total	15	12	13	13	10	5
Average	3	2.4	2.6	2.6	2	1

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Fourth Semester				
Course Title		**WEB TECHNOLOGY LAB**		
Course Code		**22UDCSC2**		
Prerequisite		**HTML** and **CSS**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CCP – VIII	**Core**	**3**	**4**	**40+60**

COURSE OBJECTIVES

- To implement client side validation program using JavaScript.
- To create simple web applications using ASP.NET with VB coding.
- To develop web applications that validates the data using validation control.
- To develop web applications using database.

LIST OF LAB EXERCISES

I. JAVASCRIPT

1. Preparation a train time table.
2. Creation of JavaScript Program to Sort numbers and strings using Array.
3. Check whether the given number is prime or not using JavaScript while, do..while and for loop
4. Find the reverse and sum of given integer using while loop.
5. Create a calculator.
6. Registration Form Validation using JavaScript.
7. Create a web page using two image file which switch black and white one another as the mouse pointer moves over the image. Use the On Mouse over and On Mouse event, on Dblclick handler.
8. Build a WWW page with an image and 3 buttons., Pick three favorite graphics, Label the buttons and make each one swap in the graphic you have chosen.
9. Create a frameset that has two frames, side by side. Make the left-hand frame contain a form with 3 radio buttons The buttons should be for three search engines:
   • Yahoo (http://www.yahoo.com)
   • Altavista (http://www.altavista.com)
   • Infoseek (http://www.infoseek.com)

II. ASP.NET

10. Create a login form, to expire, if the user does not type the password within 100 seconds
11. Create an application form to apply for a new course in a college, fill the information and submit it (Use Basic Web Server controls).
12. Design Sign Up form and validate User Name (Minimum 8 character Maximum 15 and only characters and underscore), Password (Minimum 8 Characters) and Retype Password (Both should be same), Phone No (Only digits), Email-id etc. (Use Validation controls).
13. Web page to display list of fruits, vegetables, grains etc. (Use DataList Web Server controls).
14. Create an employee database and manipulate the records.
15. Create an Active Server Page to display the records one by one from a student database. The student database should contain roll no, name, marks & total

16. Develop an application to illustrate the usage of Request and Response Objects in ASP.NET.

METHODOLOGY OF TEACHING

- Class Lecturers, Lab hands on Experience

COURSE OUTCOMES (COs)

At the end of the Course, the Student will be able to:

CO	Course Outcomes	K-LEVELS
CO1	Recollect the basics of JavaScript and apply to implement programs.	**K1,K2**
CO2	Apply the syntax of HTML and Web server controls with coding techniques and experiment their functionalities.	**K3**
CO3	Analyze the domain and develop web applications using SQL Server database.	**K4**
K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**–Creating		

CO- PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**2**	**1**
CO2	**3**	**2**	**2**	**3**	**1**	**1**
CO3	**3**	**3**	**3**	**2**	**2**	**1**
Total	**9**	**8**	**8**	**7**	**5**	**3**
Average	**3**	**2.67**	**2.67**		**2.3**	**1**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

B.Sc Degree Programme in Computer Science

Fourth Semester				
Course Title		**INTRODUCTION TO SHELL PROGRAMMING**		
Course Code		**22UDSBE5**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
SBE– IV	**SBE**	**3**	**2**	**25+75**

COURSE OBJECTIVES

- To understand the basics of Linux OS.
- Study the shell programming.

UNIT – I: Introduction to Linux **6 Hours**

Introduction to Linux: History of Linux – Linux Architecture – Kernel – Uses of Linux – Linux distributions - Linux Essential Commands.

UNIT – II: Shell Script basics **6 Hours**

Introduction to Shell scripting: Files and directories - Shell – Shell Types – Structure of bash shell script – Script file names and permissions – Variables: Variable names, Defining and accessing variables, Variable types, Special variables – Read and Echo commands.

UNIT – III: Operators **6 Hours**

Basic operators: Arithmetic Operators, Relational Operators, Boolean Operators, String Operators and File Test Operators.

UNIT – IV: Decision Making and Looping **6 Hours**

Decision Making: if statement, if else statement, elif ladder and case statement- Looping: while loop, for loop and until loop – break and continue statements.

UNIT – V: Advanced Concepts **6 Hours**

Arrays: Indexed arrays and Associative arrays - User-defined functions – Command line arguments – String processing.

TEXT BOOK

1. The Complete Reference LINUX - Richard L. Petersen, McGraw Hill.

REFERENCES

1. Linux Shell Scripting with Bash 1st Edition by Ken O. Burtch.
2. LINUX shell scripting by Ganesh Naik, Packt Publishing Ltd.

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WEB REFERENCES

1. https://www.geeksforgeeks.org/introduction-linux-shell-shell-scripting/
2. https://www.tutorialspoint.com/unix/shell_scripting.htm
3. https://www.udemy.com/course/linux-shell-scripting-free/

METHODOLOGY OF TEACHING

- Class lectures, Demonstrations, Class tests, Assignments, Quiz.

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to:

CO	COURSE OUTCOME	
CO1	Define the architecture and features of Linux Operating System and contrast it from other Operating Systems.	**K1, K2**
CO2	Define and illustrate different variable types related with shell.	**K1, K2**
CO3	Show the basic operators of bash Shell.	**K2**
CO4	Demonstrate the different decision making and looping construction.	**K2**
CO5	Solve a given problem and apply requisite facets of SHELL programming in order to develop a SHELL script to solve the problem.	**K3**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**2**	**2**	**1**
CO2	**3**	**3**	**3**	**2**	**2**	**1**
CO3	**2**	**3**	**2**	**3**	**1**	**-**
CO4	**3**	**3**	**3**	**2**	**3**	**2**
CO5	**3**	**2**	**1**	**3**	**2**	**1**
Total	**14**	**13**	**12**	**12**	**10**	**5**
Average	**2.8**	**2.6**	**2.4**	**2.4**	**2**	**1**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN

UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

SEMESTER-V

B.Sc Degree Programme in Computer Science

FIFTH SEMESTER				
Course Title		**OPERATING SYSTEMS**		
Course Code		**22UECSC1**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CC– IX	**Core**	**4**	**5**	**25+75**

COURSE OBJECTIVES

- To introduce basic concepts and functions of operating systems and understand the concept of process, thread and resource management.
- To understand various Memory, I/O and File management techniques.

UNIT – I: **15 Hours**

Introduction: Views- Goals – Types of System – OS Structure – Components – Services – Process Management: Process – Process Scheduling – Cooperating process – Threads – Inter Process Communication. CPU Scheduling: CPU Schedulers – Scheduling Criteria – Scheduling Algorithms.

UNIT – II: **15 Hours**

Process Synchronization: Critical-Section Problem – Synchronization Hardware – Semaphores – Classical Problems of Synchronization. Deadlocks: Characterization – Methods for Handling Deadlocks – Deadlock Prevention - Avoidance – Detection - Recovery.

UNIT – III: **15 Hours**

Memory Management: Address Binding – Dynamic Loading and Linking – Overlays – Logical and Physical Address Space – Contiguous Allocation – Internal and External Fragmentation. Non-Contiguous Allocation: Paging and Segmentation Schemes – Implementation – Fragmentation.

UNIT – IV: **15 Hours**

Virtual Memory: Demand Paging – Page Replacement – Page Replacement Algorithms. File System: File Concepts – Access Methods – Directory Structures – File System Structures – Allocation Methods – Free Space Management.

UNIT – V: **15 Hours**

I/O System: Overview – I/O Hardware – Application I/O Interface – Transforming I/O Requests to Hardware Operations – Protection – Goals – Domain – Access matrix – The Security Problem – Authentication – Unix System: Features of UNIX - Basic commands.

TEXT BOOK

1. A. Silberschatz P.B.Galvin, Gange., Operating System Concepts, John Wiley and Sons, 2018, 9th edition.

REFERENCE BOOKS

1. H.M. Deitel, An Introduction to Operating System, Second Edition, Addition Wesley.
2. William Stallings, “Operating Systems Internals and Design Principles”, Pearson, 2018, 9th Edition.

.**WEB REFERENCES**

1. NPTEL & MOOC courses titled Operating Systems
2. https://onlinecourses.nptel.ac.in/noc21_cs88
3. https://www.javatpoint.com/os-tutorial

METHODOLOGY OF TEACHING

- Lectures, Assignments, Group discussions, Quiz, Seminar.

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to:

CO	COURSE OUTCOME	KJ Level
CO1	Define an Operating system and compare the different types of operating systems and explain their functions and services. Understand Process management and choose the best scheduling algorithm	**K1, K2, K3**
CO2	Identify the need for Synchronization, describe the different problems of synchronization and illustrate the different methods for handling deadlocks	**K1, K2, K3**
CO3	Learn the memory management concepts and explain the different memory management schemes and choose the best one	**K1, K2, K3**
CO4	Acquire knowledge on concept of virtual memory, distinguish between different page replacement algorithms, select the best algorithm and analyze file allocation methods	**K1, K2, K3, K4**
CO5	Gain knowledge about I/O system, explain and illustrate operations on Access matrix	**K1, K2, K3**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**2**	**1**	**1**	**1**
CO2	**3**	**2**	**2**	**1**	**1**	**1**
CO3	**3**	**2**	**1**	**1**	**1**	**1**
CO4	**2**	**2**	**1**	**1**	**1**	**1**
CO5	**2**	**2**	**2**	**1**	**1**	**1**
Total	**13**	**10**	**8**	**5**	**5**	**5**
Average	**3**	**2**	**1.6**	**1**	**1**	**1**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Fifth Semester				
Course Title		**RELATIONAL DATABASE MANAGEMENT SYSTEMS**		
Course Code		**22UECSC2**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CC– X	**Core**	**4**	**4**	**25+75**

COURSE OBJECTIVES

- To describe a sound introduction to the discipline of database management systems.
- To give a good formal foundation on the relational model of data and study the SQL and PL/SQL in detail.

