SRI DHARMASTHALA MANJUNATHESHWARA COLLEGE (AUTONOMOUS)
UJIRE – 574 240
DAKSHINA KANNADA, KARNATAKA STATE
(Re-Accredited by NAAC at 'A++' Grade)
Ph: 08256-236221, 236101(O), Fax: 236220
e-Mail:sdmcollege@rediffmail.com, sdmcollege@sdmcujire.in, Website: www.sdmcujire.in

DEPARTMENT OF COMPUTER SCIENCE

Syllabus of

Bachelor's Degree in Science (B.Sc. BCA)

(Basic and Honours Programmes)

with

Computer Science as Major

Course Syllabus for I and VI Semesters

And **Open Elective Courses in Computer Science**

CHOICE BASED CREDIT SYSTEM

SEMESTER SCHEME

UNDER NEW EDUCATION POLICY 2020

2021-22 ONWARDS

BOS meeting held on 10-02-2024
Academic Council meeting, held on 23-03-2024

Preamble

Due to globalization of education and economy, UGC has long back identified the necessity to align higher education with the emerging needs of the economy so as to make the current Indian Higher Education System more relevant and career-oriented with focus on quality and excellence and also to ensure that the graduates of higher education system have adequate knowledge and skills for employment and entrepreneurship. It is envisaged that professionally qualified graduates with a sound knowledge of their core disciplines and expertise in a concerned skill will have more openings in service, industry and self-employment sectors. Demand and scope for such professionally trained graduates are visible in the applied fields of almost all basic/core disciplines and faculties in the current changing global scenario and is likely to increase in the future. The higher education system has to incorporate the requirements of various industries in its curriculum, in an innovative and flexible manner while developing a holistic and well-groomed graduate. The scheme was designed to ensure that graduates who pass out after completing these courses would have knowledge, skills and aptitude for gainful employment in the wage sector in general and self-employment in particular.

The UGC initiated a major programme of vocationalisation at undergraduate level during VIII Plan (1994- 95). The scheme was designed to ensure that graduates who pass out after completing these courses would have knowledge, skills and aptitude for gainful employment in the wage sector in general and self- employment in particular.

The objective of Computer Applications vocational Programme is to provide students with an education that will prepare them to develop a career in the field of computer Science and Applications.

COURSE PATTERN AND SCHEME FOR B.Sc.

Group	Code	Title	Hours / week	Exam in hours	Marks			Credits
					IA	Exam	Total	
I Sem								
DCC	CSCT 101	Computer Fundamentals and Programming in C	4	2	40	60	100	4
DCC	CSCP 101	Programming in C	4	3	25	25	50	2
DOE	CSOE 101	Office Automation	3	2	40	60	100	3
II Sem								
DCC	CSCT 151	Data Structures using C	4	2	40	60	100	4
DCC	CSCP 151	Data structures Lab	4	3				2
DOE	CSOE 151	Web Designing	3	2	40	60	100	3
III Sem								
DCC	CSCT 201	Object oriented programming concepts and programming in Java	4	2	40	60	100	4
DCC	CSCP 201	Java lab	4	3	25	25	50	2
DOE	CSOE 201	Programming in C Concepts	3	2	40	60	100	3

IV Sem								
DCC	CSCT 251	Database Management System	4	2	40	60	100	4
DCC	CSCP 251	Database Management System lab	4	3	25	25	50	2
DOE	CSOE 251	i. Python Programming Concepts ii. E-Commerce	3	2	40	60	100	3
V Sem								
DCC	CSCT 301	Programming in Python	4	2	40	60	100	4
DCC	CSCP 301	Python Programming Lab	4	3	25	25	50	2
DCC	CSCT 302	Computer Networks	3	2	40	60	100	3
DCC	CSCP 302	Computer Networks Lab	4	3	25	25	50	2
VI Sem								
DCC	CSCT 351	Web Technologies	4	2	40	60	100	4
DCC	CSCP 351	Web Technologies Lab – Java Script, HTMS, CSS Lab	4	3	25	25	50	2
DCC	CSCT 352	Statistical Computing & R Programming	3	2	40	60	100	3

DCC	CSCP 352	R Programming Lab	4	3	25	25	50	2

Program: B.Sc **Subject: Computer Science**

Model Curriculum for B.Sc

Semester	Course No	Theory/ Practical	Credits	Paper Title	S.A	L.A
V	CSCT 301	Theory	4	Programming in Python	60	40
	CSCP 301	Practical	2	Python Programming Lab	25	25
	CSCT 302	Theory	4	Computer Networks	60	40
	CSCP302	Practical	2	Computer Networks Lab	25	25
	SEC-4	Theory	**3**	Employability skills	60	40
VI	CSCT 351	Theory	4	Web Technologies	60	40
	CSCP 351	Practical	**2**	Web Technologies Lab – Java Script, HTMS, CSS Lab	25	25
	CSCT 352	Theory	4	Statistical Computing & R Programming	60	40
	CSCP 352	Practical	**2**	R Programming Lab	25	25
	SEC-5	Theory/ Practical	**2**	Internship	30	20

Group	Code	Title	Hours/ week	Exam in hours	Marks			Credits
					IA	Exam	Total	
SKILL ENHANCEMENT COURSE I Sem								
	SBDF 101	Digital Fluency		2				
SKILL ENHANCEMENT COURSE II Sem								
	SBDF 151	Digital Fluency		2				
SKILL ENHANCEMENT COURSE III Sem								
	SBAI 201	Artificial Intelligence		2				
	SBOT 201	Open source tools		2				
SKILL ENHANCEMENT COURSE IV Sem								
	SBAI 251	Artificial Intelligence		2				

Curriculum Structure

Program: B.Sc. (Basic and Honors) Subject: Computer Science

Sem	Discipline Specific Core Courses (DSC)	Hours/Week		Discipline Specific Elective Courses (DSE)/ Vocational Courses (VC)	Hours/ Week
		Theory	Lab		
1	DSC-1: Computer Fundamentals and Programming in C DSC-1Lab: C Programming Lab	4	4		

	2	DSC-2: Data Structures using C DSC-2Lab: Data structures Lab	4	 4		
	3	DSC-3: Object Oriented Programming Concepts and Programming in JAVA DSC-3Lab: JAVA Lab	4	 4		
	4	DSC-4: Database Management Systems DSC-4Lab: DBMS Lab	4	 4		
	5	DSC-5: Programming in PYTHON DSC-6: Operating System Concepts DSC-5Lab: PYTHON Programming lab DSC-6Lab: Operating System lab	3 3	 4 4	VC-1: Any one from Vocational Courses, Group – 1*	3
	6	DSC-7: Internet Technologies	3		VC-2:	
		DSC-8: Computer Networks	3		Any one from Vocational	
		DSC-7Lab: JAVA Script, HTML, CSS Lab DSC-8Lab: Research Project		4 4	Courses, Group – 2* Research Project:	3 2

* Vocational Courses

Group-1
DTP, CAD and Multimedia Hardware and Server Maintenance Web Content Management Systems E-Commerce Web Designing
Group-2
Health Care Technologies Digital Marketing Office Automation Multimedia Processing Accounting Package

** Discipline Specific Elective Courses

Group-1
• IoT • Cyber Law and Cyber Security • Web Programming - PHP and MySQL • Clouds, Grids, and Clusters • SoftwareTesting
Group-2
• Information and Network Security • Data Compression • Discrete Structures • Open source Programming • Multimedia Computing • Big Data
Group-3
• Data Analytics • Storage Area Networks • Pattern Recognition • Digital Image Processing • Parallel Programming • Digital Signal Processing

First Semester

Course Code: DSC-1 CSCT 101	Course Title: Computer Fundamentals and Programming in C
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs)

After completing this course satisfactorily, a student will be able to:

- Operate desktop computers to carry out computational tasks
- Understand working of hardware and software and the importance of operating systems
- Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts
- Read, understand and trace the execution of programs written in C language
- Write the C code for a given problem
- Perform input and output operations using programs in C
- Write programs that perform operations on arrays

Course Content

Content	Hours
Unit - 1	
Fundamentals of Computers: Introduction to Computers –Definition of a computer, Characteristics of computers, Evolution of computers, Generations of computers, Classification of computers. Computer system, applications of computers. **Number Systems** – different types, conversion from one number system to another; Coding schemes –ASCII and Unicode. **Computer Software** – Categories of software. **Computer Programming and Languages**–Machine Level, Assembly level and	13

Highlevel languages; Translator Programs – Assembler, Interpreter and Compiler. Developing a computer program, Program Development Cycle - Algorithm, Flowchart and Pseudocode with examples. **Introduction to C Programming:** Overview of C; History and Importance of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C.	
Unit - 2	
C Programming Basic Concepts: C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration and initialization of variables; Symbolic constants. **C Operators and Expressions:** Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associatively. Evaluation of arithmetic expressions; Type conversion. **Input and output with C:** Formatted I/O functions - *printf* and *scanf,* control stings and escape sequences, output specifications with *printf* functions; Unformatted I/O functions to read and display single character and a string - *getchar, putchar, gets* and *puts* functions.	13
Unit - 3	
Control Structures: Branching: if, if-else, nested if, else-if ladder, switch. Looping**:** while, do-while and for loop, nested loops, exit, break, jumps in loops. **Arrays**: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation. **Strings**: Declaring and Initializing string variables; String handling functions - *strlen, strcmp, strcpy and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumeric* etc.	13
Unit - 4	

Pointers in C: Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using pointers. **User-Defined Functions:** Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type. **User-Defined Data Types:** Structures - Structure Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, comparing structure variables, Array of Structures; Unions - Union definition; difference between Structures and Unions.	13

Text Books:

1. Pradeep K. Sinha and Priti Sinha: **Computer Fundamentals** (Sixth Edition), BPB Publication.
2. ITL Education Solution Limited, **Introduction to Information Technology**, Second Edition 2018, Pearson Education.
3. E. Balagurusamy: **Programming in ANSI C** (TMH),7th Edition.

