PROGRAM OBJECTIVES, OUTCOMES, CO-CURRICULAR ANDASSESSMENT METHODS

B.Sc.	Computer Science

1. Aim and objectives of UG program in Subject: Computer Science
   The Objectives of this Program describes what students are expected to know and be able to do by the time of graduation. The Computer Science Department's Bachelor of Science program must enable students to attain, by the time of graduation:

   - An ability to identify, formulate and develop solutions to computational challenges.
   - An ability to design, implement and evaluate a computational system to meet desiredneeds within realistic constraints.
   - An ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.
   - An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.
   - An ability to communicate and engage effectively with diverse stakeholders.
   - An ability to analyze impacts of computing on individuals, organizations, and society.
   - Recognition of the need for and ability to engage in continuing professional development.
   - An ability to use appropriate techniques, skills, and tools necessary for computing practice.
   - Effectively utilizing their knowledge of computing principles and mathematicaltheory to develop sustainable solutions to current and future computing problems.
   - Developing and implementing solution based systems and/or processes that addressissues and/or improve existing systems within in a computing based industry.

2. Learning outcomes of Subject Computer Science:
   - Students will be able to communicate in written and oral forms in such a way as to demonstrate their ability to present information clearly, logically, and critically.
   - Students will be able to apply mathematical and computing theoretical concepts in solution of common computing applications, such as computing the order of an algorithm.
   - Students will be able to complete successfully be able to program small-to-mid- size programs on their own. Sufficient programming skills will require use of good practice, e.g., good variable names, good use of computational units, appropriate commenting strategies.
   - Students will be able to use appropriately system design notations and apply system design engineering process in order to design, plan, and implement software systems
   - In a self-selected area of depth in Computing, students will demonstrate a depth of knowledge appropriate to graduate study and/or lifelong learning in that area. Students should be able to read for understanding materials in that area beyond those assigned in coursework.
   - Students will be prepared for a career in an information technology oriented business or industry, or for graduate study in computer science or other scientific or technical fields.
   - Use systems development, word-processing, spreadsheet, and presentation software tosolve basic information systems problems

3. Recommended Skill enhancement courses: (Titles of the courses given below and detailsof the syllabus for 4 credits (i.e., 2 units for theory and Lab/Practical) for 5 hrs class-cum-lab work.

4. Recommended Co-curricular activities: (Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

   A. Measurable:
   1. Assignments
   2. Student seminars (Individual presentation of papers)
   3. Quiz Programmers
   4. Individual Field Studies/projects
   5. Group discussion
   6. Group/Team Projects

   B General:
   1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
   2. Group Discussions
   3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
   4. Any similar activities with imaginative thinking.

5. Recommended Continuous Assessment methods:

   Some of the following suggested assessment methodologies could be adopted;
   - The oral and written examinations (Scheduled and surprise tests).
   - Closed-book and open-book tests.
   - Coding exercises.
   - Practical assignments and laboratory reports.
   - Observation of practical skills.
   - Individual and group project reports.
   - Efficient delivery using seminar presentations.
   - Viva voce interviews.
   - Computerized adaptive testing, literature surveys and evaluations.
   - Peers and self-assessment, outputs form individual and collaborative work

.

DETAILS OF COURSE-WISE SYLLABUS

B Sc	Semester: I	Credits: 4
Course: 1	PROBLEM SOLVING IN C	Hrs/Wk: 4

Aim and objectives of Course:

- This course aims to provide exposure to problem-solving through programming.
- It introduces the concepts of the C Programming language.

Learning outcomes of Course:

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

- Understand the evolution and functionality of a Digital Computer.
- Apply logical skills to analyse a given problem
- Develop an algorithm for solving a given problem.
- Understand 'C' language constructs like Iterative statements, Arrayprocessing, Pointers.
- Apply 'C' language constructs to the algorithms to write a 'C' languageprogram.

B Sc	Semester: II	Credits: 4
Course: 2	DATA STRUCTURES USING C	Hrs/Wk: 4

Aim and objectives of Course:

- To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms.