UNIT – I: 13 Hours

Introduction: Database System-Characteristics of Database Management Systems - DBMS Vs. File System – Advantages of DBMS - Architecture of Database Management Systems -Database Models - Entity Relationship Model.

UNIT – II: 13 Hours

Relational Database Model: Structure of Relational Model-Types of keys. Relational Algebra - Operations- Join operations.

Normalization: Functional Dependency - First Normal form - Second Normal Form - Third Normal form - Boyce-Codd Normal Form.

UNIT – III: 13 Hours

SQL: Introduction. Data Definition Language, Data Manipulation Language, Data Retrieval: Select statement, Transaction Control Language, Single row functions using dual: Date, Numeric and Character functions. Group/Aggregate functions. Defining Constraints: Primary Key, Foreign Key, Unique, Check, Not Null.

UNIT – IV: 11 Hours

PL/SQL: Introduction-PL/SQL Basic-Character Set- PL/SQL Structure – PL/SQL and Oracle-Subprograms – Functions – Procedures – IN, IN OUT, OUT parameter.

UNIT – V: 10 Hours

Exception Handling: Introduction - Predefined Exception - User Defined Exception –Database Triggers - SQL Cursor Management - Implicit and Explicit Cursors - Loops in Explicit Cursor.

TEXT BOOK

1. Pranab Kumar Das Gupta and P. Radha Krishnan, "*Database Management System Oracle SQL and PL/SQL"*, Second Edition, 2013, PHI Learning Private Limited.

REFERENCE BOOKS

1. Ramez Elmasri and Shamkant B. Navathe, "*Fundamentals of Database Systems*", Seventh Edition, Pearson Publications.
2. Abraham Silberschatz, Henry Korth, S. Sudarshan, "*Database System Concepts*", Seventh Edition, TMH.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc22_cs51/preview

METHODOLOGY OF TEACHING

- Class Lecturers, Assignments, Group Discussion, Quiz, Seminar.

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to:

CO	COURSE OUTCOME	KJ Level
CO1	**List** and **explain** the various data models and architecture of the DBMS, **Compare** the flat file system with DBMS.	**K1, K2, K4**
CO2	**Illustrate** the various operators of relational algebra and **analyze** the redundancy in database design, **Identify** the level of normalization.	**K1, K2, K3, K4**
CO3	**Define** any table using SQL, **explain** various types of SQL statements **Categorize** the type of SQL statement, **Build** any database table with constraints.	**K1, K2, K3, K4**
CO4	**Define** the various primitives of PL/SQL, **experiment** with PL/SQL programs and functions.	**K1, K2, K3**
CO5	**Define** exception and cursors, **explain** the Implicit and Explicit Cursors, able to manage SQL exception and cursors, study the **relationship** among the Implicit and Explicit Cursors.	**K1,K2, K3, K4**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**1**	**0**	
CO2	**2**	**3**	**0**	**1**	**0**	
CO3	**3**	**3**	**2**	**1**	**1**	
CO4	**3**	**3**	**2**	**1**	**1**	
CO5	**3**	**3**	**2**	**1**	**1**	
Total	**14**	**14**	**7**	**5**	**3**	**0**
Average	**2.8**	**2.8**	**1.4**	**1**	**0.6**	**0**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN

UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Fifth Semester				
Course Title		**COMPUTER GRAPHICS**		
Course Code		**22UECSC3**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CC– XI	**Core**	**4**	**4**	**25+75**

COURSE OBJECTIVES

- To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and Algorithms

UNIT – I: **12 Hours**

Overview of graphics Systems: Video Display Device - Refresh Cathode-Ray tubes Raster - Scan Displays Random - Scan Displays - Color CRT Monitors -Direct view Storage tubes Flat - Panel Displays Three - Dimensional Viewing Devices, Stereoscopic and Virtual - Reality Systems.

UNIT – II: **12 Hours**

Raster - Scan Systems Video Controller - Random - Scan Systems Video Controller - Random-Scan Systems - Input device – Keyboard- Mouse - Trackball - Space ball and Joysticks - Data Glove – Digitizers Image Scanners - Touch Panels - Light pens. Voice Systems - Hard-Copy Devices - Line Drawing Algorithms-DDA Algorithms - Circle generating Algorithm Properties of Ellipses.

UNIT – III: **12 Hours**

Two Dimensional Geometric Transformation: Basic Transformations - Translation - Rotation - Scaling - Matrix Representations and Homogeneous Coordinates - Other Transformations Reflections Two Dimensional Viewing : Windows to view point coordinate Transformations - Clipping Operations - Point Clipping - Line Clipping - Curve Clipping - Text Clipping - Exterior Clipping.

UNIT – IV: **12 Hours**

Three Dimensional Concepts: Three Dimensional Display method - Parallel projection - Depth cueing visible line and surface - Three Dimensional Geometric and modeling Transformations: Translation - Rotation - Scaling - Composite Transformations. Three Dimensional Viewing: Viewing pipeline - Viewing Coordinates - Projections - Parallel Projections - Perspective Projections. \

UNIT – V: **12 Hours**

Visible Surface Detection Methods: Classification Visible Surface Detection Algorithms - Back Face Detection - Depth - Buffer Method - A-Buffer Method - Scan line method - Depth sorting method.

TEXT BOOK

1. Donald Hearn and M.Pauline Baker , "Computer Graphics",2nd Edition, 1996

REFERENCE BOOKS

1. John f. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley, "Computer GraphicsPrinciples and Practice" 3rdEdition, Pearson Education,2014.

WEB REFERENCES

1. nptel.ac.in/syllabus/106102063/

METHODOLOGY OF TEACHING

- Chalk and Talk method, Power point presentation, seminars, quiz, Assignment

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to:

CO	COURSE OUTCOME	KJ Level
CO1	Describes Graphics systems and its applications.	**K1,K2,K3**
CO2	Analyses the working of the CRT. Evaluates DDA Line drawing and Bresenham's Circle drawing algorithm	**K1,K2,K3,K4**
CO3	Understands basics of 2D Transformations. Analyze Clipping operations.	**K1,K2,K3,K4**
CO4	Understands basics of 3D Transformations, Describes Parallel and Perspective projection.	**K1,K2,K3**
CO5	Describes different Visible Surface Detection Methods and analyze its algorithm.	**K1,K2,K3,K4**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**1**	**1**	**2**	**1**
CO2	**3**	**3**	**2**	**2**	**1**	**2**
CO3	**3**	**3**	**1**	**2**	**3**	**2**
CO4	**3**	**3**	**3**	**1**	**1**	**2**
CO5	**3**	**3**	**1**	**2**	**2**	**1**
Total	**15**	**15**	**8**	**8**	**10**	**8**
Average	**3**	**3**	**1.6**	**1.6**	**2**	**1.6**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN

UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Fifth Semester				
Course Title		**MOBILE APPLICATION DEVELOPMENT**		
Course Code		**22UECSC4**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CC– XII	**Core**	**4**	**4**	**25+75**

COURSE OBJECTIVES

- To introduce Android platform and its architecture.
- To learn activity creation and Android UI designing.
- To be familiarized with Intent, Broadcast receivers and Internet services.
- To work with SQLite Database and content providers.

UNIT – I: Android basics, Intents and Fragments **12 Hours**

Introduction to Android – Features of Android-Architecture of Android-Obtaining the Required Tools-Creating First Android Application - Anatomy of Android Application-Components of Android Application-Lifecycle of Activity. Intents: Creating Intents, Types of Intents, Intents returning result, Intent Filters, Calling Built–In Application Using Intents and Displaying Notifications using PendingIntent. Fragments: Lifecycle of Fragment, Types of Fragments and how to create and use fragments.

UNIT – II: Screen layouts and Views **12 Hours**

Screen Layouts: Linear, Table, Relative, Absolute and Grid.Basic Views**:** Toast**,** Text View**,** Edit Text, Button, Auto Complete Text View, Check Box, Toggle Button, Image Button, Radio Button, Seek Bar, List View, Image View, Date Picker and Time Picker- Drawables and shape drawables - Adapting to Display Orientation - Creating the views programmatically.

UNIT – III: Menus and Data Storage options **12 Hours**

Menus: Options Menu, Context Menu and Popup Menu. Data Persistence: Saving and Loading using Shared Preferences - Persisting Data to Local Storage and Secondary Storage - SQLite Database: Create, Insert, Delete, Update and Select queries. - Content Provider: Creating and using Content Provider.

UNIT – IV: SMS, E-Mail and Location based services **12 Hours**

Sending SMS - Sending E-Mail- Location Based Services: Displaying Maps - Getting Location Data. Networking: Integrating web browser in application - Consuming Web Services Using HTTP - Consuming JSON Services - Sockets Programming.

UNIT – V: Services, Threads and Publication of Applications **12 Hours**

Developing Android Services: Lifecycle of Service, Types of service and creating own services. Interfacing Camera, Audio and Video. - Publishing Android Applications: Preparing for Publishing - Deploying APK Files.

TEXT BOOK

1. J.F. DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition, Wiley Publications, 2017.

REFERENCE BOOKS

1. Wei Meng Lee,"Beginning Android 4 Application Development",Wiley Publications,2013. 2013.
2. Anubhav Pradhan, Anil V Deshpande, 'Mobile Applications Development', First Edition.
3. Barry Burd,"Android Applications Development all in one for Dummies", First Edition.

