Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2019-2020 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

B. Sc-Computer Science

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of B. Sc. CS Programme, the students will be able to
PO1	To provide a solid foundation in the discipline of Computer Science and enable students to formulate computational solutions to real life problems
PO2	To identify, analyze, design an optimized solution using appropriate algorithms ofvarying complexity using cutting edge technologies
PO3	To develop skills in software and hardware so as to enable the students to establish aproductive career in industry, research and academia
PO4	To equip the students to meet the industrial needs by utilizing tools and technologieswith the skills to communicate effectively among peers

COURSE OUTCOMES (COs)

COURSE CODE: 19UCS1CC1 COURSE TITLE: PROGRAMMING IN C		
CO Number	CO Statement	Knowledge Level
CO1	Acquire programming logic, use of program instructions,syntax, program structure.	K1
CO2	Understand the concept of arrays and functions.	K2
CO3	Classify the structure, union, pointers and files in the program.	K3
CO4	Solve various problems using C features.	K3

COURSE CODE: 19UCS1CC1P COURSE TITLE: PROGRAMMING IN C LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic terminologies of C programming by using different data types, decision structures, loops and functions.	**K1**
CO2	Understand the dynamic memory allocation by the use of pointers and files.	**K2**
CO3	Demonstrate practical experience in developing solutions using C	**K3**
CO4	Apply, compile and debug programs in C language	**K3**

COURSE CODE: 19UCS2CC2 COURSE TITLE: JAVA PROGRAMMING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the necessary attributes and methods of an object, hierarchical classification of classes	**K1**
CO2	Execute inheritance codes, packages & collection interfaces	**K2**
CO3	Develop desktop application using multi-threading, IOconcepts, GUI to solve real-time problems and design distributed applications	**K3**
CO4	Classify the multitasking application using exceptionhandling concepts	**K3**
CO5	Apply GUI concepts	**K3**

COURSE CODE: 19UCS2CC2P COURSE TITLE: JAVA PROGRAMMING LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recall the fundamentals of Java programming concepts	**K1**
CO2	Execute inheritance codes, packages & collection interfaces	**K2**
CO3	Predict the exception occurrence on the code and handle it efficiently	**K3**
CO4	Build the user interface of the application and handle the events by using AWT components	**K3**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 10:43:47

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2020-2021 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

B. Sc-Computer Science

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of BSc computer science, the students will be able to
PO1	To provide a solid foundation in the discipline of Computer Science and enable students to formulate computational solutions to real life problems
PO2	To identify, analyze, design an optimized solution using appropriate algorithms of varying complexity using cutting edge technologies
PO3	To develop skills in software and hardware so as to enable the students to establish a productive career in industry, research and academia
PO4	To equip the students to meet the industrial needs by utilizing tools and technologies with the skills to communicate effectively among peers

COURSE OUTCOMES (COs)

COURSE CODE: 19UCS1CC1 COURSE TITLE: PROGRAMMING IN C		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Acquire programming logic, use of program instructions, syntax, program structure.	K1
CO2	Understand the concept of arrays and functions.	K2
CO3	Classify the structure, union, pointers and files in the program.	K3
CO4	Solve various problems using C features.	K3

COURSE CODE: 19UCS1CC1P COURSE TITLE: PROGRAMMING IN C LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Acquire programming logic, use of program instructions, syntax, program structure.	**K1**
CO2	Understand the concept of arrays and functions.	**K2**
CO3	Classify the structure, union, pointers and files in the program.	**K3**
CO4	Solve various problems using C features.	**K3**

COURSE CODE: 19UCS2CC2 COURSE TITLE: JAVA PROGRAMMING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the necessary attributes and methods of an object, hierarchical classification of classes	**K1**
CO2	Execute inheritance codes, packages & collection interfaces	**K2**
CO3	Develop desktop application using multi-threading, IO concepts, GUI to solve real-time problems and design distributed applications	**K3**
CO4	Classify the multitasking application using exception handling concepts	**K3**
CO5	Apply GUI concepts	**K3**

COURSE CODE: 19UCS2CC2P COURSE TITLE: JAVA PROGRAMMING LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recall the fundamentals of Java programming concepts	**K1**
CO2	Execute inheritance codes, packages & collection interfaces	**K2**
CO3	Predict the exception occurrence on the code and handle it efficiently	**K3**
CO4	Build the user interface of the application and handle the events by using AWT components	**K3**

COURSE CODE: 19UCS3CC3 COURSE TITLE: DATABASE MANAGEMENT SYSTEMS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Design ER model to represent simple database application scenario	**K2**
CO2	Apply normalization to improve the database design	**K3**
CO3	Explain the transaction processing and concurrency control	**K2**
CO4	Apply SQL commands to manipulate data	**K3**
CO5	Solve a data intensive application using PL/SQL	**K3**

COURSE CODE: 19UCS3CC3P COURSE TITLE: SQL & PL/SQL LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the operators, basic commands, built-in functions in MySQL	**K1**
CO2	Compute Aggregate functions, join operations and string functions	**K2**
CO3	Implement RDBMS concept in developing simple applications using MySQL	**K3**
CO4	Apply the techniques of Exception Handling using PL/SQL.	**K3**
CO5	Solve the various types of online applications	**K3**