Reference Books :

1. Kamthane: Programming with ANSI and TURBO C (Pearson Education)
2. V. Rajaraman: Programming in C (PHI – EEE)
3. S. Byron Gottfried: Programming with C (TMH)
4. Kernighan &Ritche: The C Programming Language (PHI)
5. Yashwant Kanitkar: Let us C
6. P.B. Kottur: Programming in C (Sapna Book House)

Course Code: DSC-1 Lab CSCP 101	Course Title: C Programming Lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 20
Exam Marks: 30	Exam Duration: 3 Hours

Practice Lab

The following activities be carried out in the lab during the initial period of the semester.

1. Basic Computer Proficiency

a) Familiarization of Computer Hardware.

b) Basic Computer Operations and Maintenance.

c) Do's and Don'ts, Safety Guidelines in Computer Lab.

2. Familiarization of Basic Software – Operating System, Word Processors, Internet Browsers, Integrated Development Environment (IDE) with Examples.
3. Type Program Code, Debug and Compile basic programs covering C Programming fundamentals discussed during theory classes.

Programming Lab

Part A

1. Program to read three numbers and find the biggest of three.
2. Program to find the area of a triangle using three sides of triangle.
3. Program to check for prime number.
4. Program to generate n Fibonacci numbers.
5. Program to read a multi - digit number find the sum of the digits, reverse the number and check it for palindrome.
6. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers.
7. Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).

8. Program to find the roots of quadratic equation(Demonstration of switch Statement).
9. Program to find largest and smallest element in a list of 'n' elements (Demonstration of one- dimensional array).
10. Program to multiply two matrices**.**

Part B

1. Program to accept 'n' and find the sum of the series 1! + 3! + 5! …… + n!
2. Write user-defined functions to (a) find the length of a string (b) concatenate two strings. Call these functions in the main program.
3. Program to find whether a given string is palindrome or not (Use a function to reverse a string using pointers).
4. Program to transpose a matrix of order N x M and check whether it is symmetric or not.
5. Program to add two matrices using pointers.
6. Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
7. Program to display the first 'n' Fibonacci numbers using a function to generate the n^{th} Fibonacci number.
8. Program to find the GCD of 'n' integers using a function to compute the GCD of two integers.
9. Program to enter the information of n students (name, register number, marks in three subjects) into an array of structures. Compute and print the result of all students. For passing, student should get at least 35 in each subject, otherwise result is "FAIL".
   If the student passes and if percentage >= 70, result is DISTINCTION; If percentage is < 70 and >= 60, result is FIRST CLASS; if percentage is < 60 and >=50, result is SECOND CLASS; otherwise result is PASS CLASS. Get the out put of all students in a tabular form with proper column headings.
10. Program to prepare the pay slip of 'n' employees using an array of

structures. Input the employee name, employee number and basic pay. Calculate the DA,HRA, PF, PT, Gross Pay and Net Pay as follows:

If Basic < 40000, DA = 50% of Basic, HRA = 12% of Basic, PF = 12% of Gross Pay,PT = 250.Otherwise DA = 40% of Basic, HRA = 10% of Basic, PF = 13% of Gross, PT= 300. Gross Pay = Basic + DA + HRA and Net Pay = Gross Pay – PF – PT.

Evaluation Scheme for Practical Examination

Assessment Criteria		**Marks**
Program-1 from Part A	Writing the Program	5
	Execution and Formatting	5
Program-2 from Part B	Writing the Program	7
	Execution and Formatting	8
Practical Records		5
Total		**30**

Course Code: CSOE 101	Course Title: Office Automation
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Compare and contrast various types of operating systems
- Explain the purpose of office automation
- Describe how information is stored and retried in/from computer memory
- Know about various types of office automation software and their applications
- Create document using word processing software
- Design presentation using presentation software
- Create worksheets using spreadsheet software
- Store and retrieve data in/from database management application

Course Content

Content	Hours
Unit - 1	
Computer software: Introduction, Software definition, Software categories, Installing and uninstalling software, Software piracy, Software terminologies **Introduction to windows Operating System**, operating with windows, GUI, use of help features, starting an application, essential accessories, creating shortcuts, windows explorer, control panel, finding folders and files, System utilities. **MS-Office**: Introduction, Office user interface, Microsoft office Components. **MS-Word:** Introduction, Starting MS-Word, Microsoft word Environment working with word documents, working with text, working with tables checking spelling and grammar, adding graphs to the document, mail merge, header and footers, page	12

numbers, protect the document, working with formatting tools.	
Unit - 2	
MS-Excel: Introduction, starting MS Excel, Microsoft Excel environment, Working with Excel workbook, Working with worksheet – Entering data, Excel formatting tips and Techniques, Generating graphs, Formulas and Functions, Inserting charts, Sorting, Pivot Tables, data extraction, adding clip art, add an image from a file, Printing in Excel.	10
Unit - 3	
MS-PowerPoint: Starting MS PowerPoint, Working with PowerPoint, Creating, Saving and Printing a presentation, Working with Animation, Adding a slide to presentation, Navigating through a presentation, Slide-sorter, Slide-show, Editing slides, Working with Graphics and Multimedia in PowerPoint (Inserting Photo, Video, and Audio). **The Internet:** Basic internet terms, Internet applications, Internet tools, Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, Advantages and disadvantages of email.	10
Unit - 4	
Database Fundamentals - Basic database terms, Database Management System. **MS-Access:** Introduction to Access, Creating Tables and Database, Data Type and Properties, Adding & Deleting Field in Table, Primary Key Fields, Queries, Forms: The Forms wizard saving forms, Modifying forms, Pages, Macro, Module, Reports, Printing Report, Forms.	10

Text Book :

1. ITL Education Solution Limited, Introduction to Information Technology, Second Edition., Pearson

Reference Books:

1. Peter Norton, Introduction to Computers, 7th edition, Tata McGraw Hill Publication, 2011)
2. Anita Goel, Computer Fundamentals, Pearson Education, 2011.
3. Linda Foulkes, Learn Microsoft Office 2019: A comprehensive guide to getting started with Word, PowerPoint, Excel, Access, and Outlook, Packet Publishing Limited, 2020.
4. Bittu Kumar, Mastering MS Office: Concise Handbook with Screenshots, V&S Publishers, 2017.

II Semester

Course Code: DSC-2 CSCT 151	Course Title: Data Structures using C
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs)

After completing this course satisfactorily, a student will be able to:

- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
- Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs
- Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
- Demonstrate different methods for traversing trees
- Compare alternative implementations of data structures with respect to performance
- Describe the concept of recursion, give examples of its use
- Discuss the computational efficiency of the principal algorithms for sorting and searching

Course Content		
Content	**Hours**	
Unit - 1		
Introduction to Data Structures: Definition, Need for Data Structures, Types of Data Structures. **Linear Data Structures:** Arrays - Definition, Declaration and storage of one- and two-dimensional arrays. Sparse matrices. **Recursion**: Definition; Types of recursion; Recursion Technique Examples - Fibonacci numbers, GCD, Binomial coefficient ${}^{n}C_{r}$, Comparison between iterative and recursive functions. **Sorting**: Sorting – Selection sort, Bubble sort, Quick sort, Insertion sort; Comparison of different sorting techniques.	13	
Unit - 2		
Searching: Introduction, Linear search, Binary Search, Comparison of different searching techniques. **Dynamic memory allocation:** Static and Dynamic memory allocation; Memory allocation and deallocation functions - *malloc*, *calloc*, *realloc* and *free.* **Linked List**: Introduction, characteristics, types of linked lists, Representation of singly linked list in memory, Singly linked list – Operations, algorithms, Representation of polynomials using linked lists. Circular linked list – Operations, Doubly linked list - operations. Memory allocations.	13	
Unit - 3		
Stacks – Array representation of stacks, Linked representation of stacks, operations, Applications of stacks Recursion, Implementation of recursive procedure by stack (factorial function and Fibonacci sequence). **Arithmetic Expressions**: Prefix, infix and postfix notation, infix to postfix conversion, evaluation of postfix expression. **Queues**: Array representation of queue, Linked representation of queue,	13	