WEB REFERENCES

1. http://developer.android.com/
2. https://www.tutorialspoint.com/android/index.htm
3. https://abhiandroid.com/

METHODOLOGY OF TEACHING

- Class lectures, Demonstration, Group Discussion, Assignments, Quiz.

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to:

CO	COURSE OUTCOME	KJ Level
CO1	Define Android applications, how to download, install and work in Android Studio development environment, and to show the execution of First Android Application. Illustrate the use of activities and fragments and build intents in Android to invoke Built-in Applications and develop notifications in Android	**K1,K2,K3**
CO2	Explain and illustrate the user interfaces using basic widgets, views, view groups and layouts of Android.	**K2**
CO3	Outline the working with user interface to handle pictures and menus and explain and apply data storage options using the internal and external storage using Shared Preferences, files, SQLite database and Content Providers.	**K2,K3**
CO4	Build the formation of SMS and E-mail in the mobile phones and examine the Location Based Services (LBS) and consumption of Web Services in Android using JSON and Sockets.	**K3,K4**
CO5	Analyze the development of Android Services by establishing communication between a service and an activity and identify the steps for publishing Android applications.	**K3,K4**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**2**	**2**	**1**
CO2	**3**	**3**	**3**	**2**	**2**	**1**
CO3	**2**	**3**	**2**	**3**	**1**	**-**
CO4	**3**	**3**	**3**	**2**	**3**	**2**
CO5	**3**	**2**	**1**	**3**	**2**	**1**
Total	**14**	**13**	**12**	**12**	**10**	**5**
Average	**2.8**	**2.6**	**2.4**	**2.4**	**2**	**1**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Fifth Semester				
Course Title		SQL AND PL/SQL LAB		
Course Code		22UECSC5		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CCP – XIII	**Core**	**2**	**4**	**40+60**

COURSE OBJECTIVES

- Study the various DDL, DML commands.
- Write queries in SQL to retrieve any type of information from a data base.
- Use PL/SQL to learn about cursors and exception handling mechanism

LIST OF LAB EXERCISES

Demonstrate the following SQL commands and can take any back end RDBMS system for implementation purpose.

1. Data Definition of Base Tables.
2. DDL with Primary key constraints
3. DML Commands: Insert, Delete and Update of Base Table
4. Demonstrate the Query commands
5. Numeric and Character Functions.
6. Aggregate or Group Functions.
7. Set operations
8. Write a PL/SQL code block that will accept an account number from the user and debit an amount of Rs. 2000 from the account. If the account has a minimum balance of 500 after the amount is debited, the Process will fire a message.
9. Write a PL/SQL code block to write a PL/SQL code to calculate the total and the percentage marks of the students in four subjects (Use Cursors).
10. Write a PL/SQL program to demonstrate various Exception Handling mechanisms.

METHODOLOGY OF TEACHING

- Class Lecturers, Lab hands on Experience

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to

CO	Course Outcomes	K-LEVELS
CO1	**Define** a table using SQL, **explain** various types of SQL statements **Categorize** the type of SQL statement	**K1,K2,K3**
CO2	**Illustrate** cursors using PL/SQL code, and **apply** the concept to implement any type of small applications	**K2,K3**
CO3	**recall** system defined exception, and **apply** this concept to catch any type of system defined exceptions	**K1,K3**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO- PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**		**1**	**2**	
CO2	**3**	**3**		**1**	**2**	
CO3	**3**	**3**		**1**	**2**	
Total	**9**	**9**	**0**	**3**	**6**	**0**
Average	**3**	**3**	**0**	**1**	**2**	**0**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

B.Sc Degree Programme in Computer Science

Fifth Semester				
Course Title		**MOBILE APPLICATION DEVELOPMENT LAB**		
Course Code		**22UECSC6**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CCP – XIV	**Core**	**2**	**4**	**40+60**

COURSE OBJECTIVES

- Describe the platforms upon which the Android OS will run.
- Create simple applications that run under Android OS.
- Access and work with the Android file system.
- Define and access with databases under Android OS.

LIST OF LAB EXERCISES

1. Activity Lifecycle.
2. Fragments.
3. Notifications.
4. Screen Orientation.
5. Implicit and Explicit Intents.
6. Working with Basic Widgets-Button, Text view, Edit text, Toggle button, Radio button, Radio group, Auto complete text view, Checkbox, Seek bar, List view, Picker views.
7. Using drawable and shape drawable.
8. Storing data permanently using Shared preferences.
9. Storing data using local storage.
10. Database access using SQLite.
11. Sending SMS.
12. Location Based Services.
13. Illustration of menus-Option menu, Context menu, Popup menu.
14. Media management.

METHODOLOGY OF TEACHING

- Class Lecturers, Lab hands on Experience

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to

CO	Course Outcomes	K-LEVELS
CO1	Outline simple programs using activities and fragments.	**K2**
CO2	Make use of persistent data storage concepts to write programs	**K3**
CO3	Construct/discover applications for SMS, Maps and Media.	**K3,K4**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO- PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	2	1
CO2	3	2	2	3	1	1
CO3	3	3	3	2	2	-
Total	9	8	8	7	5	2
Average	3	2.7	2.7		2.3	0.66

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

B.Sc Degree Programme in Computer Science

Fifth Semester				
Course Title		**SOFTWARE ENGINEERING**		
Course Code		**22UECSE1A**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CEC– I	**Elective**	**5**	**5**	**25+75**

COURSE OBJECTIVES

- To introduce the students to a branch of study associated with the development of a software product.
- To gain basic knowledge about the pre-requisites for planning a software project.
- To gain knowledge about the project scheduling concept in software engineering.
- To learn how to design of software.
- To enable the students to perform testing of a software.

UNIT – I: **15 Hours**

Introduction to Software Engineering: Need and Software problem -Software Crises – A Process framework - **Process models**: The waterfall model – Incremental process models – Prototyping – The Spiral model. **System Engineering Hierarchy**: System modelling and simulation.

UNIT – II: **15 Hours**

Project Management: The Management Spectrum – The People –The Product – The Process – The Project – The W5HH Principle. **Metrics in the Process and Project Domains**: Metrics in the Process and Project Domains – Process Metrics and Project Metrics – Software measurement- Size-oriented metrics – Function oriented metrics. **Project Scheduling:** Defining task set and a task network– Scheduling – Timeline charts – Tracking the Schedule

UNIT – III: **15 Hours**

Software Design: Design concepts- Abstraction – Architecture Modularity. **Basic Design Principles:** Component-level Design Guidelines- Cohesion – Coupling- Designing Conventional Components- Graphical Design Notation – Tabular Design Notation – Program Design Language – Comparison of notations.

UNIT – IV: **15 Hours**

Risk Management: Reactive and Proactive risks – Software risks – Risk identification – Risk projection- Risk Refinement – Risk mitigation, monitoring and management – The RMMM plan. **Software Quality Assurance**: Concepts - SQA activities – Formal Technical Reviews (FTR).

UNIT – V: **15 Hours**

Software Testing: Definition- Verification and validation – Test strategies – Unit Testing – Integration Testing – Alpha and Beta testing – White Box testing – Basis path testing – Control Structure Testing – Black box testing. **Software Configuration Management (SCM):** Elements of SCM – Baselines – The SCM repository.

TEXT BOOK

1. **Roger S. Pressman,** "*Software Engineering a Practitioner's Approach*", Seventh Edition, Tata McGraw Hill

REFERENCE BOOKS

1. **Watts S. Humphrey**, "*A Discipline for Software Engineering*", Addition Wesley Company.
2. **Sommerville**, "*Software Engineering*", Ninth Edition, Pearson Education.

WEB REFERENCES

1. http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Soft%20Engg/New_index1.html
2. http://it-ebooks.info/book/2609/

METHODOLOGY OF TEACHING

- Class lectures, Group Discussion, Assignments, Quiz.

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to:

CO	COURSE OUTCOME	
CO1	Familiarization with the concept of software engineering and its relevance	**K1,K2,K3**
CO2	Understanding of various methods or models for developing a software product	**K2**
CO3	Understand tools and techniques of software engineering	**K2,K3**
CO4	Skill to design and code a software	**K3,K4**
CO5	Verify and validate the problem of software programming	**K3,K4**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	**3**	**3**	**3**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**3**	**3**	**3**	**3**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**2**
Total	**15**	**15**	**15**	**15**	**15**	**14**
Average	**3**	**3**	**3**	**3**	**3**	**2.8**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN

UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Fifth Semester				
Course Title		**SYSTEM SOFTWARE**		
Course Code		**22UECSE1B**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CEC– I	**Elective**	**5**	**5**	**25+75**

COURSE OBJECTIVES

- To understand the relationship between system software and machine architecture.
- To understand the processing of an HLL program for execution on a computer.
- To understand the process of scanning and parsing.
- To know the design and implementation of assemblers, macro processor, linker and compiler.
- To have an understanding of loader, system software tools.
- To understand and know the working of device drivers

UNIT – I: **15 Hours**

Introduction to System Software and software tools : Language Processors: - Introduction - Language Processing Activities - Fundamentals of Language Processing & Language Specification - Language Processor Development Tools. Data Structures for Language Processing: - Search Data structures - Allocation Data Structures. Software Tools: - Software Tools for Program Development - Editors - Debug Monitors - Programming Environments - User Interfaces.

UNIT – II: **15 Hours**

Assemblers: - Elements of Assembly Language Programming - A Simple Assembly Scheme - Pass Structure of Assemblers - Design of a Two Pass Assembler - A single pass Assembler for IBM PC.

UNIT – III: **15 Hours**

Macros and Macro Processors: - Macro Definition and Call - Macro Expansion - Nested Macro Calls - Advanced Macro Facilities - Design of a Macro Preprocessor.