COURSE CODE: 19UCS4CC4 COURSE TITLE: DATA STRUCTURES & ALGORITHMS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand storage organization & operations of data structure	**K1**
CO2	Demonstrate problems to represent the linear and nonlinear structures	**K3**
CO3	Analyse the various types of data structure	**K4**
CO4	Discuss various sorting and searching techniques	**K2**

CRITERION I **POs and COs**

COURSE CODE: 19UCS4CC4P **COURSE TITLE: DATA STRUCTURES LAB USING C**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic concepts of data structure	**K2**
CO2	Write and debug linear and non linear data structure programs to represent real world problems	**K3**
CO3	Apply suitable data structure to design an algorithm in real time problems	**K3**
CO4	Construct Programs step-wise by defining functions and calling them	**K4**

COURSE CODE: 19UCS4NME2P **COURSE TITLE: MULTIMEDIA LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic concepts of data structure	**K2**
CO2	Write and debug linear and non linear data structure programs to represent real world problems	**K3**
CO3	Apply suitable data structure to design an algorithm in real time problems	**K3**
CO4	Construct Programs step-wise by defining functions and calling them	**K4**

COURSE CODE: 19UCS4SBE1AP **COURSE TITLE: PC PACKAGES & MULTIMEDIA LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain / Outline the concepts of MS Office – Word, Excel, Power Point	**K2**
CO2	Analyze /Recognize when to use each of the MS Office programs to create professional and academic documents	**K4**
CO3	Use MS Office programs to create personal, academic and business documents following current professional and/or industry standards	**K3**
CO4	Explain / Outline the concepts of Multimedia	**K2**
CO5	Design and implement an animation for various themes and edit the images with the use of Multimedia	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19UCS4SBE1BP **COURSE TITLE: COMPUTER HARDWARE AND TROUBLE SHOOTING LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recall the fundamentals of computer components	**K1**
CO2	Explain the connection and functions of computer	**K2**
CO3	Predict the system problems	**K3**
CO4	Build the system with trouble shooting	**K3**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 10:43:47

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2021-2022 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

B. Sc-Computer Science

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of B. Sc. CS Programme, the students will be able to
PO1	To provide a solid foundation in the discipline of Computer Science and enable students to formulate computational solutions to real life problems
PO2	To identify, analyze, design an optimized solution using appropriate algorithms ofvarying complexity using cutting edge technologies
PO3	To develop skills in software and hardware so as to enable the students to establish aproductive career in industry, research and academia
PO4	To equip the students to meet the industrial needs by utilizing tools and technologieswith the skills to communicate effectively among peers

COURSE OUTCOMES (COs)

COURSE CODE: 19UCS1CC1 COURSE TITLE: PROGRAMMING IN C		
CO Number	CO Statement	Knowledge Level
CO1	Acquire programming logic, use of program instructions,syntax, program structure.	K1
CO2	Understand the concept of arrays and functions.	K2
CO3	Classify the structure, union, pointers and files in the program.	K3
CO4	Solve various problems using C features.	K3

COURSE CODE: 19UCS1CC1P COURSE TITLE: PROGRAMMING IN C LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic terminologies of C programming by using different data types, decision structures, loops and functions.	**K1**
CO2	Understand the dynamic memory allocation by the use of pointersand files.	**K2**
CO3	Demonstrate practical experience in developing solutions using C	**K3**
CO4	Apply, compile and debug programs in C language	**K3**

COURSE CODE: 19UCS2CC2 COURSE TITLE: JAVA PROGRAMMING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the necessary attributes and methods of an object, hierarchical classification of classes	**K1**
CO2	Execute inheritance codes ,packages & collection interfaces	**K2**
CO3	Develop desktop application using multi-threading, IOconcepts, GUI to solve real-time problems and design distributed applications	**K3**
CO4	Classify the multitasking application using exceptionhandling concepts	**K3**
CO5	Apply GUI concepts	**K3**

COURSE CODE: 19UCS2CC2P COURSE TITLE: JAVA PROGRAMMING LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recall the fundamentals of Java programming concepts	**K1**
CO2	Execute inheritance codes ,packages & collection interfaces	**K2**
CO3	Predict the exception occurrence on the code and handle it efficiently	**K3**
CO4	Build the user interface of the application and handle the events by using AWT components	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19UCS3CC3 **COURSE TITLE: DATABASE MANAGEMENT SYSTEMS**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Design ER model to represent simple database applicationscenario	**K2**
CO2	Apply normalization to improve the database design	**K3**
CO3	Explain the transaction processing andconcurrency control	**K2**
CO4	Apply SQL commands to manipulate data	**K3**
CO5	Solve a data intensive application using PL/SQL	**K3**

COURSE CODE: 19UCS3CC3P **COURSE TITLE: SQL & PL/SQL LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the operators, basic commands, built-in functions in MySQL	**K1**
CO2	Compute Aggregate functions, join operations and string functions	**K2**
CO3	Implement RDBMS concept in developing simple applications usingMySQL	**K3**
CO4	Apply the techniques of Exception Handling using PL/SQL.	**K3**
CO5	Solve the various types of online applications	**K3**