Types of queues- Simple queue, circular queue, double-ended queue, priority queue, operations on queues.		
Unit - 4		
Trees: Definition; Tree terminologies – node, root node, parent node, ancestors of a node, siblings, terminal and non-terminal nodes, degree of a node, level, edge, path, depth; Binary tree: Types of binary trees - strict binary tree, complete binary tree, binary search tree. Array representation of binary tree. Traversal of binary tree; *preorder, inorder* and *postorder* traversal; Construction of a binary tree when inorder and pre/postorder traversals are given. **Graphs:** Terminologies, Matrix representation of graphs, Traversals: Breadth First Search and Depth first search.	13	

1. Sudipa Mukherjee: Data Structures using C – 1000 Problems and Solutions (McGraw Hill Education, 2007)

Text Books

1. Sartaj Sahni: Fundamentals of Data Structures.
2. YedidyahLang sam, Moshe J. Augenstein and Aaron M. Tenenbaum, **Data Structures Using C and C**++, 2nd Edition, PHI Publication
3. Seymour Lipschutz, Schaum's Outlines Series, **Data Structures with C**, Tata McGraw Hill 2011

References

1. Kamathane: Introduction to Data structures (Pearson Education)
2. Y. Kanitkar: Data Structures Using C (BPB)
3. Kottur: Data Structure Using C
4. Padma Reddy: Data Structure Using C

Course Code: DSC-2 Lab CSCP 151	Course Title: Data Structures Lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 20
Exam Marks: 30	Exam Duration: 3 Hours

Programming Lab

Part A

1. Program to compute power of a number using a recursive function.
2. Program to compute the value of ^{n}c using a recursive function to find factorial function.
3. Program to implement dynamic array, find smallest and largest element of the array.
4. Program to read the names of cities and arrange them alphabetically.
5. Program to sort the given list using selection sort technique.
6. Program to sort the given list using bubble sort technique.
7. Program to sort the given list using quick sort technique.
8. Program to sort the given list using insertion sort technique.
9. Program to search an element using linear search technique.
10. Program to search an element using recursive binary search technique.

Part B

1. Program to implement queue using arrays.
2. Program to implement stack using arrays.
3. Program to implement stack using linked list.
4. Write a Program for converting an Infix Expression to Postfix Expression. Program should support both parenthesized and free parenthesized expressions with the following operators:

   +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands.
5. Program to evaluate a postfix expression.
6. Program to implement all operations on a sorted singly linked list.

7. Program to implement queue using linked list.
8. Program to implement circular queue using array.
9. Write a menu driven program for the following operations on Binary Search Tree (BST) of integers:

(a) Create a BST of 'n' Integers

(b) Traverse the BST in Inorder, Preorder and Postorder

(c) Search the BST for a given element and report the appropriate message

10. Program for the following operations on a graph (G) of cities:

(a) Create a graph of N cities using Adjacency Matrix.

(b) Print all the nodes reachable from a given starting node in a digraph using BFS method.

Evaluation Scheme for Practical Examination :

Assessment Criteria		**Marks**
Program-1 from Part A	Writing the Program	5
	Execution and Formatting	5
Program-2 from Part B	Writing the Program	7
	Execution and Formatting	8

Practical Records	5
Total	**30**

Course Code: CSOE2/CAOE2 CSOE 151	**Course Title: Web Designing**
Course Credits: 3	Hours of Teaching/Week:
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs)

After completing this course satisfactorily, a student will be able to:

- Understand various Internet related terminologies
- Explain features and evolution of Internet
- Explain the use of search engines
- Know the use of different tags available in HTML
- Design web pages using HTML5, CSS3, XML and XHTML
- Implement websites using linked web pages.

Course Content

Content	Hours
Unit - 1	
The Internet: Introduction, Evolution, basic internet terms, Getting connect to internet, Internet applications, Data over the internet. **Internet tools:** Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, checking email, sending email, email attachment, How email works, advantages and disadvantages of email. **Search Engines:** Searching an internet, refining the search, Instant messaging, Features of messengers.	12
Unit - 2	
Overview of HTML5 -Exploring new features of HTML5, Structuring an HTML Document, Creating and saving HTML document, Viewing an HTML document. **Fundamentals of HTML-**Understanding Elements, Root elements, Metadata elements, Style element, Section element, Header and Footer element, Address element, Basic HTML data types, Data types defined by RFC and IANA	10

Documentation. **Working with Text:** Formatting Text with HTML Elements, Defining MARK element, Defining STRONG element, Defining CODE element, Defining SMALL element. **Organizing Text in HTML:** Arranging text, Displaying Lists.	
Unit - 3	
Working with Links and URLs- Exploring the Hyperlinks, Exploring the URL, Exploring Link Relations. **Creating Tables-**Understanding Tables, Describing the table element. **Working with Images, Colors and Canvas -** Inserting images in a web page, Exploring Colors, Introducing Canvas **Working with Forms:** Exploring Form element, Exploring types of the INPUT element, Exploring the BUTTON element, Exploring the Multiple-Choice elements, Exploring TEXTAREA and LABEL elements.	10
Working with Frames:<FRAMESET>, <FRAME> tag with attributes.	
Unit - 4	
Overview of CSS3- Understanding the syntax of CSS, Exploring CSS Selectors, Inserting CSS in an HTML document. **Background and Color Gradients in CSS:** Exploring Background of a Web Page, Exploring Color Properties, Exploring Gradient Properties, Exploring Font properties. **Working with Basics of XML-**Exploring XML, Comparing XML with HTML, Describing the Structure of an XML document.	10

Text Books:

1. ITL Education Solution Limited, Introduction to Information Technology, Pearson Education, 2012
2. DT Editorial Services, HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Second Edition, Dreamtech Publisher, 2016

References :

1. Laura Lemay & Rafe Colburn, Mastering Html, CSS & JavaScript, Web Publishing, 2016
2. Firuza Aibara, HTML 5 for Beginners, 2012
3. Glenn Johnson, Training Guide – Programming in HTML5 with JavaScript and CSS3 (Microsoft Press Training Guide), 2013

Semester III

Course Title: Object Oriented Programming Concepts and Programming in Java	Course code: CSCT 201
Total Contact Hours: 52	Course Credits: 04+02
Formative Assessment Marks:40	Duration of SEE/Exam: 02Hours
Summative Assessment Marks:60	

Course Outcomes (COs):

At the end of the course, students will be able to:

- Understand the object-oriented concepts and JAVA Technology.
- Java technology enabled solutions for various applications
- Understand the Java features to implement concurrency, parallelism etc.
- Demonstrate the basic principles of creating Java applications with GUI.

Contents	Hours
Unit-1	
Introduction to Java: Basics features of Java programming, Java program structure, Java Virtual Machine, Constants, Variables, Data Types, Operators, Control structures: if, if ...else, else if ladder, switch statements Looping Structures: for, while, do…while, for-each	**13**
Unit-2	
Objects and Classes: Basics of objects and classes, Methods and objects, Constructors, Method Overloading, Finalizer, Visibility modifiers, Arrays in Java, built-in classes: Math, String, Character, String Buffer and their methods. **This** reference. **Inheritance and Polymorphism:** Inheritance, Super and Sub class, Overriding, Polymorphism, Dynamic binding, Casting objects, Abstract methods and Classes, Interfaces, Packages, Built-in packages: io, util, lang, awt.	**13**
Unit-3	

Event and GUI programming: Event handling in Java, Event types, Mouse and key events, GUI Basics, Panels, Frames, **Layout Managers:** Flow Layout, Border Layout, Grid Layout, GUI components: Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Menus, Dialog Box. Applet and its life cycle, Introduction to Swing, Exceptional Handling Methods	**13**
Unit-4	
I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. **Multithreading in Java**: Thread life cycle and methods, Runnable interface, Thread synchronization. **Introduction to Network Programming:** Network Basics and Remote Method Invocation (RMI) **Java Database Connectivity:** JDBC Driver Types, JDBC Packages, Overview Of the JDBC process, Database Connection.	**13**

Text Books:

1. Programming with Java, By E Balagurusamy – A Primer, 4th Edition, McGraw Hill Publication.

Reference Books:

1. Core Java Volume I –Fundamentals, By CayS. Horstmann, PrenticeHall.
2. Object Oriented Programming with Java: Somashekara M.T., Guru, D.S., Manjunatha K.S, 1st Edition, PHI Learning2017.
3. Java2 - The Complete Reference, Herbert Schildt, 5th Edition, McGraw Hill Publication,2017.
4. Java - The Complete Reference, Herbert Schildt, 7th Edition, McGraw Hill Publication, 2017.