UNIT – IV: **15 Hours**

Interpreters and Introduction of Compilers: - Interpreters: Use and overview of interpreters - Pure and impure interpreters. - Phases of the Compiler - Introduction of scanning and parsing - Aspects of compilation

UNIT – V: **15 Hours**

Linkers and Loaders: - Introduction to linkers - Relocation and Linking Concepts - Design of a Linker - Self-Relocating Programs - A Linker for MS-DOS - Linking for Overlays and Loaders.

TEXT BOOK

1. D. M. Dhamdhere, “Systems Programming and Operating Systems”, Second Revised Edition, Tata McGraw-Hill, 1999.

REFERENCE BOOKS

1. Leland L. Beck, “System Software – An Introduction to Systems Programming”, 3rd Edition, Pearson Education Asia, 2000.
2. Santanu Chattopadhyay, “System Software”, Prentice-Hall India, 2007

3. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, "Compilers: Principles, Techniques, and Tools",2nd Edition, Pearson Education Asia

WEB REFERENCES

https://www.youtube.com/watch?v=VG9VopzV_T0http://it-ebooks.info/book/2609/

METHODOLOGY OF TEACHING

- Class lectures, Group Discussion, Assignments, Quiz.

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to:

CO	COURSE OUTCOME	
CO1	**Define** the term with system software and **Explain** the uses of the **various** software tools	**K1,K2**
CO2	**Define** a assembler and **explain** its working, and **analyze** its types	**K2, K4**
CO3	**Define** a Macro Processors and **Design** a macro processor	**K1,K5**
CO4	**Define** a interpreter and **examine** its working	**K1,K4**
CO5	Study about linked and loader and explain their working	**K1, K2**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**1**
CO2	**3**	**3**	**3**	**3**	**3**	**1**
CO3	**3**	**3**	**3**	**3**	**3**	**1**
CO4	**3**	**3**	**3**	**3**	**3**	**1**
CO5	**3**	**3**	**3**	**3**	**3**	**1**
Total	**15**	**15**	**15**	**15**	**15**	**5**
Average	**3**	**3**	**3**	**3**	**3**	**1**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Fifth Semester				
Course Title		**AI AND EXPERT SYSTEM**		
Course Code		**22UECSE1C**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CEC– I	**Elective**	**5**	**5**	**25+75**

COURSE OBJECTIVES

- To get in-depth Knowledge about the evolution of AI and Export Systems.
- Bring out the Features of Artificial Intelligence.
- Develop Heuristic Search Techniques.
- Implementing the Predicate Logic and Expert System

UNIT - I **15 Hours**

Introduction: Definition, AI Problems, AI Applications, AI techniques, Criteria for success. Problems, Problem Spaces, Search: Defining the problem as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics

UNIT - II **15 Hours**

Heuristic Search Techniques: Generate and Test – Simple Hill Climbing – Best First Search: OR graphs, The A* Algorithm. Problem Reduction: AND OR graphs, The AO* Algorithm. Constraint Satisfaction. Inheritance: Keyword extends- Types of Inheritance–Keyword super- Overriding of methods-Abstract class and methods.

UNIT – III: **15 Hours**

Knowledge Representation Issues: Representations and Mappings – Approaches to Knowledge representations: Properties for Knowledge representation systems, Simple relational knowledge- Issues in Knowledge representations – The Frame Problem.

UNIT – IV: **15 Hours**

Using Predicate Logic: Representing simple facts in logic – Representing Instance and ISA relationships – Computable functions and predicates– Resolution – Natural deduction.

UNIT – V: **15 Hours**

Expert Systems: Definition- Characteristics of Expert Systems –Architecture of Expert Systems -Benefits and Limitations of Expert Systems – Development states of an Expert System -Applications of Expert Systems – Expert System tools

TEXT BOOK

1. Stuart Russell & Peter Norvig, “Artificial Intelligence a modern Approach”, Second Edition, Pearson Education.
2. E. Rich, K. Knight and Shivashankar B. Nair, "Artificial Intelligence", Third Edition, TMH.

REFERENCE BOOKS

1. V S Janaki Raman, K Sarukesi, P Gopalakrishnan, “Foundations of Artificial Intelligence and Expert Systems”, MacMillan Indialimited.

2. D.W. Patterson, “Introduction to AI and Expert Systems” ,PHI.

WEB REFERENCES

1. www.vssut.ac.in/lecture_notes/lecture1428643004.pdf
2. http://vfu.bg/en/e-Learning/Artificial-Intelligence-- AI_and_ES_Nowledge_base_systems.pd

METHODOLOGY OF TEACHING

- Class lectures, Group Discussion, Assignments, exercises, Seminar and Assessments

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to:

CO	COURSE OUTCOME	
CO1	Definition, AI Problem, AI Applications, AI Techniques and criteria for success. Defining the problem as a state space search	**K1, K2, K3**
CO2	Heuristic search techniques –Generate and test, simple hill climbing. Best first search – OR graph, A* Algorithm. Problem Reduction- AND OR graph, AO* Algorithm.	**K1,K2, K3**
CO3	Knowledge representations and Mapping, Properties for Knowledge representation system, Frame Problem Characteristics of Expert System, Architecture of Expert Systems, Benefits and Limitations of Expert systems, Development States ,Applications and Expert	**K1, K2, K3, K4**
CO4	Representing simple facts in logic, Representing Instance and ISA relationship, Computable function and Predicate, Resolution and Natural Deduction.	**K1, K2,K3,K4**
CO5	Characteristics of Expert System, Architecture of Expert Systems, Benefits and Limitations of Expert systems, Development States ,Applications and Expert	**K1,K2,K3, K4**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	**3**	**1**	**1**	**2**	**2**	**1**
CO2	**3**	**2**	**1**	**3**	**2**	**1**
CO3	**3**	**3**	**1**	**2**	**2**	**1**
CO4	**3**	**3**	**1**	**3**	**3**	**1**
CO5	**3**	**3**	**2**	**2**	**2**	**3**
Total	**15**	**12**	**6**	**12**	**11**	**7**
Average	**3**	**2.4**	**1.2**	**2.4**	**2.2**	**1.4**

Level of Correlation between PSO’s and CO’s

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN

UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

SEMESTER-VI

B.Sc Degree Programme in Computer Science

Sixth Semester				
Course Title		**DATA COMMUNICATION NETWORKS**		
Course Code		**22UFCSC1**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CC– XV	**Core**	**4**	**5**	**25+75**

COURSE OBJECTIVES

- To introduce the basic concepts and reference models.
- To understand the wired and wireless medium for transporting data.
- To gain knowledge about networking and internetworking devices.
- To understand the real time mechanisms FDDI, ISDN, ATM

UNIT - I **15 Hours**

Introduction to Data Communication, Network, Protocols standards - standard organizations – Line Configuration –Topology – Transmission mode – Classification of network – OSI Model – Layers of OSI Model, TCP/IP Reference Model.

UNIT - II **15 Hours**

Parallel and Serial Transmission – DTE/DCE/interface – Modems – Guided Media – Unguided Media – Transmission of Digital Data, Transmission Impairment, Performance– Performance – Types of Error – Error Detection – Error Corrections.

UNIT – III: **15 Hours**

Multiplexing – Types of Multiplexing – Multiplexing Application – Ethernet – Token Bus – Token Ring – FDDI – Circuit Switching – Packet Switching – Message Switching – Connection Oriented and Connectionless services.

UNIT – IV: **15 Hours**

History of Analog and Digital Network – Access to ISDN – ISDN Layers – Broadband ISDN – X.25 Layers – Packet Layer Protocol – ATM – ATM Topology – ATM Protocol.

UNIT – V: **15 Hours**

Networking and internetworking devices: Repeaters – Bridges – Types – Routers – Routing concepts – Gateway – Routing algorithms: Distance vector and Link state routing-Network Layer-Address Mapping-Sub netting-Transport layer-UDP-TCP/IP Protocol suite-Overview of TCP/IP-Application layer-Namespace-Domain name space-HTTP-Web documents – World Wide Web.

TEXT BOOK

1. Behrouz and Forouzan. *Introduction to Data Communication and Networking.* 2nd Edition – TMH

REFERENCE BOOKS

1. Jean Walrand. *Communication Networks (A first Course).* Second Edition – WCB/McGraw Hill – 1998
2. Andrew S. Tanenbum. Computer Networks. Fourth edition –Pearson edition -2003

WEB REFERENCES

1. NPTEL & MOOC courses titled Communication networks.
2. https://onlinecourses.nptel.ac.in/noc22_ee61/
3. https://www.javatpoint.com/os-tutorial

METHODOLOGY OF TEACHING

- Class lectures, Group Discussion, Assignments, exercises, Seminar and Assessments

COURSE OUTCOMES (COs)

On completion of the course the students will be able to:

CO	COURSE OUTCOME	
CO1	Identify the need for Data communication and network, explain transmission modes and network topology and illustrate the OSI layers	**K1, K2,K3**
CO2	Recall and illustrate guided and unguided media and describe error detection and correction process.	**K1, K2,K3**
CO3	Define Multiplexing and explain its types, illustrate different circuit switching techniques and choose the best one	**K1, K2,K3, K4**
CO4	Define analog and digital networks and describe ATM	**K1, K2**
CO5	Recall and explain networking and internetworking devices, analyze and evaluate routing algorithms and describe functions of transport and application layer	**K1, K2,K4, K5**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**2**	**1**	**1**
CO2	**3**	**3**	**1**	**2**	**1**	**1**
CO3	**3**	**3**	**1**	**1**	**1**	**1**
CO4	**2**	**2**	**1**	**1**	**1**	**1**
CO5	**3**	**3**	**2**	**1**	**2**	**1**
Total	**14**	**14**	**7**	**7**	**6**	**5**
Average	**3**	**3**	**1.4**	**1.4**	**1.2**	**1**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Sixth Semester				
Course Title		**DATA SCIENCE**		
Course Code		**22UFCSC2**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal+External)**
CC– XVI	**Core**	**4**	**5**	**25+75**

COURSE OBJECTIVES

- To introduce the basic concepts of data science and Analytics
- To understand the implementation of data science concepts in python programming
- At the end of this course students will be able to work effectively in Data Science Projects

UNIT - I **15 Hours**

Introduction to Big Data Analytics-Big Data Overview-Data Structures-Analyst Perspective on Data Repositories-State of the Practice in Analytics: BI Versus Data Science, Current Analytical Architecture, Drivers of Big Data, Emerging Big Data Ecosystem and a New Approach

UNIT - II **15 Hours**

Data Analytics Lifecycle: Key Roles for a Successful Analytics Project, Overview of Data Analytics Lifecycle: Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize.