COURSE CODE: 19UCS4CC4 **COURSE TITLE: DATA STRUCTURES AND ALGORITHMS**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand storage organization & operations of data structure	**K1**
CO2	Demonstrate problems to represent the linear and nonlinearstructures	**K3**
CO3	Analyse the various types of data structure	**K4**
CO4	Discuss various sorting and searching techniques	**K2**

COURSE CODE: 19UCS4CC4P **COURSE TITLE: DATA STRUCTURES LAB USING C**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic concepts of data structure	**K2**
CO2	Write and debug linear and nonlinear data structure programs to represent real world problems	**K3**
CO3	Apply suitable data structure to design an algorithm in real time problems	**K3**
CO4	Construct Programs step-wise by defining functionsand calling them	**K4**

CRITERION I **POs and COs**

COURSE CODE: 19UCS4SBE1AP **COURSE TITLE: PC PACKAGES & MULTIMEDIA LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain / Outline the concepts of MS Office –Word, Excel, Power Point	**K2**
CO2	Analyze /Recognize when to use each of the Ms Office programs to create professional and academicdocuments	**K4**
CO3	Use MS Office programs to create personal, academic and business documents following current professionaland/or industry standards	**K3**
CO4	Explain / Outline the concepts of Multimedia	**K2**
CO5	Design and implement an animation for various themesand edit the images with the use of Multimedia	**K3**

COURSE CODE: 19UCS4NME2P **COURSE TITLE: MULTIMEDIA LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic concepts of data structure	**K2**
CO2	Write and debug linear and non linear data structure programs to represent real world problems	**K3**
CO3	Apply suitable data structure to design an algorithm in real time problems	**K3**
CO4	Construct Programs step-wise by defining functions and calling them	**K4**

COURSE CODE: 19UCS4SBE1BP **COURSE TITLE: COMPUTER HARDWARE AND TROUBLE SHOOTING LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recall the fundamentals of computer components	**K1**
CO2	Explain the connection and functions of computer	**K2**
CO3	Predict the system problems	**K3**
CO4	Build the system with trouble shooting	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19UCS5CC5 **COURSE TITLE: PYTHON PROGRAMMING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the basic built-in functions and syntax of Python programming	**K1**
CO2	Understand the concepts of arrays and file operations	**K2**
CO3	Use external libraries and packages with python	**K3**
CO4	Apply the concepts of decision making and construct statements	**K3**
CO5	Implementing database concepts	**K3**

COURSE CODE: 19UCS5CC5P **COURSE TITLE: PYTHON PROGRAMMING LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic concepts of Python	**K2**
CO2	Write and debug simple Python programs with loops and conditions	**K3**
CO3	Use Python lists, tuples, dictionaries for representingcompound data and apply file concept in Python	**K3**
CO4	Developing simple applications using MySql	**K3**
CO5	Construct Python programs step-wise by definingfunctions and calling them	**K4**

COURSE CODE: 19UCS5CC6 **COURSE TITLE: COMPUTER GRAPHICS**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic attributes of various output primitives	**K1**
CO2	Explain about the basic principles of Graphics systems	**K2**
CO3	Describe various input techniques and Methods	**K2**
CO4	Apply algorithm to draw different mathematicalobjects	**K3**
CO5	Illustrate various 2D & 3D Geometric & modeling Techniques	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19UCS5CC7 **COURSE TITLE: COMPUTER NETWORKS**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the basics of data communication	**K1**
CO2	Identify the different types of network topologies and the layers of OSI model.	**K1**
CO3	Explain contemporary issues in networking technologies	**K2**
CO4	Illustrate about Internetworking	**K3**

COURSE CODE: 19UCS5MBE1A **COURSE TITLE: COMPUTER ARCHITECTURE**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the basic structure of computer	**K1**
CO2	Express computer arithmetic operations	**K2**
CO3	Demonstrate the control unit operations	**K3**
CO4	Analyse the concept of IO organization	**K3**

COURSE CODE: 19UCS5MBE1B **COURSE TITLE: SOFTWARE ENGINEERING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe about Software engineering concepts and process	**K1**
CO2	Recall the importance on Measurement & Metrics	**K1**
CO3	Identify various software computing cost	**K2**
CO4	Discuss on software Implementation and Maintenance	**K2**
CO5	Illustration on software design and modules	**K3**
CO6	Demonstrate the subject knowledge on coupling, cohesion and testing strategies	**K3**
CO7	Describe about Emerging Trends in Web Engineering, Cloud Computing, open source	**K3**

COURSE CODE: 19UCS5MBE1C **COURSE TITLE: CYBER SECURITY**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand threat, risk, attack and motivations behindthem	K2
CO2	Design and develop secured architecture for anorganization	K3
CO3	Determine software vulnerabilities to reduce the risk ofexploitation	K3

COURSE CODE: 19UCS5SBE2AP COURSE TITLE: MOBILE APPLICATION DEVELOPMENT LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Install and configure Android application development tools	**K1**
CO2	Analyze and discover own mobile app for simple needs	**K3**
CO3	Deploy applications to hand held devices	**K5**