Semester: IV

Course Title: **Database Management System**	Course code: CSCT251
Total Contact Hours: 52	Course Credits: 04+02
Formative Assessment Marks: 40	Duration of SEE/Exam: 02Hours
Summative Assessment Marks: 60	

Course Outcomes(COs):

At the end of the course, students will be able to:

- Understand the various data base concepts and the need for database systems.
- Identify and define database objects, enforce integrity constraints on a database using different modeling techniques
- Design a data model and Schemas in RDBMS.
- Identify entities and relationships and draw ER diagram for a given real-world applications.
- Realization of ER models through Relational Model using SQL
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Understand the transaction processing and concurrency control techniques.

Contents	Hours
Unit-1	
Database Architecture: Introduction to Database systems, Applications, Characteristics, Database users, Data models, Database schema, Database architecture, Data independence, Database languages, Classification of DBMS. **E-RModel:** Entity-Relationship modeling**:** E-R Model Concepts, Entity, Entity types, Entity sets, Attributes, Types of attributes, Relationships between the entities. Relationship types, Roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity, E-R diagram	**13**
Unit-2	
Relational Data Model: Relational model concepts, Characteristics of relations. **Relational model constraints:** Domain constrains, Key Constraints, Primary & Foreign Key Constraints, Integrity Constraints, and Null Values. **Data Normalization:** Functional dependencies, Normalization, First normal form, Second normal form, Third normal form, Boyce-Codd normal form. **Transaction Management:** Introduction to Transaction Processing, Single user& multiuser systems, Transaction states, Transaction Properties, Transactions: read & write operations, Need of concurrency control, The lost update problem, Dirty read problem, Types of failures.	**13**
Unit-3	
INTERACTIVE SQL: Table fundaments, Oracle data types, Create Table command, Inserting data into table, Viewing Data in the table, sorting data in a table, Creating a table from a table, Inserting data into a table from another table, Delete operations, Updating the contents of a table, Modifying the structure of tables, Renaming tables, destroying tables, displaying table structure. **DATA CONSTRAINTS:** Types of data constraints, IO constraints-The PRIMARY KEY constraint, The FOREIGN KEY constraint, The UNIQUE KEY constraint, Business Rule Constraints, NULL value concepts, NOTNULL constraints, CHECK constraint, DEFAULT VALUE concepts. **OPERATIONS ON TABLE DATA:** Arithmetic Operators, Logical Operators, Range Searching, Pattern Matching, Oracle Table – DUAL, Oracle Function-Types, Aggregate Function, Date Conversion Function. GROUPING DATA FROM TABLES IN SQL**,** Group By Clause, Having Cause, Sub queries, JOINS, UNION, INTERSECTION, MINUS Clauses	**13**
Unit-4	
INTRODUCTION TO PL/SQL: The Generic PL/SQL Block, PL/SQL: The character set, Literals, PL/SQL datatypes, Variables, Logical comparisons, Displaying User Messages on The VDU Screen, Comments. Control Structures -Conditional Control, Iterative Control	

PL/SQL Transactions: Cursors-Types of Cursors, Cursor Attributes. Explicit cursor-Explicit cursor Management, Cursor for loop **PL/SQL Database Objects:** Procedures and Functions, Oracle Packages, Error Handling in PL/SQL.	**13**

ext Books:

1. Fundamentals of Database Systems, Ramez Elamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015

Reference Books:

2. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
3. Introduction to Database System, CJDate, Pearson,1999.
4. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6th Edition, McGraw Hill, 2010.
5. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002

Open Elective for I Semester

Course Title: **Office Automation**	
Course Code: CSOE101	
Course Credits:03	Hours/Week:03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Compare and contrast various types of operating systems
- Explain the purpose of office automation
- Describe how information is stored and retried in/from computer memory
- Know about various types of office automation software and their applications
- Create document using word processing software
- Design presentation using presentation software
- Create worksheets using spreadsheet software
- Store and retrieve data in/from database management application

Contents	Hours
Unit–1	
Computer software: Introduction, Softwaredefinition, Software categories, Installing and uninstalling software, Software piracy, Software terminologies. **Introduction to windows Operating System**, operating with windows, GUI, use of help features, starting an application, essential accessories, creating shortcuts, windows explorer, control panel, finding folders and files, System utilities. **MS-Office**: Introduction, Office user interface, Microsoft office Components **MS-Word:** Introduction, Starting MS-Word, Microsoft word Environment working with word documents, working with text, working with tables checking spelling and grammar, adding graphs to the document, mail merge, header and footers, page numbers, protect the document, working with	12

Formatting tools.	
Unit–2	
MS-Excel: Introduction, starting MS Excel, Microsoft Excel environment, working with Excel workbook, working with worksheet – Entering data, Excel formatting tips and Techniques, generating graphs, Formulas and Functions, inserting charts, Sorting, Pivot Tables, data extraction, adding clipart, add an image from a file, Printing in Excel.	10
Unit-3	
MS-Power point- Starting MS–Power Point, working with power point -, Creating, Saving and Printing a presentation, Working with Animation, adding a slide to presentation, navigating through a presentation, Slide-sorter, Slide-show, editing slides, Working with Graphics and Multimedia in PowerPoint (Inserting Photo, Video & Sound). **The Internet:** Basic internet terms, Internet applications, Internet tools, Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, Advantages and Disadvantages of email.	10
Unit-4	
Database fundamentals- Basic database terms, Database Management System **MS-Access:** Introduction to Access, Creating Tables and Database ,Datatype and Properties, Adding & Deleting Field in Table, Primary Key Fields, Queries, Forms: The Forms wizard saving forms, Modifying forms, Pages, Macro, Module, Reports, Printing Report, Forms	10

Text Book:

1. ITL Education Solution Limited, Introduction to Information Technology, Second Edition., Pearson

Reference Books:

1. Peter Norton, Introduction to Computers, 7th edition, Tata McGraw Hill Publication, 20112)
2. Anita Goel, Computer Fundamentals, PearsonEducation,2011
3. Linda Foulkes, Learn MicrosoftOffice 2019: A comprehensive guide to getting started with Word, PowerPoint, Excel, Access, and Outlook, Packt Publishing Limited,2020
4. Bittu Kumar, Mastering MS Office: Concise Handbook with Screenshots, V&S Publishers, 2017

Digital Fluency

Course Content

Semester:

Course Title: **Digital Fluency** **Course Code: SBDF101**	Course Credits: 2
Total Contact Hours: 15 hours of theory and 30 hours of practicals	Duration of ESA:
Formative Assessment Marks: **50 marks**	Summative Assessment Marks: 50 marks
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to:

(Write 3-7 course outcomes. Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and values acquired in this course)

1. Have an intelligent conversation on the key concepts and applications of Artificial Intelligence (AI), Big Data Analytics (BDA), Internet of Things (IoT), Cloud Computing, and Cybersecurity
2. Develop holistically by learning essential skills such as effective communication, problem-solving, design thinking, and teamwork
3. Build his/her personal brand as an agile and expansive learner – one who is interested in horizontal and vertical growth?

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

This mapping needs to be done considering POs of respective programs.

Course Outcomes (COs) / Program Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**			**10**	**11**	**12**
1. Have an intelligent conversation on the key concepts and applications of AI, BDA, IoT, Cloud Computing, and Cybersecurity												
2. Develop holistically by learning essential skills such as effective communication, problem-solving, design thinking, and teamwork												
3. Build his/her personal brand as an agile and expansive learner – one who is interested in horizontal and vertical growth												

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark ‘X’ in the intersection cell if a course outcome addresses a particular program outcome.