UNIT – III: **15 Hours**

Introduction to Python in Statistical Works- Interactive Mode- Batch Mode- Introduction to Functions-python programming structure-data types- Control Statements- Arithmetic and Boolean operators-Default values for Arguments- return values-Functions as objects.

UNIT – IV: **15 Hours**

Vectors: Arrays, and Matrices- Declarations, Recycling. Filtering Matrices and Arrays: Creating Matrices- General Matrix Operations- Applying Functions to Matrix Rows and Columns- Adding and Deleting Matrix Rows and Columns- More on the Matrix Distinction.

UNIT – V: **15 Hours**

Descriptive Statistics – Reading Data File-basic statistics-Types of Data-mean, median, mode, standard deviation – Normal distribution – Data Visualization- using ggplot2()-Logistics- overview of clustering-K Medan's-Decision Trees.

TEXT BOOK

1. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data Published by John Wiley & Sons, Indianapolis, Indiana
2. An Introduction to Python Programming: A Practical Approach: Using Python to Solve Complex Problems with a Burst of Machine Learning Paperback

REFERENCE BOOKS

1. Python Data Science- The Ultimate and Complete Guide for Beginners to Master Data Science with Python Step By Step 2020 Edition by Andrew Park, Independently Published

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc22_cs32/preview
2. https://www.tutorialspoint.com/python_data_science/index.htm

METHODOLOGY OF TEACHING

- Class lectures, Group Discussion, Assignments, Lab exercises, Seminar and Assessments

COURSE OUTCOMES (COs)

On completion of the course the students will be able to:

CO	COURSE OUTCOME	KJ LEVELS
CO1	Learn the basics of data science, data repositories and big data eco system	**K1, K2, K3**
CO2	Understand the life cycle of data analyst	**K1,K2, K3, K4**
CO3	Introduce the students to python programming for statistical methods and do simple programs using control structures	**K1, K2, K3, K4**
CO4	Compare List, tuples and dictionary based on its usage and Write program using list, tuples and dictionary	**K1, K2,K3,K5**
CO5	Learn the concept of File handlings in python ,Concept of reading and writing files and develop programs using data visualization	**K1,K2,K3, K4**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**0**	**1**
CO2	**1**	**2**	**1**	**3**	**2**	**1**
CO3	**3**	**2**	**1**	**2**	**0**	**1**
CO4	**3**	**2**	**1**	**3**	**3**	**1**
CO5	**3**	**2**	**2**	**2**	**1**	**1**
Total	**13**	**10**	**6**	**12**	**6**	**5**
Average	**2.6**	**2**	**1,2**	**2.4**	**1.2**	**1**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Sixth Semester				
Course Title		**NETWORK SECURITY**		
Course Code		**22UFCSC3**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CC– XVII	**Core**	**4**	**5**	**25+75**

COURSE OBJECTIVES

- To Understand OSI security architecture and to acquire fundamental knowledge on the concepts of finite fields and number theory
- To Understand various block cipher and stream cipher models and the principles of symmetric &public key cryptosystems
- To learn the system security practices.

UNIT - I **15 Hours**

OSI Security Architecture – Security attacks, services and mechanisms – Network security Model – Classical encryption techniques: Symmetric cipher model, Substitution techniques – Transposition techniques – Rotor machines – Steganography.

UNIT - II **15 Hours**

Number theory and finite fields: The Euclidean algorithm – Modular arithmetic - Groups, Rings and Fields – Finite fields of the Form GF (p) – Polynomial arithmetic – prime numbers – Fermat's and eulers theorems.

UNIT – III: **15 Hours**

Block Ciphers and Data Encryption Standard: Traditional block cipher structure – Data Encryption – Strengths of DES – Block Cipher Design Principles – Advanced Encryption Standard – AES structure – AES transformation functions – AES Key expansion – implementation

UNIT – IV: **15 Hours**

Public Key Cryptography and RSA – Principles of Public-key Crypto systems – RSA algorithm - Diffie – Hellman Key exchange - Elgamal Cryptographic System.

UNIT – V: **15 Hours**

Hash functions – Applications – two simple hash functions – Hash functions based on Cipher block chaining - Secure Hash Algorithm (SHA)

TEXT BOOK

1. William Stallings, "*Cryptography and Network Security: Principles and Practice*", Pearson Education 2013,6th Edition.

REFERENCE BOOKS

1. Behrouz A. Ferouzan, "*Cryptography & Network Security*", Tata McGraw Hill 2007.
2. Man Young Rhee, "*Internet Security: Cryptographic Principles, Algorithms and Protocols*", Wiley Publications 2003.
3. Charles Pfleeger, "*Security in Computing*", Prentice Hall of India 2006, 4th Edition.
4. Ulysess Black, "*Internet Security Protocols"*, Pearson Education Asia 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, "*Network Security, Private Communication in Public World*", PHI 2002, 2nd Edition.

WEB REFERENCES

1. NPTEL & MOOC courses titled Network Security
2. https://nptel.ac.in/courses/106105031

METHODOLOGY OF TEACHING

- Class Lecturers, Assignments, Group Discussion, Quiz, Seminar

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to

CO	COURSE OUTCOME	KJ LEVELS
CO1	One should be able to Tell about the OSI architecture and able to classify the various attacks and compare various cryptographic techniques	**K1,K2,K4**
CO2	Illustrate the principles of the Number theory and finite fields.	**K1,K2**
CO3	Demonstrate how Block Ciphers such as DES, AES are implemented.	**K1,K2,K3**
CO4	Demonstrate how public key crypto-systems such as RSA, Diffie-Hellman, Elgamal are implemented.	**K1,K2,K3**
CO5	Apply hash function and digital signatures to implement authentication protocols.	**K1,K2,K3,K5**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**1**	**3**	**-**
CO2	**3**	**3**	**2**	**1**	**3**	**-**
CO3	**3**	**3**	**2**	**1**	**3**	**-**
CO4	**3**	**3**	**2**	**1**	**3**	**-**
CO5	**3**	**3**	**2**	**1**	**3**	**-**
Total	**15**	**15**	**10**	**5**	**15**	**0**
Average	**3**	**3**	**2**	**1**	**3**	**0**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Sixth Semester				
Course code		**DATA SCIENCE LAB**		
Name of the Course		**22UFCSC4**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs/ Week**	**Total Marks (Internal +External)**
CCP – XVIII	**Core**	**2**	**4**	**40+60**

COURSE OBJECTIVES

- To introduce the basic concepts of data science and Analytics
- To understand the implementation of data science concepts in python programming
- At the end of this course students will be able to work effectively in Data Science Projects

LIST OF LAB EXERCISES

1. Write Python program to construct a calculator.
2. Python program for Fibonacci series
3. Python program to find whether a given number is prime or not.
4. Python Programming Using ggplot() to construct (Histogram, Scatter plots, box plots etc.)
5. Data Pre-processing in Python
6. Implementing Linear Regression in Python
7. Implementing Multiple Linear Regression in Python
8. Implementing Logistic Regression in Python
9. Implementing Nearest Neighbors in Python
10. Implementing Decision Tree in Python
11. Python Program to implement basic statistical operations

METHODOLOGY OF TEACHING

- Class Lecturers, Assignments, Lab exercises, Discussions, seminars and assessments

COURSE OUTCOMES (COs)

Upon completion of this course, the students will

CO	Course Outcomes	K-LEVELS
CO1	Be able to design and program Python applications. Be able to create loops and decision statements in Python. Be able to work with functions and pass arguments in Python.	**K1, K2**
CO2	Be able to work with functions and packages in python.	**K1,K2, K3**
CO3	Be able to build and package Python modules for regression and decision trees and be able to visualize the data using python	**K1, K2, K3, K4**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO- PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**2**	**3**	**2**	**1**	**2**	**1**
CO2	**3**	**3**	**2**	**3**	**2**	**1**
CO3	**3**	**3**	**2**	**2**	**2**	**1**
Total	**9**	**9**	**6**	**6**	**6**	**3**
Average	**3**	**3**	**2**	**2**	**2**	**1**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Sixth Semester				
Course Title		**MINI PROJECT**		
Course Code		**22UFCSP1**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs/ Week**	**Total Marks (Internal +External)**
CCP – XIX	**Core**	**5**	**5**	**40+60**

COURSE OBJECTIVES

- The aim of the mini project is that the student has to understand the real time software development environment.
- The student should gain a thorough knowledge in the problem, he/she has selected and the language / software, he/she is using.

Project planning:

The B.Sc (Computer Science) Major Project is an involved exercise, which has to be planned well in advance. The topic should be chosen in the beginning of final year itself. Related reading training and discussions of first internal project viva voce should be completed in the first term of final year.