COURSE CODE: 19UCS5SBE2BP COURSE TITLE: COMPUTER NETWORKS LAB USING JAVA		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the basic concept of networking	**K1**
CO2	Implement the socket programming for client serverarchitecture	**K2**
CO3	Illustrate various protocols implementation	**K3**

COURSE CODE: 19UCS5SBE3AP COURSE TITLE: SOFTWARE TESTING TOOL - SELENIUM		
CO Number	**CO Statement**	**Knowledge Level**
CO1	State how to install and run open-source software testing tool Selenium	**K1**
CO2	Understand Selenium tool to perform testing	**K2**
CO3	Prepare test suits for different applications	**K3**
CO4	Use test suits and test simple programs	**K3**

COURSE CODE: 19UCS5SBE3BP COURSE TITLE: COMPUTER GRAPHICS LAB USING C		
CO Number	**CO statement**	**Knowledge level**
CO1	Recall the basics of computer graphics.	**K1**
CO2	Describe pixel activation with algorithms	**K2**
CO3	Apply different text formatting using graphic functions and 2D transformations of an object.	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19UCS6CC8 **COURSE TITLE: OPERATING SYSTEM**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	State the basic concepts of operating system and itscomponents	**K1**
CO2	Explain the concepts of Memory allocation Schemes	**K2**
CO3	Apply different process scheduling algorithms tominimize the waiting time	**K3**
CO4	Analyze the various file management techniques	**K3**
CO5	Classify the various types of Device	**K3**

COURSE CODE: 19UCS6CC9 **COURSE TITLE: WEB TECHNOLOGY**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Analyze and design a static webpage by applying HTML elements.	**K3**
CO2	Develop a dynamic webpage by the use of JavaScript and DHTML.	**K3**
CO3	Analyze and use appropriate Client-side or Server-side applications	**K3**
CO4	Understand any suitable real time web application	**K2**

COURSE CODE: 19UCS6MBE2A **COURSE TITLE: CLOUD COMPUTING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Classify the concepts of Cloud deployment Models	**K2**
CO2	Apply the Virtualization Technologies	**K3**
CO3	Examine basic terminologies in service oriented architecture andcloud security	**K4**
CO4	Elucidate the applications of Cloud Computing	**K4**
CO5	Expose the concept of Cloud Computing Technologies, Platformsand Services	**K4**

COURSE CODE: 19UCS6MBE2B **COURSE TITLE: FUNDAMENTALS OF BIG DATA & IOT**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the basic concepts of Big Data	**K2**
CO2	Analyze the Hadoop framework	**K4**
CO3	Elucidate the application areas of the Internet of Things	**K3**
CO4	Explore the building blocks of IoT	**K4**

COURSE CODE: 19UCS6MBE2C COURSE TITLE: ARTIFICIAL INTELLIGENCE		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the AI problems	**K2**
CO2	Describe various AI techniques	**K2**
CO3	Apply basic AI algorithms for real time situations	**K3**
CO4	Explore the concepts of Knowledge Representations	**K4**

COURSE CODE: 19UCS6MBE3AP COURSE TITLE: OPERATING SYSTEMS LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the basic command with examples and shell programming	**K2**
CO2	Implement memory management schemes, page replacement schemes and file allocation	**K3**
CO3	Analyze the performance of process scheduling algorithms and seek strategies	**K4**
CO4	Simulate Bankers algorithm for deadlockavoidance	**K5**

COURSE CODE: 19UCS6MBE3BP COURSE TITLE: R PROGRAMMINGLAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Demonstrates data manipulation operations	**K2**
CO2	Develop programs using Loop constructs	**K3**
CO3	Use R for Descriptive statistics	**K3**
CO4	Apply the knowledge of R in data Analytics for real life applications	**K3**
CO5	Predict unknown values from known dataset	**K6**

COURSE CODE: 19UCS6MBE3CP COURSE TITLE: WEB TECHNOLOGY LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic tags used in HTML document	**K1**
CO2	Able to write HTML, CSS codes.	**K3**
CO3	Demonstrate JavaScript and related technologies	**K3**
CO4	Create dynamic web pages using JSP	**K6**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 10:43:47

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2022-2023 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

B. Sc-Computer Science

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest qualitystandards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achievetheir goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strongattitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overallsustainable development.