Learning outcomes of Course:

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

- Understand available Data Structures for data storage and processing.
- Comprehend Data Structure and their real-time applications - Stack,Queue, Linked List, Trees and Graph
- Choose a suitable Data Structures for an application
- Develop ability to implement different Sorting and Search methods
- Have knowledge onData Structures basic operations like insert, delete,search,update and traversal
- Design and develop programs using various data structures
- Implement the applications of algorithms for sorting, pattern matching etc

B Sc	Semester: III	Credits: 4
Course: 3	DATABASE MANAGEMENTSYSTEM	Hrs/Wk: 4

Aim and objectives of Course:

- The objective of the course is to introduce the design and development ofdatabases with special emphasis on relational databases.

Learning outcomes of Course: Upon successful completion of the course, a student will be able to:

- Gain knowledge of Database and DBMS.
- Understand the fundamental concepts of DBMS with special emphasis onrelational data model.
- Demonstrate an understanding of normalization theory and apply suchknowledge to the normalization of a database
- Model data base using ER Diagrams and design database schemas based on themodel.
- Create a small database using SQL.
- Store, Retrieve data in database.

B Sc	Semester: IV	Credits: 4
Course: 4	OBJECT ORIENTED PROGRAMMING USING JAVA	Hrs/Wk: 4

Aim and objectives of Course:

- To introduce the fundamental concepts of Object-Oriented programming and todesign & implement object oriented programming concepts in Java.

Learning outcomes of Course:

- Understand the benefits of a well-structured program
- Understand different computer programming paradigms
- Understand underlying principles of Object-Oriented Programming in Java
- Develop problem-solving and programming skills using OOP concepts
- Develop the ability to solve real-world problems through software developmentin high-level programming language like Java

Detailed Syllabus: (Five units with each unit having 12 hours of class work)

B Sc	Semester: IV	Credits: 4
Course: 5	OPERATING SYSTEMS	Hrs/Wk: 4

Aim and objectives of Course:

- This course aims to introduce the structure and organization of a file system. It emphasizes various functions of an operating system like memory management, process management, device management, etc.

Learning outcomes of Course:

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

- Know Computer system resources and the role of operating system in resourcemanagement with algorithms
- Understand Operating System Architectural design and its services.
- Gain knowledge of various types of operating systems including Unix andAndroid.
- Understand various processmanagement concepts including scheduling, synchronization, and deadlocks.
- Have a basic knowledge about multithreading.
- Comprehend different approaches for memory management.
- Understand and identify potential threats to operating systems and the securityfeatures design to guard against them.
- Specify objectives of modern operating systems and describe how operatingsystems have evolved over time.
- Describe the functions of a contemporary operating system

Detailed Syllabus: (Five units with each unit having 12 hours of class work)

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 4
Course: 6A	Web Interface Designing Technologies	Hrs/Wk: 4

Learning Outcomes: Students after successful completion of the course will be able to:

1. Understand and appreciate the web architecture and services.
2. Gain knowledge about various components of a website.
3. Demonstrate skills regarding creation of a static website and an interface to dynamic website.
4. Learn how to install word press and gain the knowledge of installing various plugins to use in their websites.

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 6A	Web Interface Designing Technologies Lab	Hrs/Wk: 2

Web Interface Designing Technologies – PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Create a basic website with the help of HTML and CSS.
2. Acquire the skill of installing word press and various plugins of Word press.
3. Create a static website with the help of Word press.
4. Create an interface for a dynamic website.
5. Apply various themes for their websites using Word press.

B Sc	**Semester :V**(Skill Enhancement Course - Elective)	**Credits: 4**
Course: 7A	**Web Applications Development using PHP& MYSQL**	**Hrs/Wk: 4**

Learning Outcomes:

Students after successful completion of the course will be able to:

1. Write simple programs in PHP.
2. Understand how to use regular expressions, handle exceptions, and validate data usingPHP.
3. Apply In-Built functions and Create User defined functions in PHP programming.
4. Write PHP scripts to handle HTML forms.
5. Write programs to create dynamic and interactive web based applications using PHPand MYSQL.
6. Know how to use PHP with a MySQL database and can write database driven webpages.