Selection of the project work

Project work could be of three types.

a) Developing solution for real life problem

In this case a requirement for developing a computer-based solution already exits and the different stages of system development life cycle is to be implemented successfully. Examples are accounting software for particular organization, computerization of administrative function of an organization, web based commerce etc.

b) System Software Project

Projects based on system level implementation. An example is a Tamil language editor with spell checker, compiler design.

b) Research level project

These are projects which involve research and development and may not be as a structured and clear cut as in the above case. Examples are Tamil character recognition, neural net based speech recognizer etc. This type of projects provides more challenging opportunities to students.

Selection of team

To meet the stated objectives, it is imperative that major project is done through a team effort. Though it would be ideal to select the team members at random and this should be strongly recommended, due to practical consideration students may also be given the choice of forming themselves into teams with three members. A team leader shall be selected. Team shall maintain the minutes of meeting of the team members and ensure that tasks have been assigned to every team member in writing. Team meeting minutes shall form a part of the project report. Even if students are doing project as groups, each one must independently taken different modules of the work and must submit the report.

Selection of Tools

No restrictions shall be placed on the students in the choice of platform/tools/languages to be utilized for their project work, though open source is strongly recommended, wherever possible. No value shall be placed on the use of tools in the evaluation of the project.

Project management

Head of the Department / Principal of the college should publish the list of student's project topic, internal guide and external organization and teams agreed before the end of July. Changes in this list may be permitted for valid reasons and shall be considered favorably by the Head of the department / Principal of the college any time before commencement of the project. Students should submit a fortnightly report of the progress, which could be indication of percentage of completion of the project work. The students should ideally keep a daily activity book. Team meeting should be documented and same should be submitted at the end of the project work.

Documentation

Three copies of the project report must be submitted by each student (one for department library, one for the organization where the project is done and one for the student himself/herself). The final outer dimensions of the project report shall be 21cm X 30 cm. The color of the flap cover shall be light blue. Only hard binding should be done. The text of the report should be set in 12 pt, Times New Roman, 1.5 spaced.

Headings should be set as follows: CHAPTER HEADINGS 16 pt,

Arial, Bold, All caps, Centered.

1. Section Headings 14 pt Bookman old style, Bold, Left adjusted.

1.1 Section Sub-heading 12 pt, Bookman old style.

Title of figures tables etc are done in 12 point, Times New Roman, Italics, centered.

Content of the Project should be relevant and specify particularly with reference to the work. The report should contain the requirement specification of the work, Analysis, Design, Coding, testing and Implementation strategies done.

- Organizational overview (of the client organization, where applicable)
- Description of the present system
- Limitations of the present system
- The Proposed system- Its advantages and features
- Context diagram of the proposed system
- Top level DFD of the proposed system with at least one additional level of expansion
- Program List (Sample code of major functions used)
- Files or tables (for DBMS projects) list. List of fields or attributes (for DBMS projects) in each file or table.
- Program – File table that shows the files/tables used by each program and the files are read, written to, updated, queried or reports were produced from them.
- Screen layouts for each data entry screen.
- Report formats for each report.

Some general guidelines on documentation are:

1. Certificate should be in the format**: "Certified that this report titled…….is a bonafide record of the project work done by Sri/ Kum …….under our supervision and guidance, towards partial fulfillment of the requirement for award of the Degree of B.Sc Computer Science of Dr. Ambedkar Govt Arts College**" with dated signature of internal guide, external guide and also Head of the Department/ College.

2. If the project is done in an external organization, another certificate on the letterhead of the organization is required: **"Certified that his/her report titled …….is a bonafide record of the project work done by Sri/Kum…….under my supervision and guidance, at the ……..department of…… (Organization) towards partial fulfillment of the requirement for the award of the Degree of B.Sc (Computer Science) of Dr. Ambedkar Govt. Arts College**.

3. Page numbers shall be set at right hand bottom, paragraph indent shall be set as 3.

4. Only 1.5 space need be left above a section or subsection heading and no space may be left after them.

5. References shall be IEEE format (see any IEEE magazine for detail) While doing the project keep note of all books you refer, in the correct format and include them in alphabetical order in your reference list.

Project Evaluation:

Internal Assessment

There shall be six components that will be considered in assessing a project work with weightage as indicated.

1. Timely completion of assigned tasks as evidenced by team meeting minutes 20%
2. Individual involvement, team work and adoption of industry work culture 10%
3. Quality of project documentation (Precision, stylistics etc) 10%
4. Achievement of project deliverables 20%
5 Effective technical presentation of project work 10%
6. Viva 30%

Based on the above 6 components internal mark (10) can be awarded.

External Assessment

Dissertation/Project submitted at the end of third year shall be valued by two examiners appointed by the Controller for the conduct of practical exam. The board of examiners shall award 40 marks based on the following components.

1. Achievement of project deliverables - 15 Marks
2. Effective technical presentation of project work - 10 marks
3. Project Viva -15 marks

There shall be a common written examination conducted for all the candidates in each group together for a minimum of 10 minutes.

(i) Requirement Specification of Project

(ii) Design of Project

(iii) Testing and Implementation of Project.

COURSE OUTCOMES (COs)

On completion of the course the students will be able to:

CO	COURSE OUTCOME	KJ LEVELS
CO2	Identify the software requirements, define and illustrate various modules of the system	**K1, K2,K3**
CO3	Analyze the flow and develop Data flow diagram and design of the system	**K1, K2,K3, K4, K5**
CO4	Write the code in programming language, analyze and evaluate the system using a testing process	**K1, K2,K3, K4, K5**
CO5	Document the system by preparing the report and presentation	**K1, K2**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating		

CO- PSO Mapping (Course Articulation Matrix)

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**2**	**1**	**2**	**2**	**2**	**1**
CO2	**3**	**2**	**2**	**2**	**2**	**1**
CO3	**3**	**3**	**2**	**2**	**2**	**1**
CO4	**3**	**3**	**2**	**2**	**2**	**1**
CO5	**2**	**2**	**3**	**2**	**3**	**1**
Total	**13**	**11**	**11**	**10**	**11**	**5**
Average	**2.6**	**2.2**	**2.2**	**2**	**2.2**	**1**

B.Sc Degree Programme in Computer Science

Sixth Semester				
Course Title		**PHP PROGRAMMING**		
Course Code		**22UFCSE2A**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Int +Ext)**
CEC - II	**Elective J II**	**5**	**5**	**25+75**

COURSE OBJECTIVES

- Understand the usage of PHP and MySQL in dynamic web development. Understand PHP language data types, logic controls, built-in and user-defined functions
- Be able to setup and configure MySQL, PHP, and Apache web server development environment.
- Select, insert, update and delete data using SQL language.
- Understand Object oriented programming paradigm in PHP.
- Build a simple, yet functional web application using PHP/MySQL

UNIT - I **15 Hours**

Introducing 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 **15 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: **15 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: **15 Hours**

Using Functions and Classes: Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts. Working with Files and Directories: Reading Files-Writing Files- Processing Directories – Cookies – Session Management.

UNIT – V: **15 Hours**

Working MySQL with PHP: Database connectivity- Usage of MYSQL commands in PHP- Processing result sets of queries- Validating user input through Database layer and Application layer- Formatting query output with Character, Numeric, Date and time.

TEXT BOOK

1. VikramVaswani, "PHP A Beginner's Guide", First Edition,TMH.
2. Mike Mcgrath, "PHP and MySQL", 2012,TMH.

REFERENCE BOOKS

1. Rasmus Lerdorf, Kevin Tatroe, "Programming PHP", Third Edition,O'Reilly.
2. Robin Nixon," PHP, MySQL, and JavaScript: A Step-By-Step Guide to Creating Dynamic Websites", First Edition, O'ReillyMedia.
3. Leon Atkinson, "Core PHP Programming", Prentice Hall, ISBN0130463469.
4. W.Jason Gilmore, "Beginning PHP5 and MySQL: From Novice to Professional", 2004,

Apress, ISBN:1-893115-51-8.
5. Steven Holzner, “The PHP Complete Reference”, Tata McGraw-Hill.

WEB REFERENCES

1. http://www.w3schools.com/php/
2. http://www.codingunit.com/php-tutorial-language-introduction

METHODOLOGY OF TEACHING

- Chalk and Talk method, Power point presentation, seminars, quiz, Assignment

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to

CO	COURSE OUTCOME	KJ LEVELS
CO1	Define and Explain the basic concepts of PHP, Creating basic scripts, Implement data types, variables and operators	**K1,K2,K3**
CO2	Illustrate the conditional statements, Implementing String and numeric functions	**K1,K2,K3**
CO3	Create and processing array functions, Express the date and time functions	**K1,K2,K3**
CO4	Creating User-Defined Functions and classes, Implement files and directories	**K1,K2,K3**
CO5	Demonstrate database connectivity, Examine the user input through Database layer and Application layer, Construct query output with Character, Numeric, Date and time.	**K1,K2,K3,K4**

K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**2**	**1**	**3**
CO2	**3**	**3**	**3**	**2**	**2**	**2**
CO3	**3**	**2**	**3**	**3**	**1**	**3**
CO4	**3**	**3**	**2**	**3**	**2**	**2**
CO5	**3**	**2**	**2**	**2**	**2**	**2**
Total	**15**	**13**	**12**	**12**	**8**	**12**
Average	**3**	**2.6**	**2.4**	**2.4**	**1.6**	**2.4**

Level of Correlation between PSO’s and CO’s

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Sixth Semester				
Course code		22UFCSE2B		
Name of the Course		SOFTWARE TESTING		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CEC - II	**Elective J II**	**5**	**5**	**25+75**

COURSE OBJECTIVES

- The student will be able to study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
- To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing,
- To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report, to learn various software testing process like verification and validation.
- To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

UNIT - I **15 Hours**

Introduction: Purpose – Productivity and Quality in Software – Testing Vs debugging Model for Testing – Bugs – Types of Bugs – Testing during Development Life- cycle. Requirement Traceability matrix-Work Bench. Principles of software testing, Salient features of Good Testing-Challenges in Testing- cost Aspect of Testing-Developing Testing Methodologies.