CRITERION I **POs and COs**

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome **On completion of B. Sc Computer Science / B. Sc Computer Science with Cognitive Systems / BCA/ B. Sc Information Technology Programme, the students will be able to**
PO1	**ACADEMIC SKILLS & SOCIAL RESPONSIBILITY** Apply Computing, Mathematical and Scientific Knowledge in Various disciplines byunderstanding the concerns of the society.
PO2	**CRITICAL THINKING AND INNOVATIVE PROGRESS** Design the software applications with varying intricacies using programming languages for innovative learning in techno world to meet the changing demands.
PO3	**PERSONALITY DEVELOPMENT** Perceive Leadership skills to accomplish a common goal with effective communication and understanding of professional, ethical, and social responsibilities.
PO4	**LIFELONG LEARNING** Identify resources for professional development and apply the skills and tools necessary for computing practice to gain real life experiences.
PO5	**CREATIVITY AND HOLISTIC APPROACH** Create a scientific temperament and novelties of ideas to support research and development in Computer Science to uphold scientific integrity and objectivity.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO NO.	The students of B. Sc Computer Science will be able to,	POs Addressed
PSO1	Identify, analyze, design an optimized solution using appropriatealgorithms of varying complexity using cutting edge technologies	**PO 1** **PO 2** **PO 5**
PSO2	Attain a solid foundation in the Programming languages and toformulate computational solutions to real life problems	**PO 1** **PO 2** **PO 4** **PO 5**
PSO3	Equip the skills to utilize tools and technologies in computer science tomeet the industrial needs and to communicate effectively among peers	**PO 3** **PO 4**
PSO4	Develop skills in software and hardware so as to enable them to establish a productive career in industry, research, academia and also as an entrepreneur	**PO 1** **PO 4** **PO 5**
PSO5	Implement independent projects of their own choice using latest tools and also work as an effective team member to attain the predefined goals.	**PO 3** **PO 4** **PO 5**

COURSE OUTCOMES (COs)

COURSE CODE: 22UCS1CC1 COURSE TITLE: PROGRAMMING IN C		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Define the basic concepts of C Programming	**K1**
CO2	Illustrate the components of C programming	**K2**
CO3	Build algorithms and data structures swiftly and fastercomputation using programs	**K3**
CO4	Apply the knowledge of programming concepts to developprograms	**K4**
CO5	Solve real time problems using C	**K5**

COURSE CODE: 22UCS1CC1P COURSE TITLE: PROGRAMMING IN C (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand and implement the fundamentals of C Programming	**K2, K3**
CO2	Analyze the problem and develop skills on identifying appropriate Programming constructs for problem solving	**K3, K4**
CO3	Examine the problem and provide solution using control structures And Looping statements	**K4, K6**
CO4	Analyze the problem and create program using arrays and functions	**K4, K6**
CO5	Assess and solve the problems using structures and pointers	**K5, K6**

COURSE CODE: 22UCS2CC2 COURSE TITLE: PROGRAMMING IN JAVA		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recite the basic programming skills	**K1**
CO2	Understand the Java features	**K2**
CO3	Analyze OOPs concepts	**K4**
CO4	Apply the programming skills in various domains	**K3**
CO5	Solve real time problems using Java	**K5**

COURSE CODE: 22UCS2CC2P COURSE TITLE: JAVA PROGRAMMING (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Demonstrate and implement the fundamentals of Java programmingconcepts	**K2, K3**
CO2	Analyze the problem and develop skills on identifying appropriate Programming constructs like looping, branching and functions	**K3, K4**
CO3	Examine the problem and create a reusable program by combining the features of Java such as Classes, Objects, Packages, Interfaces and Exception handling	**K4, K6**
CO4	Analyze the complexity of problem in real world and design an eventdriven and web based interactive programs using Applets	**K4, K6**
CO5	Build applications with database connectivity to mimic the real world scenarios	**K6**

COURSE CODE: 22UCS2CC3P COURSE TITLE: DATA VISUALIZATION (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Demonstrate the use of basic Functions, Methods and Formatting	**K2**
CO2	Identify the different Models for data analysis	**K3**
CO3	Analyze the data using Graph Function	**K4**
CO4	Construct the data analysis report with proper validation	**K5**
CO5	Build Dashboard for data visualization	**K6**

COURSE CODE: 22UCS2CC3P COURSE TITLE: DATA VISUALIZATION (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Demonstrate the use of basic Functions, Methods and Formatting	**K2**
CO2	Identify the different Models for data analysis	**K3**
CO3	Analyze the data using Graph Function	**K4**
CO4	Construct the data analysis report with proper validation	**K5**
CO5	Build Dashboard for data visualization	**K6**

CRITERION I **POs and COs**

COURSE CODE: 22UCS3CC3 **COURSE TITLE: DATA STRUCTURES AND ALGORITHMS**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the abstract data types and operations of data structure	**K1**
CO2	Demonstrate the problems to represent the linear and nonlinearstructures	**K2**
CO3	Implement the basic data structures and Algorithm design Techniques	**K3**
CO4	Analyze the efficiency and proofs of correctness	**K4**
CO5	Assess, evaluate and choose appropriate data structure and algorithmic techniques to solve real-world problems.	**K5**

COURSE CODE: 22UCS3CC4P **COURSE TITLE: DATA STRUCTURES (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall program execution and Debugging	**K1**
CO2	Demonstrate the ideas of Data structures	**K2**
CO3	Make use of Operations of Linear and Non- linear data structures	**K3**
CO4	Develops the ability to analyze a problem and implement an algorithm to solve it.	**K4**
CO5	Acquire logical thinking, Identify the correct and efficient ways of solving problems	**K5**

COURSE CODE: 22UCS3GEC1P **COURSE TITLE: OFFICE AUTOMATION(P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Describe the concepts of Office Package.	**K1**
CO2	Recognize when to use each of the Office programs to create professional and academic documents.	**K2**
CO3	Use Office programs to create personal, academic and Business documents following current professional and/or industry standards.	**K3**
CO4	Test the working knowledge of advanced concepts of Office Software.	**K4**
CO5	Assess oneself to get employment with this practical hands on training.	**K6**