B Sc	**Semester :V**(Skill Enhancement Course - Elective)	**Credits: 4**
Course: 7A	**Web Applications Development using PHP& MYSQL Lab**	**Hrs/Wk: 4**

Web Applications Development using PHP & MYSQL–PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Write, debug and implement the Programs by applying concepts and error handling techniques of PHP.
2. Create an interactive and dynamic website.
3. Create a website with reports generated from a database.
4. Write programs to create an interactive website for e-commerce sites like online shopping, etc.

B Sc	**Semester :V**(Skill Enhancement Course - Elective)	Credits: 4
Course: 6B	**Internet of Things**	Hrs/Wk: 4

Learning Outcomes: Students after successful completion of the course will be able to:

1. Appreciate the technology for IoT
2. Understand various concepts, terminologies and architecture of IoT systems.
3. Understand various applications of IoT
4. Learn how to use various sensors and actuators for design of IoT.
5. Learn how to connect various things to Internet.
6. Learn the skills to develop simple IOT Devices.

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 6B	Internet of Things Lab	Hrs/Wk: 2

Internet of Things – PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Acquire the skills to design a small IoT device.
2. Connect various sensors, actuators, etc to Arduino board.
3. Connect the things to Internet
4. Design a small mobile app to control the sensors.
5. Deploy a simple IoT device.

B Sc	**Semester :V**(Skill Enhancement Course - Elective)	**Credits: 4**
Course: 7B	**Application Development using Python**	**Hrs/Wk: 4**

Learning Outcomes: Students after successful completion of the course will be able to:

1. Understand and appreciate the web architecture and services.
2. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
3. Demonstrate proficiency in handling Strings and File Systems.
4. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
5. Interpret the concepts of Object-Oriented Programming as used in Python.
6. Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 7B	Application Development using Python Lab	Hrs/Wk: 2

Application Development Using Python– PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Implement simple programs in Python
2. Implement programs related to various data structures like lists, dictionaries, etc.
3. Implement programs related to files.
4. Implement applications related to databases, Web services and IOT.

B Sc	**Semester :V**(Skill Enhancement Course - Elective)	**Credits: 4**
Course: 6C	**Data science**	**Hrs/Wk: 4**

Learning Outcomes: Students after successful completion of the course will be able to:

1. Develop relevant programming abilities.
2. Demonstrate proficiency with statistical analysis of data.
3. Develop the ability to build and assess data-based models.
4. Demonstrate skill in data management
5. Apply data science concepts and methods to solve problems in real-world contextsand will communicate these solutions effectively

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 6C	Data science Lab	Hrs/Wk: 2

Course 6C: Data Science – PRACTICAL SYLLABUS

Learning Outcomes: On successful completion of this practical course, student shall beable to:

1. Apply data science solutions to real world problems.
2. Implement the programs to get the required data, process it and present the outputs using Python language.
3. Execute statistical analyses with Open source Python software.

B Sc	**Semester :V**(Skill Enhancement Course - Elective)	**Credits: 4**
Course: 7C	**Python for Data science**	**Hrs/Wk: 4**

Learning Outcomes: Students after successful completion of the course will be able to:

1. Identify the need for data science and solve basic problems using Python built-in data types and their methods.
2. Design an application with user-defined modules and packages using OOP concept
3. Employ efficient storage and data operations using NumPy arrays.
4. Apply powerful data manipulations using Pandas.
5. Do data pre-processing and visualization using Pandas

B Sc	Semester :V(Skill Enhancement Course - Elective)	Credits: 1
Course: 7C	Python for Data science Lab	Hrs/Wk: 2

Python for Data Science – PRACTICAL SYLLABUS

Learning Outcomes: On successful completion of this practical course, student shall beable to:

1. Implement simple programs in Python.
2. Implement programs related to various structures like arrays, lists, Data frames, etc.
3. Implement programs related to files.
4. Implement applications related to data science.