UNIT - II **15 Hours**

Domain Testing: Domains and Paths – Domains and Interface Testing- Metrics –Linguistic and Structural Metric.

UNIT – III **15 Hours**

Software Testing Process-Verification and Validation-Levels of Testing-Testing Approaches-Types of Testing-Test Plan.

UNIT – IV **15 Hours**

Test Model- Defect Management-Levels of Testing-Acceptance Testing-Special Tests-Test Planning.

UNIT – V **15 Hours**

Software Testing Tools Overview- QTP Tools- Performance Testing Tools-Load Runner Tool. Testing Management Tools-Test Director-GUI Testing-Silk Test- Open Source Testing Tool-J Meter.

TEXT BOOK

1. B. Beizer (2003). *Software Testing Techniques*, Second Edition), Dream TechIndia, New Delhi. (UNIT I and II).
2. K.V.KK. Prasad (2005). *Software Testing Tools*, DreamTech. , India, New Delhi. (UNIT III, IV and V).
3. M.G. Limaye (2009). *Software Testing Principles, Techniques and Tools*, Tata Mc.Graw Hill Education Private Limited, New Delhi.(UNIT III and IV)

REFERENCE BOOKS

1. I.Burnstein (2003). *Practical Software Testing*, Springer International Edition.
2. M G Limaye (2009). *Software Testing*, TMH, New Delhi.

WEB REFERENCES

1. http://awards.istqb.org/award-winner/boris-beizer.html
2. http://www.testingreferences.com/testinghistory.php
3. http://www.swquality.com/users/pustaver/Books/books.htm
4. http://www.bullseye.com/coverage.html
5. https://www.tutorialspoint.com/software_testing/
6. https://lecturenotes.in/subject/129/software-testing-st
7. www.ecs.csun.edu/~rlingard/COMP595VAV/SoftwareTesting.ppt

METHODOLOGY OF TEACHING

- Class Lecturers, Group Discussions, Assignments and Quiz.

COURSE OUTCOMES (COs)

Upon completion of this course, the students are able to

CO	COURSE OUTCOME	KJ LEVELS
CO1	Discuss about the concept of bugs and analyses the principles in software testing to prevent and remove bugs.	**K1, K2,K3**
CO2	Discuss about domains and path. Analyze Linguistic and Structural Metric	**K1, K2,K3**
CO3	Discuss about Verification and Validation. Analyse various levels of Testing, Testing Approaches, and Types of Testing & Test Plan.	**K1, K2,K3, K4**
CO4	Analyze Defect Management. Discuss about Acceptance testing and special test.	**K1, K2**
CO5	Analyze various automation testing tools.	**K1, K2,K4, K5**
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**3**	**3**	**3**	**3**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**2**
Total	**15**	**15**	**15**	**15**	**15**	**14**
Average	**3**	**3**	**3**	**3**	**3**	**2.8**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

B.Sc Degree Programme in Computer Science

Sixth Semester				
Course Title		**MICRO PROCESSOR AND ITS APPLICATIONS**		
Course Code		**22UFCSE2C**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
CEC - II	**Elective J II**	**5**	**5**	**25+75**

COURSE OBJECTIVES

- To train the students in the basic concepts of Microprocessor and Assembly Language Fundamentals.
- To explore the various types of instructions and its usage.
- To impart the in-depth knowledge of counters and subroutine
- To explore the various types of number systems and its conversions.
- To know the operational and importance of Interrupts, DMA and I/O interfaces.

UNIT - I **15 Hours**

Introduction to microcomputers-microprocessor and assembly languages – microprocessor architecture and its operations-8085 – MPU-8085 instruction set and classifications.

UNIT - II **15 Hours**

Writing assembly level programs–programming techniques such as looping – counting and indexing addressing modes – data transfer instructions – arithmetic and logic operations-dynamic debugging.

UNIT – III **15 Hours**

Counters and time delays –hexadecimal counter –modulo 10 counter –pulse timings for flashing lights –debugging counter and time delay program –stack –subroutine –conditional call and return instructions.

UNIT – IV **15 Hours**

BCD to binary and binary to BCD conversions – BCD to HEX and HEX to BCD conversions – ASCII to BCD to ASCII conversions – BCD to seven segment LED code conversions-binary to ASCII and ASCII to binary conversions – multi byte addition-multi byte subtraction – BCD addition-BCD subtraction – multiplication and division.

UNIT – V **15 Hours**

Interrupt – implementing interrupts – multiple interrupt 8085-trap-problems on implementing 8085 interrupt – DMA memory interfaces – RAM & ROM – I/O interface-direct I/O memory mapped I/O.

TEXT BOOK

1. R.S.Ganokar-1990-Microprocessor architecture-Programming and Application with 8085/ 8080A-Wiley Eastern Limited.

REFERENCE BOOKS

1. A.Mathur-Introduction to Microprocessor-3rd Edition-Tata McGraw Hill-1993.
2. V. Vijayendran - Fundamental of Microprocessor 8085: Architecture Programming, and Interfacing - Viswanathan, S., Printers & Publishers Pvt Ltd – 2009.

WEB REFERENCES

1. https://www.digimat.in/nptel/courses/video/108105102/L01.html
2. https://www.youtube.com/watch?v=hwwhsNOqqm8

METHODOLOGY OF TEACHING

- Lectures, Assignments, Group discussions, Seminar , Quiz, Home work, PPT

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COURSE OUTCOMES (COs)

At the end of the Course, the Student will be able to:

CO	COURSE OUTCOME	KJ LEVELS
CO1	**What** are the foundation of Microprocessor and Assembly language. **Show** the architecture of Microprocessor.	K1, K2
CO2	**List**and **apply** the different types of instructions to build Assembly level program. **Outline** dynamic debugging methods.	K1,K2,K3
CO3	List the categories of Counters and **analyze** their working. **Examination** of stack memory.	K4
CO4	**Understand, analyze** and **apply** the knowledge of different number systems and their conversion.	K2,K3,K4
CO5	**Analyze** the working principles of Interrupts and DMA	K4
K1-Remembering, **K2**-Understanding, **K3**-Applying, **K4**-Analyzing, **K5**-Evaluating, **K6**-Creating.		

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	2	1
CO2	2	2	2	3	1	1
CO3	3	3	3	2	2	-
CO4	3	3	3	2	3	1
CO5	2	3	3	3	2	1
Total	13	14	14	12	10	4
Average	2.6	2.8	2.8	2.4	2	0.8

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

NON-MAJOR ELECTIVES

First Semester				
Course Title		**FUNDAMENTALS OF COMPUTERS**		
Course Code		**22UACSN1A**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
NME-I	**NME**	**2**	**2**	**25+75 = 100**

COURSE OBJECTIVES

- To teach the basics of Computers and internet

UNIT – I **6 Hours**

Introduction - Computer Basics – Block diagram – Software and Programming Languages. Components of Computer System: Central Processing Unit (CPU), input/output Devices, computer Memory: primary and secondary memory Concepts of Hardware and Software.

UNIT - II **6 Hours**

Input Devices: Key board, Mouse, Joystick, Scanner.

Output devices: Monitor, Printer – Types of printers – Plotter.

UNIT- III **6 Hours**

Operating system-Definition & functions, Types of Operating System – Single user, Multi user, Multi tasking, Time Sharing.

UNIT - IV **6 Hours**

Basics of Windows - Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders.

UNIT – V **6 Hours**

Basic of Computer networks: LAN, WAN, MAN.

Internet: Introduction to internet and its application in education, Browsing

Service on Internet: WWW and web-sites, Electronic mails.

Web Browsers: Internet Explorer, Netscape Communicator.

TEXT BOOKS

1. Alexis Leon and Mathews Leon, “Fundamentals of Information Technology”, Vikas, 1999
2. Stewart Venit, “Introduction to Programming: Concepts and Design”,4th Edition,2010, Dream Tech Publishers.

WEB REFERENCES

1. http://www.nptel.iitm.ac.in/video.php?subjectId=106102067
2. http://utubersity.com/?page_id=876

METHODOLOGY OF TEACHING

- Class Lecturers, Assignments, Group Discussion, Quiz, Seminar

COURSE OUTCOMES (COS)

Upon completion of this course, the students are able to

CO	COURSE OUTCOME	K-LEVELS
CO1	Illustrate and define the computer basic hardware and software components	**K1,K2**
CO2	Illustrate and define the input and output devices	**K1,K2**
CO3	Discover the capabilities of the operating system	**K1,K2,K4**
CO4	Demonstrate the capabilities of the operating system	**K2**
CO5	Illustrate and define the computer networks, internet. Examine the functionality of the web browsers	**K1,K2, K4**

K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**–Creating

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**1**	**3**	**-**
CO2	**3**	**3**	**2**	**1**	**3**	**-**
CO3	**3**	**3**	**2**	**1**	**3**	**-**
CO4	**3**	**3**	**2**	**1**	**3**	**-**
CO5	**3**	**3**	**2**	**1**	**3**	**-**
Total	**15**	**15**	**10**	**5**	**15**	**0**
Average	**3**	**3**	**2**	**1**	**3**	**0**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

First Semester				
Course Title		**FUNDAMENTALS OF INTERNET**		
Course Code		**22UACSN1B**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Int +Ext)**
NME-I	**NME**	**2**	**2**	**25+75 = 100**

COURSE OBJECTIVES

- To understand the basic knowledge of internet, internet applications, email, WWW and basics of HTML.