Course Content (Digital 101)

	Details of topic	Duration
Module 1: Emerging Technologies	Overview of Emerging Technologies: i. Artificial Intelligence, Machine Learning, Deep Learning, ii. Database Management for Data Science, Big Data Analytics, iii. Internet of Things (IoT) and Industrial Internet of Things (IIoT) iv. Cloud computing and its service models v. Cyber Security and Types of cyber attack	05 hours
Module 2: Applications of Emerging Technologies	Applications of emerging technologies: i. Artificial Intelligence ii. Big Data Analytics iii. Internet of Things iv. Cloud Computing v. Cyber Security	05 hours
Module 3: Building Essential Skills Beyond Technology	Importance of the following: **i.** Effective Communication Skills **ii.** Creative Problem Solving & Critical Thinking **iii.** Collaboration and Teamwork Skills **iv.** Innovation & Design Thinking **v.** Use of tools in enhancing skills	05 hours

References to learning resources:

1. The learning resources made available for the course titled “Digital 101” on Future Skills Prime Platform of NASSCOM

Pedagogy

Flipped classroom pedagogy is recommended for the delivery of this course. For every class:

1. Before coming to the class students are expected to go through the content (both video and other resources) on the related topic and give the quiz on Future Skills Prime Platform of NASSCOM.
2. Class room activities are designed around the topic of the session towards developing better understanding, clearing mis-conceptions and discussions of higher order thinking skills like application, analysis, evaluation and design.
3. Every theory class ends with announcement of exercise for practical activity of the week

Assessment

Formative Assessment	
Assessment Occasion	**Weightage in Marks**
1. After watching videos of each topic, 05 marks tests are to be given by the students on Future Skills Prime Platform. The total marks earned bystudents is to be computed.	No weightage
2. Practical Sessions: A total of 05 activities from Module 1 and Module 2 and 03 activities from Module 03 need be completed by students. All the activities are expected to be done in teams of 02 -03 students per team. Each session performance is assessed for 10 marks against announced rubrics for assessment. The total marks earned by students is to be computed.	50%
3. Summative Assessment : After completion of all 3 modules students will be giving Final Assessment with 30 questions (30 min) on Future Skills Prime platform. Students will have two attempts and those who score at least 50% marks will get certificate from NASSCOM-AICTE.	This assessment may be given 50% weight in computing the final grade of the students.

Date: **Co-Ordinator**

Open Elective for II Semester

Course Title: **Web Designing**	
Course Code: CSOE151	
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand various Internet related terminologies
- Explain features and evolution of Internet
- Explain the use of search engines
- Know the use of different tags available in HTML
- Design web pages using HTML5, CSS3, XML and XHTML
- Implement websites using linked webpages.

Contents	**Hours**
Unit–1	
The Internet: Introduction, Evolution, basic internet terms, Getting connect to internet, Internet applications, Data over the internet. **Internet tools:** Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, checking email, sending email, email attachment, How email works, advantages and disadvantages of email. **Search Engines:** Searching an internet, refining the search, Instant messaging, Features of messengers.	12
Unit–2	
Overview of HTML5- Exploring new features of HTML5, Structuring an HTML Document, Creating and saving HTML document, Viewing an HTML document. **Fundamentals of HTML-**Understanding Elements, Root elements, Metadata elements, Style element, Section element, Header and Footer element, Address element, Basic HTML datatypes, Datatypes defined by RFC and IANA	10

Documentation. **Working with Text:** Formatting Text with HTML Elements, Defining MARK element, Defining STRONG element, Defining CODE element, Defining SMALL element. **Organizing Text in HTML:** Arranging text, Displaying Lists.	
Unit-3	
Working with Links and URLs – Exploring the Hyperlinks, Exploring the URL, Exploring Link Relations. **Creating Tables-** Understanding Tables, Describing the table element. **Working with Images, Colors and Canvas-** Inserting images in a web page, Exploring Colors, Introducing Canvas **Working with Forms:** Exploring Form element, Exploring types of the INPUT element, Exploring the BUTTON element, Exploring the Multiple-Choice elements, Exploring TEXTAREA and LABEL elements. **Working with Frames:** <FRAMESET>, <FRAME> tag with attributes.	10
Unit-4	
Overview of CSS3- Understanding the syntax of CSS, Exploring CSS Selectors, Inserting CSS in an HTML document. **Background and Color Gradients in CSS:** Exploring Background of a Web Page, Exploring Color Properties, Exploring Gradient Properties, Exploring Font properties. **Working with Basics of XML-**Exploring XML, Comparing XML with HTML, Describing the Structure of an XML document.	10

Text Books

1. ITL Education Solution Limited, Introduction to Information Technology, Pearson Education, 2012
2. DT Editorial Services, HTML5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Second Edition, Dreamtech Publisher,2016

Reference Books

1. Laura Lemay & Rafe Colburn, Mastering Html, CSS & Java script, Web Publishing, 2016
2. Firuza Aibara, HTML5 for Beginners, 2012
3. Glenn Johnson, Training Guide– Programming in HTML5 with Java Script and CSS3 (Microsoft Press Training Guide),2013

Skill Enhancement Course: SEC for other Programmes

Semester: III

Course Title: **Artificial Intelligence**	
Course code: SBAI201	Course Credits: 2
Total Contact Hours: 13 hours of theory and 26 hours of practical	Duration of SEE: 01 Hour
Formative Assessment Marks: 20 marks	Summative Assessment Marks: 30 marks

Course Outcomes (COs):

At the end of the course, students will be able to:

- Appraise the theory of Artificial intelligence and list the significance of AI.
- Discuss the various components that are involved in solving an AI problem.
- Illustrate the working of AI Algorithms in the given contrast.
- Analyze the various knowledge representation schemes, Reasoning and Learning techniques of AI.
- Apply the AI concepts to build an expert system to solve the real-world problems. Course Content

Contents	Hours
Unit-1	
Overview of AI: Definition of Artificial Intelligence, Philosophy of AI, Goals of AI, Elements of AI system, Programming a computer without and with AI, AI Techniques, History of AI. Intelligent Systems: Definition and understanding of Intelligence, Types of Intelligence, Human Intelligence vs Machine Intelligence.	05
Unit-2	
AI Applications: Virtual assistance, Travel and Navigation, Education and Healthcare, Optical character recognition, E-commerce and mobile payment systems, Image based search and photo editing. AI Examples in daily life: Installation of AI apps and instructions to use	05

AI apps.	
Unit-3	
Robotics: Introduction to Robotics, Difference in Robot System and Other AI Program, Components of a Robot.	03

Laboratory Activities: • Amazon Alexa: https://play.google.com/store/apps/details?id=com.amazon.dee.app&hl=en &gl=US • Google Lens: https://play.google.com/store/search?q=google+lens&c=apps&hl=en&gl=US • Image to Text to Speech ML OCR: https://play.google.com/store/apps/details?id=com.mlscanner.image.text.s peech& hl=en_IN&gl=US • Google Pay: https://play.google.com/store/apps/details?id=com.google.android.apps.nb u.paisa .user&hl=en_IN&gl=US	26

- Grammarly: https://play.google.com/store/search?q=grammarly&c=apps&hl=en_IN&gl=
- Google Map: https://play.google.com/store/search?q=google+maps&c=apps&hl=en&gl=US
- FaceApp: https://play.google.com/store/apps/details?id=io.faceapp&hl=en_IN&gl=US
- Socratic: https://play.google.com/store/apps/details?id=com.google.socratic&hl=en_I N&gl =US
- Google Fit: Activity Tracking: https://play.google.com/store/apps/details?id=com.google.android.apps.fitn ess&h l=en_IN&gl=US
- SwiftKey Keyboard: https://swiftkey-keyboard.en.uptodown.com/android
- E-commerce App:

https://play.google.com/store/apps/details?id=com.jpl.jiomart&hl=en_IN&gl=US

Text Book:

1. Wolfgang Ertel, “Introduction to Artificial Intelligence”, 2nd Edition, Springer International Publishing 2017.
2. Michael Negnevitsky, “Artificial Intelligence A Guide to Intelligent Systems”, 2nd Edition, Pearson Education Limited 2005.

Reference Books:

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_tutorial.pdf
2. Kevin Knight, Elaine Rich, Shivashankar B. Nair, ”Artificial Intelligence”, 3rd Edition, July 2017.

Reference Links:

1. Voice Assistant: https://alan.app/blog/voiceassistant-2/
2. Browse with image: https://www.pocket-lint.com/apps/news/google/141075-what-isgoogle-lens-and-how-does-it-work-and-which-devices-have-it
3. OCR: https://aws.amazon.com/what-is/ocr/
4. Mobile Payment system: https://gocardless.com/en-us/guides/posts/how-do-mobilepayment-systems-work/
5. Grammarly: https://techjury.net/blog/how-to-use-grammarly/#gref
6. Travel & Navigation: https://blog.google/products/maps/google-maps-101-ai-powernew-features-io-2021/
7. AI in photo editing: https://digital-photography-school.com/artificial-intelligencechanged-photo-editing/
8. AI in education: https://www.makeuseof.com/what-is-google-socratic-how-does-itwork/
9. AI in health and fitness: https://cubettech.com/resources/blog/implementing-machinelearning-and-ai-in-health-and-fitness/
10. E-commerce and online shopping: https://medium.com/@nyxonedigital/importanceof-e-commerce-and-online-shopping-and-why-to-sell-online-5a3fd8e6f416

Skill Enhancement Course: SEC for BCA course

Semester: III

Course Title: **Open-Source Tools** **Course code: CSOE201**	Course Credits: 2 (1L+0T+2P)
Semester: III	Duration of SEE: 01 Hour
Total Contact Hours: 13 hours of theory and 26-28 hours of practicals	SEE: 30 Marks IA: 20 Marks

Course Outcomes (COs):

- Recognize the benefits and features of Open Source Technology and to interpret, contrast and compare open source products among themselves
- Use appropriate open source tools based on the nature of the problem
- Write code and compile different open-source software.