CRITERION I **POs and COs**

COURSE CODE: 22UCS4CC4 **COURSE TITLE: DATABASE MANAGEMENT SYSTEMS**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Define the basic concepts of database design, architecture and its data model	**K1**
CO2	Illustrate the structure of Relational database	**K2**
CO3	Apply the various queries in the database	**K3**
CO4	Examine the database design and E-R model	**K4**
CO5	Explain the concepts of Relational Database Design	**K2, K5**

COURSE CODE: 22UCS4CC5P **COURSE TITLE: SQL & PL/SQL(P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall and demonstrate basic commands and functions in SQL and PL/SQL	**K1, K2**
CO2	Apply the knowledge of SQL concepts to develop a database system	**K3**
CO3	Examine the problem and provide a solution using SQL concepts	**K4**
CO4	Evaluate various concepts to develop simple applications using SQL	**K5, K6**
CO5	Solve the various types of online applications using SQL	**K6**

COURSE CODE: 22UCS4GEC2P **COURSE TITLE: MULTIMEDIA (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Identify the basic tools and components of a multimedia	**K1**
CO2	Understand the use of graphical tools for various templates	**K2**
CO3	Apply basic elements and principles of photo editing software to achieve a great photo effect	**K3**
CO4	Discover layers, rotation and overlapping of an image	**K4**
CO5	Design a brochure for different situations and assess it	**K5, K6**

CRITERION I **POs and COs**

COURSE CODE: 22UCS4SEC1P **COURSE TITLE: WEB DESIGNING (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recognize the usage of tags and styles in web designing	**K2**
CO2	Plan to build a web site	**K3**
CO3	Analyze the various tags, styles and scripting in html and CSS and apply them in web page designing	**K4**
CO4	Assess the web page with different validation test cases	**K5**
CO5	Design dynamic web pages that apply various dynamic effects on the web site for real time applications.	**K6**

COURSE CODE: 22UCS5CC5 **COURSE TITLE: PYTHON PROGRAMMING**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Identify the basic built-in functions and syntax of Python programming	**K1**
CO2	Discuss the concepts of arrays and file operations	**K2**
CO3	Illustrate external libraries and packages with python	**K3**
CO4	Analyze the concepts of decision making and construct statements	**K4**
CO5	Evaluate the concept of database	**K5**

COURSE CODE: 22UCS5CC6P **COURSE TITLE: PYTHON PROGRAMMING (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Identify the basic concepts of Python	**K2**
CO2	Write and debug simple Python programs with loops and conditions	**K3**
CO3	Use Python lists, tuples, dictionaries for representing compound data and apply file concept in Python	**K3**
CO4	Developing simple applications using Database Connectivity	**K3**
CO5	Construct Python programs step-wise by defining functions and calling them	**K4**

CRITERION I **POs and COs**

COURSE CODE: 22UCS5CC6 **COURSE TITLE: OPERATING SYSTEMS**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the conceptual view of Operating systems	**K1**
CO2	Comprehend how an operating system provides an abstracted interface to the hardware resources	**K3**
CO3	Apply various scheduling algorithms for efficient resource utilization.	**K3**
CO4	Analyze the role of synchronization to improve system performance	**K3, K4**
CO5	Implement the functionalities pertaining with process, File and I/O Management.	**K5**

COURSE CODE: 22UCS5CC7 **COURSE TITLE: COMPUTER NETWORKS**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand and recall the basics of computer Networks	**K1, K2**
CO2	Explain network architecture using protocols and interfaces.	**K2**
CO3	Apply the network concepts in problem solving	**K3**
CO4	Analyzing key networking protocols and their hierarchical relationship	**K4**
CO5	Determine the need of data link, network and transport layers on real time applications	**K5**

COURSE CODE: 22UCS5DSE1A **COURSE TITLE: COMPUTER ARCHITECTURE**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Define the basics of digital computer	**K1**
CO2	Explain the various concepts of digital computer	**K2**
CO3	Utilize the numerous digital computer tools to address the issue	**K3**
CO4	Examine the digital computer's performance	**K4**
CO5	Solve the real-time problem using digital computer	**K5**

COURSE CODE: 22UCS5DSE1B COURSE TITLE: COMPUTER GRAPHICS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall the fundamentals of computer graphics and augmented reality	**K1**
CO2	Provide a insight of computer graphics and algorithms	**K2**
CO3	Apply computer graphic algorithms to solve problems	**K3**
CO4	Illustrate the steps to perform 2D & 3D graphic representation in applications	**K4**
CO5	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.	**K5**

COURSE CODE: 22UCS5DSE1C COURSE TITLE: ARTIFICIAL INTELLIGENCE		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recall the need of AI and the Knowledge representation	**K1**
CO2	Understand the AI problems &AI techniques	**K2**
CO3	Apply various AI techniques on demand	**K3**
CO4	Analyze AI algorithms with use cases	**K4**
CO5	Evaluate AI techniques for real time situations	**K5**