UNIT–I **6 Hours**

Fundamentals of Internet : Networking Concepts, Data Communication – Types of Networking, Internet and its Services, Internet Addressing – Internet Applications – Computer Viruses and its types – Browser –Types of Browsers.

UNIT–II **6 Hours**

Internet applications: Using Internet Explorer, Standard Internet Explorer Buttons, Entering a Web Site Address, Searching the Internet – Introduction to Social Networking: twitter, Linkedin, facebook, flickr, skype, yelp, yahoo!, youtube, WhatsApp, etc.

UNIT–III **6 Hours**

E-mail :Definition of E-mail - Advantages and Disadvantages – UserIds, Passwords, Email Addresses, Domain Names, Mailers, Message Components, Message Composition, Mail Management, Email Inner Workings.

UNIT–IV **6 Hours**

WWW- Web Applications, Web Terminologies, Web Browsers, URL – Components of URL, Searching WWW – Search Engines and Examples.

UNIT–V **6 Hours**

Basic HTML: Basic HTML – Web Terminology – Structure of a HTML Document – HTML, Head and Body tags – Semantic and Syntactic Tags – HR, Heading, Font, Image and Anchor Tags – Different types of Lists using tags – Table Tags, Image formats – Creation of simple HTML Documents.

TEXT BOOKS

1. In-line/On-line : Fundamentals of the Internet and the World Wide Web, 2/e - by Raymond Greenlaw and Ellen Hepp, Publishers : TMH

REFERENCE BOOKS

1. Internet & World Wide Programming, Deitel, Deitel & Nieto, 2000, Pearson Education

WEB REFERENCES

1. In-line/On-line : Fundamentals of the Internet and the World Wide Web, 2/e - by Raymond Greenlaw and Ellen Hepp, Publishers : TMH

METHODOLOGY OF TEACHING

- Chalk and Talk method, Power point presentation, seminars, quiz, Assignment

COURSE OUTCOMES (COS)

Upon completion of this course, the students are able to

CO	COURSE OUTCOME	K-LEVELS
CO1	Understand the fundamental concepts of internet and types of networking .study about computer viruses and types of	**K1,K2,K3**
CO2	Study about internet applications and Social networking.	**K1,K2,K3,K4**
CO3	Define and explain the concept of Email,Domain names,Mail	**K1,K2,K3,K4**
CO4	Learn about WWW,Search engines and examples	**K1,K2,K3**
CO5	Understand and Create about HTML basic,Structure of a HTML document	**K1,K2,K3,K4**

K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**–Creating

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**2**	**2**
CO2	**3**	**3**	**2**	**2**	**1**	**1**
CO3	**3**	**2**	**2**	**2**	**2**	**2**
CO4	**3**	**3**	**1**	**1**	**1**	**1**
CO5	**3**	**3**	**2**	**2**	**2**	**1**
Total	**15**	**13**	**8**	**9**	**8**	**7**
Average	**3**	**2.8**	**1.6**	**1.8**	**1.6**	**1.4**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

Second Semester				
Course Title		**HTML PROGRAMMING**		
Name of the Course		**22UBCSN2A**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Internal +External)**
NME-II	**NME**	**2**	**2**	**25+75 = 100**

COURSE OBJECTIVES

- To make students understand the concepts of Internet, website and webpages.
- Introduce the students to basic HTML tags for formatting documents
- Linking web pages and creating tables

UNIT – I **6 Hours**

History of Internet-WWW-web site-Web page-Web browser-Internet Explorer-Netscape Communicator-Information searching.

UNIT - II **6 Hours**

HTML Basic tags-HTML basics-document tags-Head and Body sections.

UNIT- III **6 Hours**

Formatting tags-Paragraph and heading tags-List types-Ordered and Unordered.

UNIT - IV **6 Hours**

Hyper link-tags for linking web pages-Inserting an image-Image as hyperlink.

UNIT – V **6 Hours**

Table-Table tags-Creation of train timetable and class Time table.

TEXT BOOK

1. Faithe Wempen, “Step by Step HTML”-Microsoft Corporation, 2011.

REFERENCE BOOKS

1. Thomas A .Powell ,“The complete reference HTML &CSS”fifth edition-Mc Graw Hill

WEB REFERENCES

1. https://www.w3schools.com/html/
2. https://www.tutorialspoint.com/html/index.htm

METHODOLOGY OF TEACHING

- Class Lecturers, Assignments, Discussions, seminars and assessments

COURSE OUTCOMES (COS)

Upon completion of this course, the students are able to

CO	COURSE OUTCOME	K-LEVELS
CO1	Learn the history of Internet.	**K1, K2, K3**
CO2	Introducing the basic tags for documents and using it in programs	**K1, K2, K3**
CO3	Concept of formatting documents	**K1, K2, K3, K4**
CO4	Linking web pages and inserting images to web pages	**K1, K2.K3.K4**
CO5	Creating tables in web pages and illustrations using simple programs	**K1,K2, K3**

K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**–Creating

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**0**	**2**	**3**	**1**
CO2	**2**	**3**	**0**	**3**	**1**	**0**
CO3	**3**	**2**	**0**	**2**	**2**	**0**
CO4	**3**	**2**	**0**	**3**	**3**	**0**
CO5	**3**	**2**	**0**	**2**	**2**	**0**
Total	**14**	**12**	**0**	**12**	**11**	**1**
Average	**2.8**	**2.4**	**0**	**2.4**	**2.2**	**0.2**

Level of Correlation between PSO's and CO's

Low : 1

Medium : 2

High : 3

No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**

Second Semester				
Course Title		**FLASH ANIMATION**		
Course Code		**22UBCSN2B**		
Course No	**Course Category Core / Elective**	**No. of Credits**	**No. of Hrs / Week**	**Total Marks (Int +Ext)**
NME-II	**NME**	**2**	**2**	**25+75 = 100**

COURSE OBJECTIVES

- Create, manipulate, and edit text and graphics to obtain desired graphical outcomes.
- Understand, create, and edit symbols.
- Design, create, edit, and manipulate animation using several animation tools and techniques.
- Design, create, and edit a flash-based navigation menus and interactive movies.

UNIT–I **6 Hours**

Introducing the Flash Framework- Learning Flash Tool Basics - Using the Menu Bar - Creating Flash Animation – how to create a new blank movie file in Flash–tools and steps involved in making simple animation using motion tween– Using basic shapes.

UNIT–II **6 Hours**

Flash Audio: Adding Simple Audio – add a looping audio background to our Flash character animation– Importing and Editing Sounds in Flash.

UNIT–III **6 Hours**

Controlling Movie Clips: The objects overview – working with movie clip properties – manipulating color attributes – enabling sound with action script – creating draggable movie clips.

UNIT–IV **6 Hours**

Creating cartoon animation with flash: The storyboard – Backgrounds and Scenery – Cartoon Animation Basics – Animators keys and inbetweening – flash tweening – lip synching – finishing up.

UNIT–V **6 Hours**

Integrating Flash Content with HTML: Writing markup for flash movies – detecting the flash player – using flash movies with JavaScript and DHTML.

TEXT BOOKS

1. Joey Lott and Robert Reinhardt, “Flash 8 Action Script Bible”,Wiley India (P)Ltd.2006.

REFERENCE BOOKS

1. Tom Meade and ShinsakaAnima,”The Complete Reference Maya6”, TataMC.Graw–Hill Publishing Company Limited edition2004.
2. Robert Rein hardt and SnowDowd,”Macromedia Flash 8 Bible”, Wiley India Pvt Ltd.2006.

WEB REFERENCES

1. https://www.tutorialspoint.com/computer_graphics/computer_animation.htm
2. https://www.geeksforgeeks.org/computer-animation

METHODOLOGY OF TEACHING

- Lecturers, Assignments, Group Discussion, Quiz, Seminar.

COURSE OUTCOMES (COS)

Upon completion of this course, the students are able to

CO	COURSE OUTCOME	K-LEVELS
CO1	Should be able to **p**rovide an overview of the evolution of animation, and develop basic animation using shapes.	**K1,K2**
CO2	Discover the incorporation of audio in animation.	**K3,K4,K5**
CO3	Illustrate the procedure to control movie clips	**K3,K4**
CO4	Define and Apply cartoon animation	**K1,K2,K3,K4**
CO5	Deploy flash applications using HTML.	**K1,K2, K3,K4**

K1 – Remembering , **K2**– Understanding , **K3** –Applying ,**K4** –Analysing , **K5**–Evaluating , **K6**–Creating

CO-PSO Mapping (Course Articulation Matrix)

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**1**	**3**	**-**
CO2	**3**	**3**	**2**	**1**	**3**	**-**
CO3	**3**	**3**	**2**	**1**	**3**	**-**
CO4	**3**	**3**	**2**	**1**	**3**	**-**
CO5	**3**	**3**	**2**	**1**	**3**	**-**
Total	**15**	**15**	**10**	**5**	**15**	**0**
Average	**3**	**3**	**2**	**1**	**3**	**0**

Level of Correlation between PSO's and CO's

Low : 1
Medium : 2
High : 3
No Correlation: 0

BLOOM TAXANOMY BASED QUESTION PAPER PATTERN
UG Degree Pattern

Knowledge Level	Section	Marks	Description	Total Marks
K1, K2, K3, K4	A (Answer all the questions)	10 X 2	Short Answer (Two questions from each unit)	20
K1, K2, K3, K4	B **(INTERNAL CHOICE)** EITHER (a) OR (b)	5 X 5	Question (a) OR (b) from the same Unit and same K Level	25
K2, K3, K4, K5	C (Answer any three question from five questions)	3 X 10	One questions from each unit (No unit missing)	30
Grand Total				**75**