Course Content: Open Source Tools

Module	Details	Duration
Module 1: Open Source Softwares	• Introduction to Open sources, Need of Open Sources, Open Source –Principles, Standard Requirements, Advantages of Open Sources – • Free Software – FOSS • Licenses – GPL, LGPL, Copyrights, Patents, Contracts & Licenses and Related Issues • Application of Open Sources. Open Source Operating Systems : FEDORA, UBUNTU	**05 hours**
Module 2: Programming Tools And Techniques	• Usage of design Tools like Argo UML or equivalent • Version Control Systems like Git or equivalent • Bug Tracking Systems (Trac, BugZilla) • BootStrap	**04hours**

Module 3: Case Studies	• Apache • Berkeley Software Distribution • Mozilla (Firefox) • Wikipedia • Joomla • GNU Compiler Collection • Libre Office	**04 hours**

Text Book:

1. KailashVadera, Bhavyesh Gandhi, "Open Source Technology", Laxmi Publications Pvt. Ltd 2012, 1st Edition.

Reference Book:

1. Fadi P. Deek and James A. M. McHugh, "Open Source: Technology and Policy", Cambridge Universities Press 2007.

Question Paper Pattern for Skill Enhancement Course

Artificial Intelligence & Open Source Tools

Duration: 1 Hour Max. Marks: 30

Part-A

(This section shall contain four questions from each module. Each question carries one mark)

Module-1:

1.

2.

3.

4.

Module-2:

5.

6.

7.

8.

Module-3:

9.

10.

11.

12.

Part-B

(This section shall contain two full questions from each module having an internal choice. Each full question carries six marks)

Module-1:

(a) Six mark question with sub-questions **OR** (b) Six mark question with sub-questions

Module-2:

(a) Six mark question with sub-questions **OR** (b) Six mark question with sub-questions

Module-3:

(a) Six mark question with sub-questions **OR** (b) Six mark question with sub-questions

Open Elective for III Semester: Programming in C Concepts

Course Title: **Programming in C Concepts** **COURSE CODE: CSOE 201**	Course Credits: 3 (3L+0T+0P)
Semester: III	Duration of SEE: 02 Hours
Total Contact Hours: 42	SEE: 60 Marks IA: 40 Marks

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Read, understand and trace the execution of programs written in C language
- Write the C code for a given problem
- Perform input and output operations using programs in C
- Write programs that perform operations on arrays
- Understand functions and file concepts of C language

Course Contents:

Contents	Hours
Unit-1	
Overview of C: Importance of C Program, Basic structure of a C-program, Execution of a C Program. **C Programming Basic Concepts:** Character set, Tokens, Keywords, Constants, Symbolic constants, Variables, Data types, **Input and output with C:** Formatted I/O functions – *printf* and *scanf,* control stings and escape sequences,output specifications with *printf* functions; Unformatted I/O functions to read and display single character and astring-*getchar, putchar, gets* and *puts* functions.	**11**
Unit-2	
Operators & Expressions: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators;	

Conditional operator; Operator Precedence and Associatively; Evaluation of arithmetic expressions; **Control Structures:** Decision Making and Branching -Decision making with if statement, simple if statement, the if else statement, nesting of if…else statements, the else if ladder, the switch statement, ?: operator, the go to statement.	**11**
Unit-3	
Looping Structures: Decision making and looping - The while statement, the do statement, for statement, nested loops, exit, break, Jumps in loops. **Derived data types in C:** Arrays-declaration, initialization and access of one-dimensional and two-dimensional arrays.	**10**
Unit -4	
Handling of Strings: Declaring and initializing string variables, reading strings from terminal, writing strings to screen, String handling functions - *strlen, strcmp, strcpy, strstr and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumeric*. **Functions:** Basics of functions, Parameter Passing, Simple functions **File handling:** Basics of file programming concepts- fprintf and fscanf, and example programs	**10**

Text Book:

1. E.Balagurusamy, Programming in ANSI C ,7th Edition, Tata McGraw Hill

Reference Books:

2. Herbert Scheldt, C: The Complete Reference, 4th Edition.
3. Brian W. Kernighan and Dennis Ritchie, The C Programming Language, Second Edition.

Open Elective for IV Semester: Python Programming Concepts

Course Title: **Python Programming Concepts** **Course Code: CSOE251**	Course Credits: 3 (3L+0T+0P)
Semester: IV	Duration of SEE: 02 Hours
Total Contact Hours: 42	SEE: 60 Marks IA: 40 Marks

Course Outcomes (COs):

- Explain the basic concepts of Python Programming.
- Demonstrate proficiency in handling of loops and the creation of functions.
- Identify the methods to create and manipulate string data types.
- Understand the notion of arrays, lists, tuples and their applications

Contents	Hours
Unit-1	
Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments;	**10**
Unit-2	
Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples; Illustrative programs; Libraries for graphics and image handling. **Python Control Flow:** Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range() and exit () functions; Illustrative programs.	**10**
Unit-3	
Strings: Creating and Storing Strings; Accessing Sting Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and	

Joining, Traversing; Format Specifiers; Escape Sequences; Raw and Unicode Strings; Python String Methods; Illustrative programs. **Other data types:** Basics of arrays, lists, tuples and related functions	**11**
Unit-4	
Python Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Illustrative programs	**11**

Text Book:

1. Python Programming: Using Problem Solving Approach, Reema Thareja, June 2017.

Reference Books:

1. Learning with Python, Allen Downey, Jeffrey Elkner, Chris Meyers, 2015 (Freely available online 2015. @https://www.greenteapress.com/thinkpython/thinkCSpy.pdf)

2. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.

3. http://www.ibiblio.org/g2swap/byteofpython/read/

4. http://scipy-lectures.org/intro/language/python_language.html

5. https://docs.python.org/3/tutorial/index.html

Open Elective for IV Semester: E-COMMERCE

Course Title: E-Commerce **Course Code: CSOE251**	Course Credits: 3 (3L+0T+0P)
Semester: IV	Duration of SEE: 02 Hours
Total Contact Hours: 42	SEE: 60 Marks IA: 40 Marks

Course Outcomes (COs):

- Compare how internet and other information technologies support business processes.
- Demonstrate an overall perspective of the importance of application of internet technologies in business administration
- Explain the basic business management concepts.
- Demonstrate the basic technical concepts relating to E-Commerce.
- Identify the security issues, threats and challenges of E-Commerce.

Course Contents:

Contents	**Hours**
Unit-1	
Introduction to E-Commerce and Technology Infrastructure Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5**,** Building an E-Commerce Website, Mobile Site and Apps **Systematic approach to build an E-Commerce:** Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – Choosing hardware and software – Other E-Commerce Site tools – Developing a Mobile Website and Mobile App	**11**
Unit-2	
E-Commerce Security and Payment Systems	

E-Commerce Security Environment – Security threats in E-Commerce – Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Procedure and Public Laws - Payment Systems	**11**
Unit-3	
Business Concepts in E-Commerce Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location Marketing – Ethical, Social, Political Issues in E-Commerce	**10**
Unit-4	
Project Case Study Case Study: Identify Key components, strategy, B2B, B2C Models of Business model of any e-commerce website - Mini Project : Develop E-Commerce project in any one of Platforms like Woo-Commerce, Magento or Opencar	**10**

Text Book:

1. Kenneth C. Laudon, Carol Guercio Traver - E-Commerce, Pearson, 10th Edition, 2016

Reference Books:

1. http://docs.opencart.com/
2. http://devdocs.magento.com/
3. http://doc.prestashop.com/display/PS15/Developer+tutorials
4. RobbertRavensbergen, ―Building E-Commerce Solutions with Woo Commerce‖, PACKT, 2nd Edition.

Scheme of Assessment for Theory Examination (B.Sc.)

<table>
<tr><th colspan="2">Question Pattern</th><th>Marks</th></tr>
<tr><td colspan="3">Part – A</td></tr>
<tr><td colspan="2">1. Answer any SIX sub-questions (6×2=12)</td><td rowspan="5">12</td></tr>
<tr><td>Sub-question</td><td>Unit</td></tr>
<tr><td>a, b</td><td>1</td></tr>
<tr><td>c, d</td><td>2</td></tr>
<tr><td>e, f</td><td>3</td></tr>
<tr><td>g, h</td><td>4</td></tr>
<tr><td colspan="3">Part – B
(Answer any ONE full question from each unit – 12 marks each)
(Combinations of sub-questions of 3 to 6 marks)</td></tr>
<tr><td colspan="2">Unit-1</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">2.</td></tr>
<tr><td colspan="2">3.</td></tr>
<tr><td colspan="2">Unit-2</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">4.</td></tr>
<tr><td colspan="2">5.</td></tr>
<tr><td colspan="2">Unit-3</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">6.</td></tr>
<tr><td colspan="2">7.</td></tr>
<tr><td colspan="2">Unit-4</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">8.</td></tr>
<tr><td colspan="2">9.</td></tr>
<tr><td colspan="2">Total</td><td>60</td></tr>
</table>

V SEMESTER

Program Name	B.Sc	Semester	**V**
Course Title	**Programming in Python (Theory)**		
Course Code:	CSCT 301	No.of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Setup python to develop simple applications
- Understand the basic concepts in Python Programming
- Learn how to write, debug and execute Python programs
- Understand and demonstrate the use of advanced data types such as tuples, dictionaries and lists, Tuples and Sets
- Design solutions for problems using object-oriented concepts in Python
- Use and apply the different Python Libraries for GUI Interface, Data Analysis and Data Visualization.
- Extend the knowledge of python programming to build successful career in software development.