COURSE CODE: 22UCS5SEC2P COURSE TITLE: CISCO PACKET TRACER (P)		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Demonstrate the installation of CISCO Packet Tracer	**K2**
CO2	Make use of Switch Interface	**K3**
CO3	Examine the need of VLAN	**K4**
CO4	Evaluate the router setup and static routing	**K5**
CO5	Assess the dynamic routing in CISCO Packet Tracer	**K5**

COURSE CODE: 19UCS6CC8 COURSE TITLE: OPERATING SYSTEM		
CO Number	**CO Statement**	**Knowledge Level**
CO1	State the basic concepts of operating system and its components	**K1**
CO2	Explain the concepts of Memory allocation Schemes	**K2**
CO3	Apply different process scheduling algorithms tominimize the waiting time	**K3**
CO4	Analyze the various file management techniques	**K3**
CO5	Classify the various types of Device	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19UCS6CC9 **COURSE TITLE: WEB TECHNOLOGY**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Analyze and design a static webpage by applying HTML elements.	**K3**
CO2	Develop a dynamic webpage by the use of JavaScript and DHTML.	**K3**
CO3	Analyze and use appropriate Client-side or Server-side applications	**K3**
CO4	Understand any suitable real time web application	**K2**

COURSE CODE: 19UCS6MBE2A **COURSE TITLE: CLOUD COMPUTING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Classify the concepts of Cloud deployment Models	**K2**
CO2	Apply the Virtualization Technologies	**K3**
CO3	Examine basic terminologies in service oriented architecture and cloud security	**K4**
CO4	Elucidate the applications of Cloud Computing	**K4**
CO5	Expose the concept of Cloud Computing Technologies, Platformsand Services	**K4**

COURSE CODE: 19UCS6MBE2B **COURSE TITLE: FUNDAMENTALS OF BIG DATA & IOT**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the basic concepts of Big Data	**K2**
CO2	Analyze the Hadoop framework	**K4**
CO3	Elucidate the application areas of the Internet of Things	**K3**
CO4	Explore the building blocks of IoT	**K4**

COURSE CODE: 19UCS6MBE2C **COURSE TITLE: ARTIFICIAL INTELLIGENCE**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the AI problems	**K2**
CO2	Describe various AI techniques	**K2**
CO3	Apply basic AI algorithms for real time situations	**K3**
CO4	Explore the concepts of Knowledge Representations	**K4**

CRITERION I **POs and COs**

COURSE CODE: 19UCS6MBE3AP **COURSE TITLE: OPERATING SYSTEMS LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the basic command with examples and shell programming	**K2**
CO2	Implement memory management schemes, page replacement schemes and file allocation	**K3**
CO3	Analyze the performance of process scheduling algorithms and seek strategies	**K4**
CO4	Simulate Bankers algorithm for deadlockavoidance	**K5**

COURSE CODE: 19UCS6MBE3BP **COURSE TITLE: R PROGRAMMINGLAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Demonstrates data manipulation operations	**K2**
CO2	Develop programs using Loop constructs	**K3**
CO3	Use R for Descriptive statistics	**K3**
CO4	Apply the knowledge of R in data Analytics for real life applications	**K3**
CO5	Predict unknown values from known dataset	**K6**

COURSE CODE: 19UCS6MBE3CP **COURSE TITLE: WEB TECHNOLOGYLAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the basic tags used in HTML document	**K1**
CO2	Able to write HTML, CSS codes.	**K3**
CO3	Demonstrate JavaScript and related technologies	**K3**
CO4	Create dynamic web pages using JSP	**K6**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 10:43:47

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2023-2024 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

B. Sc-Computer Science

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest qualitystandards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achievetheir goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strongattitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

CRITERION I **POs and COs**

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of B. Sc Computer Science / B. Sc Computer Science with Cognitive Systems / BCA/ B. Sc Information Technology Programme, the students will be able to
PO1	**ACADEMIC SKILLS & SOCIAL RESPONSIBILITY** Apply Computing, Mathematical and Scientific Knowledge in Various disciplines byunderstanding the concerns of the society.
PO2	**CRITICAL THINKING AND INNOVATIVE PROGRESS** Design the software applications with varying intricacies using programming languages for innovative learning in techno world to meet the changing demands.
PO3	**PERSONALITY DEVELOPMENT** Perceive Leadership skills to accomplish a common goal with effective communication and understanding of professional, ethical, and social responsibilities.
PO4	**LIFELONG LEARNING** Identify resources for professional development and apply the skills and tools necessary for computing practice to gain real life experiences.
PO5	**CREATIVITY AND HOLISTIC APPROACH** Create a scientific temperament and novelties of ideas to support research and development in Computer Science to uphold scientific integrity and objectivity.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO NO.	The students of B. Sc Computer Science will be able to,	POs Addressed
PSO1	Identify, analyze, design an optimized solution using appropriate algorithms of varying complexity using cutting edge technologies	PO1 PO2 PO5
PSO2	Attain a solid foundation in the Programming languages and to formulate computational solutions to real life problems	PO1 PO2 PO4 PO5
PSO3	Equip the skills to utilize tools and technologies in computer science tomeet the industrial needs and to communicate effectively among peers	PO3 PO4
PSO4	Develop skills in software and hardware so as to enable them to establish a productive career in industry, research, academia and also as an entrepreneur	PO1 PO4 PO5
PSO5	Implement independent projects of their own choice using latest tools and also work as an effective team member to attain the predefined goals.	PO3 PO4 PO5