Unit	Description	Hours
1	**Introduction to Features and Applications of Python;** Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. **Python Basics:** Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples. **Python Control Flow:** Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range () and exit () functions. **Exception Handling:** Types of Errors; Exceptions; Exception Handling using try, except and finally. **Python Functions:** Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Recursive Functions; Scope and Lifetime of Variables in Functions	13
	Strings: Creating and Storing Strings; Accessing Sting Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifies; Escape Sequences; Raw and Unicode Strings; Python String Methods. **Lists:** Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists. **Dictionaries:** Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries. **Tuples and Sets:** Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built-in Functions on Sets; Set Methods.	

	File Handling: File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator. **Object Oriented Programming:** Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values; Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition, Private Instance Variables; Polymorphism- Definition, Operator Overloading. **GU Interface:** The tkinter Module; Window and Widgets; Layout Management- pack, grid and place	
	Python SQLite: The SQLite3 module; SQLite Methods- connect, cursor, execute, close; Connect to Database; Create Table; Operations on TablesInsert, Select, Update. Delete and Drop Records. **Data Analysis:** NumPy- Introduction to NumPy, Array Creation using NumPy, Operations on Arrays; Pandas- Introduction to Pandas, Series and DataFrames, Creating DataFrames from Excel Sheet and .csv file, Dictionary and Tuples. Operations on DataFrames. **Data Visualisation:** Introduction to Data Visualisation; Matplotlib Library; Different Types of Charts using Pyplot- Line chart, Bar chart and Histogram and Pie chart	

Text Books:

1. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
2. R. Nageswara Rao, ―Core Python Programming‖, Dreamtech.

References:

1. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, Green Tea Press. Freely available online @ https://www.greenteapress.com/thinkpython/thinkCSpy.pdf, 2015.
2. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
3. Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Fabio Nelli, Apress®, 2015
4. Advance Core Python Programming, MeenuKohli, BPB Publications, 2021.
5. Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, Prentice Hall, 2012.

6. Automate the Boring Stuff, Al Sweigart, No Starch Press, Inc, 2015.
7. Data Structures and Program Design Using Python, D Malhotra et al., Mercury Learning and Information LLC, 2021.
8. http://www.ibiblio.org/g2swap/byteofpython/read/
9. https://docs.python.org/3/tutorial/index.html

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe- Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

CourseOutcomes(COs)/ProgramOutcomes(POs)	ProgramOutcomes(POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discuss Python programming Basics															
Describe Python Control Flow															
Discuss ExceptionHandling.															
Discuss fundamental concepts of object-oriented programming.															
Discuss usage of strings, lists, tuples and sets															
Discuss file handling															
Discuss design of GUI															
Discuss SQlite database															
Discuss data analysis, data visualization using Python.															

Program Name	B.Sc	Semester	**V**
Course Title	**Python Programming Lab (Practical)**		
Course Code:	CSCP 301	No.of Credits	**02**
Contact hours	**04 Hours**	Duration of SEA/Exam	**3 hour**
Formative Assessment Marks	**25 Marks**	Summative Assessment Marks	**25 Marks**

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:4 Marks Execution:4Marks**	**8 Marks**
Program-2	**PART-B** **Writing:6 Marks Execution:6Marks**	**12 Marks**
Practical Record		**05 Marks**
Total		**25 Marks**

Program Name	**B.Sc**	Semester	**V**
Course Title	**Computer Networks (Theory)**		
Course Code:	CSCT 302	No.of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs):

- After the successful completion of the course, the student will be able to:
- Define various data communication components in networking.
- Describe networking with reference to different types of models and topologies.
- Understand the need for Network and various layers of OSI and TCP/IP reference model.
- Explain various Data Communications media.
- Describe the physical layer functions and components CO6 Identify the different types of network topologies and Switching methods.
- Describe various Data link Layer Protocols.
- Identify the different types of network devices and their functions within a network.
- Analyze and interpret various Data Kink Layer and Transport Layer protocols.
- Explain different application

Unit	Description	Hours
1	**Introduction: Uses of Computer Networks and its Applications**- Business Applications, Home Applications, Mobile Users, Social Issues. **Network Toplogies**:Bus,Star,Ring **Network Hardware**-Local Area Networks, Metropolitan Area Networks, Wide Area Networks, and Internetworks. **Reference Models**-The OSI Reference Model, The TCP\IP Reference Model,A Comparison of the OSI and TCP Reference Models.	13
	The Physical Layer: **Transmission Media**- Twisted Pair, Coaxial Cable	13

2	and Fiber Optics. **Wireless Transmission**- Radio Transmission, Microwave Transmission, Infrared, Light Transmission.Multiplexing-Frequency division, time division, code division, Switching. **The Data Link Layer:** Data link layer design issues-Services Provided to the Network Layer, Framing, Error Control, and Flow Control.Error Detection and Correction-Error-Correcting Codes, Error –Detecting Codes.Elementary Data Link Protocols-An Unrestricted Simplex Protocol, A Simplex Stop-and-Wait Protocol for an Error-Free Channel, A Simplex Protocol for a Noisy Channel.Sliding Window Protocols –A One Bit Sliding Window Protocol, A Protocol Using Go back n, A Protocol using Selective Repeat.	
	The Network Layer: Network layer design issues-Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service,Implementation of Connection-Oriented Service, Comparison of Virtual Circuit and Datagram Networks.Routing Algorithms-Flooding, Distance Vector Routing, Link State Routing,Hierarchical ,Routing,Broadcast Routing, Multicast Routing, Anycast Routing.Congestion Control Algorithms- Approaches to Congestion Control, Approaches to Congestion Control, Admission Control.The network layer in the Internet-The IP Version 4 Protocol, IP Address, IP Version 6,Internet Control Protocol, The Interior Gateway Routing Protocol: OSPF,The Exterior Gateway Routing Protocol: BGP.	
	The Transport Layer: The Transport Service-Services Provided to the Upper Layers.Elements of Transport Protocols-Addressing, Connection Establishment, connection Release, Error control and Flow Control.The Internet Transport Protocols-(TCP and UDP)-UDP- Introduction to UDP, Remote Procedure Call, Real-Time Transport Protocols, TCP- Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, TCP Connection Management Modeling, TCP Sliding Window, **The Application Layer:** DNS — Domain Name System-The DNS Name	

	Space, Domain Resource Records, Name Servers.Electronic Mail- Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery, The Word Wide Web- Architectural Overview,Static Web Pages, Dynamic Web Pages and Web Applications, HTTP—The HyperText Transfer Protocol	

Text Book

1. Computer Networks, Andrew S. Tanenbaum, 5th Edition, Pearson Education, 2010.

References:

1. Data Communication & Networking, Behrouza A Forouzan, 3rd Edition, Tata McGraw Hill, 2001.
2. Data and Computer Communications, William Stallings, 10th Edition, Pearson Education, 2017.
3. Data Communication and Computer Networks, Brijendra Singh, 3rd Edition, PHI, 2012.
4. Data Communication & Network, Dr. Prasad, Wiley Dreamtech.
5. http://highered.mheducation.com/sites/0072967757/index.htmls

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Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discuss the fundamentals of the Computer Networks.															
Study about OSI reference mode.															
Study about TCP/IP reference mod															
Describe various problems using Decrease-and-Conquer.															

Discuss various Network layer protocol															

Program Name	**B.Sc.**	Semester	**V**
Course Title	**Computer Networks Laboratory (Practical)**		
Course Code:	CSCP 302	No.of Credits	**02**
Contact hours	**04 Hours per week**	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

PART-A-Network Simulation using NS simulator

PART-B-Implementation of networking algorithm using JAVA. Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:4 Marks Execution:4Marks**	**8 Marks**
Program-2	**PART-B** **Writing:6 Marks Execution:6Marks**	**12 Marks**
Practical Record		**05 Marks**
Total		**25 Marks**

Links for open source simulation software:

- NS3 software: https://www.nsnam.org/releases/ns-3-30/download/
- Packet Tracer Software: https://www.netacad.com/courses/packet-tracer
- GNS3 software: https://www.gns3.com/

Links for open source simulation software:

https://www.nsnam.com/2018/06/installation-of-ns2-in-ubuntu- 1804.html#:~:text=Unlike%20earlier%20version%20of%20ubuntu,then%20ns2%20and%20th en%20configuration

https://www.howtoinstall.me/ubuntu/18-04/nam/

Program Name	**BSC**	Semester	**V**
Course Title	**Employability skills (Theory)**		
Course Code:	**SEC-4**	No.of Credits	**03**
Contact hours	**48 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Program Name	**B.Sc.**	Semester	**VI**
Course Title	**Web Technologies (Theory)**		
Course Code:	CSCT 351	No.of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- CO1. Understand basics of web technology
- CO2. Recognize the different Client-side Technologies and tools like, HTML, CSS, JavaScript
- CO3. Learn Java Servlets and JDBC
- CO4. Web Technology for Mobiles and Understand web security

Unit	Description	Hours
1	**Introduction and Web Design:** Introduction to Internet, WWW and Web 2.0,Web browsers, Web protocols and Web servers, Web Design Principles and Web site structure, client-server technologies, Client side tools and technologies, Server side Scripting, URL, MIME, search engine, web server-Apache, IIS, proxy server, HTTP protocol. Introductions to HTML. HTML5 Basics tags, Formatting tags in HTML, HTML5 Page layout and Navigation concepts,Semantic Elements in HTML, List, type of list tags, tables and form tags in HTML, multimedia basics, images, iframe, map tag, embedding audio and video clips on webpage.	**13**
2	**Introduction to XML:** XML Syntax, XML Tree, Elements, Attributes, Namespace, Parser, XSLT DOM, DTD, Schema. Introduction to CSS, CSS syntax, CSS selectors, CSS Background Cursor, CSS text fonts, CSS-List Tables, CSS Box Modeling, Display Positioning, Floats, CSS Gradients, Shadows, 2D and 3 Transform, Transitions, CSS Animations.	**13**
3	**Introduction to JavaScript:** JavaScript Data type and Variables, JavaScript Operators, Conditional Statements, Looping Statements, JavaScript Functions, Number, Strings, Arrays, Objects in JavaScript, Window and Frame objects, Event Handling in JavaScript, Exception Handling, Form Object and DOM, JSON, Browser Object Model.	**13**
4	**Introduction to Servlets**: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, reading initialization parameters, Handling HTTP Request	**13**
	& Responses, Using Cookies and sessions, connecting to a database using JDBC. **Web Security:** Authentication Techniques, Design Flaws in Authentication, Implementation Flaws in Authentication, Securing Authentication, Path Traversal Attacks. Injecting into Interpreted Contexts, SQL Injection, NoSQL	

	Injection, XPath Injection, LDAP Injection, XML Injection, HTTP Injection, Mail Service Injection. Types of XSS, XSS in Real World, Finding and Exploiting XSS Vulnerabilities, Preventing XSS Attacks.	

References:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech
2. Java Server Pages – Hans Bergsten, SPD O'Reilly
3. Java Script, D.Flanagan, O'Reilly, SPD
4. Beginning Web Programming-Jon Duckett WROX.
5. Web Applications : Concepts and Real World Design, Knuckles, Wiley-India
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

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Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discuss the fundamentals of the HTML 5.															
Study about various concepts about XML.															
How to write Java Script.															
Describe various programming constructs about Java Script.															
Discuss Servelts.															

Program Name	**B.Sc.**	Semester	**VI**
Course Title	**Statistical Computing & R Programming(Theory)**		
Course Code:	CSCT 352	No.of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- CO1. Explore fundamentals of statistical analysis in R environment.
- CO2. Describe key terminologies, concepts and techniques employed in Statistical Analysis.
- CO3. Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
- CO4. Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.
- CO5. Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

Unit	Description	Hours
1	Introduction of the language, numeric, arithmetic, assignment, and vectors, Matrices and Arrays, Non-numeric Values, Lists and Data Frames, Special Values, Classes, and Coercion, Basic Plotting.	**13**
2	Reading and writing files, Programming, Calling Functions, Conditions and Loops: stand- alone statement with illustrations in exercise, stacking statements, coding loops, Writing Functions, Exceptions, Timings, and Visibility. Basic Data Visualization.	**13**

3	**Descriptive Statistics:** Types of Data, Nominal, Ordinal, Scale and Ratio, Measures of Central Tendency, Mean, Mode and Median,Percentailes,Quartiles, Measures of Variability, Mean Absolute Deviation Range, Inter-Quartile-Range, Standard Deviation,Z-Scores.Cofficient of Variation, Measure of shaper- Skewness and Kurtosis, Bar Chart, Pie Chart and Box Plot, Histogram, Frequency Polygon, Stem and Leaf Diagram. **Probability, Probability and Sampling Distribution:** Methods os assigning probability, Structure of probability, Marginal, union, joint and conditional probabilities. Discrete Probability Distributions: Binomial, Poisson, Continuous Probability Distribution, Normal Distribution, Uniform Distribution. Estimating the population mean using the and t-distribution.	**13**

4	**Statistical Inference and Hypothesis Testing:** Types of Hypothesis, and Sample, Null and Alternate Hypothesis, Level of Significance, Type I and Type II Errors, One Sample t-Test, One Sample Proportion Test, Paired Sample t-Test, Independent Samples t-Test, Two Sample Proportion Tests, One Way Analysis of Variance and Chi Square Test. **Correlation and Regression:** Analysis of Relationship, Positive and Negative Correlation, Perfect Correlation, Karl Pearson Coefficient of Correlation, Correlation Matrix, Scatter Plots, Simple Regression Analysis.	**13**

Text Books:

1. Tilman M. Davies, "The book of R: A first course in programming and statistics", San Francisco, 2016.
2. Ken Black, Business Statistics, New Delhi, Wiley, 2013.

References:

1. Vishwas R. Pawgi, "Statistical computing using R software", Nirali prakashan publisher, e1 edition, 2022.
2. https://www.youtube.com/watch?v=KlsYCECWEWE
3. https://www.geeksforgeeks.org/r-tutorial/
4. https://www.tutorialspoint.com/r/index.html

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe- Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

CourseOutcomes(COs)/ProgramOutcomes(P Os)	ProgramOutcomes(POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Explore fundamentals of statistical analysis in R environment.															
Describe key terminologies, concepts and techniques employed in Statistical Analysis.															
Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.															
Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.															
Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variable															

Program Name	**B.Sc.**	Semester	**VI**
Course Title	**Web Technologies Lab**		
Course Code:	CSCP 351	No.of Credits	**02**
Contact hours	**04 Hours per week**	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:4 Marks Execution:4Marks**	**8 Marks**
Program-2	**PART-B** **Writing:6 Marks Execution:6Marks**	**12 Marks**
Practical Record		**05 Marks**
Total		**25 Marks**

Program Name	**B.Sc.**	Semester	**VI**
Course Title	**R Programming Lab**		
Course Code:	CSCP352	No.of Credits	**02**
Contact hours	**04 Hours per week**	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:4 Marks Execution:4Marks**	**8 Marks**
Program-2	**PART-B** **Writing:6 Marks Execution:6Marks**	**12 Marks**
Practical Record		**05 Marks**
Total		**25 Marks**

Program Name	**B.Sc**	Semester	**VI**
Course Title	**Internship**		
Course Code:	**SEC-5**	No.of Credits	**02**
Contact hours	**30 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**30**

GUIDELINES FOR CONDUCTING INTERNSHIP:

Internships can cover a wide range of concepts and topics and some common concepts that can be covered under various types of internships:

- **Technical Skills**
  - Depending on the field, interns can develop technical skills such as programming languages, software tools, data analysis, design software, and more.
- **Soft Skills:**
  - Communication: Written and verbal communication skills, including effective email communication, presentations, and client interactions.
  - Teamwork: Collaborating with colleagues, working in cross-functional teams, and building effective relationships.
  - Time Management: Prioritizing tasks, managing deadlines, and staying organized.
  - Problem Solving: Analyzing challenges, identifying solutions, and making informed decisions.

- Adaptability: Handling changes, learning new processes, and adjusting to evolving situations.

- **Innovation and Entrepreneurship:**
  - Exploring innovative business ideas, product development, market research, and business model creation.
- **Data Analytics and Interpretation:**
  - Learning how to work with data, perform analysis, and derive insights to inform decision-making.
- **Leadership and Management:**
  - Developing leadership skills, understanding different management styles, and learning how to motivate teams.

These are just a few examples of the many concepts that can be covered in internship programs. The specific concepts/coverage of the above will vary based on college infrastructure and faculty competence. It is important to tailor the internship experience to align with the interns' career goals and the industry needs.

Evaluation:

The report shall be prepared by the student under the guidance of the identified mentor in the college and submitted to the Head of the Department for evaluation. The report shall be evaluated by the two internal faculty members and submit the final sessional and summative marks to the university.