COURSE OUTCOMES (COs)

COURSE CODE: 23UCS1CC1 COURSE TITLE: PYTHON PROGRAMMING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall the fundamental concepts of Python	**K1**
CO2	Demonstrate the problem-solving approach using Python statements	**K2**
CO3	Construct the Python programme using functions and modules	**K3**
CO4	Analyze the Python programming concepts to develop programs	**K4**
CO5	Develop a Python program to solve real time problems	**K5**

COURSE CODE: 23UCS1CC1P COURSE TITLE: PYTHON PROGRAMMING (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the problem-solving approaches	**K2**
CO2	Identify suitable programming constructs for problem solving.	**K3**
CO3	Analyze various concepts of Python language to solve the problem in an efficient way.	**K4**
CO4	Examine the various Python programming techniques.	**K5**
CO5	Develop a python program for a given problem and test for its Correctness.	**K6**

COURSE CODE: 22UCS2CC2 COURSE TITLE: PROGRAMMING IN JAVA		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recite the basic programming skills	**K1**
CO2	Understand the Java features	**K2**
CO3	Analyze OOPs concepts	**K4**
CO4	Apply the programming skills in various domains	**K3**
CO5	Solve real time problems using Java	**K5**

COURSE CODE: 22UCS2CC2P COURSE TITLE: JAVA PROGRAMMING (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Demonstrate and implement the fundamentals of Java programmingconcepts	**K2, K3**
CO2	Analyze the problem and develop skills on identifying appropriate Programming constructs like looping, branching and functions	**K3, K4**
CO3	Examine the problem and create a reusable program by combining the features of Java such as Classes, Objects, Packages, Interfaces and Exception handling	**K4, K6**
CO4	Analyze the complexity of problem in real world and design an eventdriven and web based interactive programs using Applets	**K4, K6**
CO5	Build applications with database connectivity to mimic the real world scenarios	**K6**

COURSE CODE: 22UCS2CC3P COURSE TITLE: DATA VISUALIZATION (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Demonstrate the use of basic Functions, Methods and Formatting	**K2**
CO2	Identify the different Models for data analysis	**K3**
CO3	Analyze the data using Graph Function	**K4**
CO4	Construct the data analysis report with proper validation	**K5**
CO5	Build Dashboard for data visualization	**K6**

COURSE CODE: 22UCS3CC3 COURSE TITLE: DATA STRUCTURES & ALGORITHMS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the abstract data types and operations of data structure	**K1**
CO2	Demonstrate the problems to represent the linear and nonlinear structures	**K2**
CO3	Implement the basic data structures and Algorithm design Techniques	**K3**
CO4	Analyze the efficiency and proofs of correctness	**K4**
CO5	Assess, evaluate and choose appropriate data structure and algorithmic techniques to solve real-world problems.	**K5**

COURSE CODE: 22UCS3CC4P COURSE TITLE: DATA STRUCTURES (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall program execution and Debugging	**K1**
CO2	Demonstrate the ideas of Data structures	**K2**
CO3	Make use of Operations of Linear and Non- linear data structures	**K3**
CO4	Develops the ability to analyze a problem and implement an algorithm to solve it.	**K4**
CO5	Acquire logical thinking, Identify the correct and efficient ways of solving problems	**K5**

COURSE CODE: 22UCS3GEC1P COURSE TITLE: OFFICE AUTOMATION (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Describe the concepts of Office Package.	**K1**
CO2	Recognize when to use each of the Office programs to create professional and academic documents.	**K2**
CO3	Use Office programs to create personal, academic and Business documents following current professional and/or industry standards.	**K3**
CO4	Test the working knowledge of advanced concepts of Office Software.	**K4**
CO5	Assess oneself to get employment with this practical hands on training.	**K6**

COURSE CODE: 22UCS4CC4 COURSE TITLE: DATABASE MANAGEMENT SYSTEMS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Define the basic concepts of database design, architecture and its data model	**K1**
CO2	Illustrate the structure of Relational database	**K2**
CO3	Apply the various queries in the database	**K3**
CO4	Examine the database design and E-R model	**K4**
CO5	Explain the concepts of Relational Database Design	**K2, K5**

CRITERION I **POs and COs**

COURSE CODE: 22UCS4CC5P **COURSE TITLE:SQL & PL/SQL(P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall and demonstrate basic commands and functions in SQL and PL/SQL	**K1, K2**
CO2	Apply the knowledge of SQL concepts to develop a database system	**K3**
CO3	Examine the problem and provide a solution using SQL concepts	**K4**
CO4	Evaluate various concepts to develop simple applications using SQL	**K5, K6**
CO5	Solve the various types of online applications using SQL	**K6**

COURSE CODE: 22UCS4GEC2P **COURSE TITLE: MULTIMEDIA (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Identify the basic tools and components of a multimedia	**K1**
CO2	Understand the use of graphical tools for various templates	**K2**
CO3	Apply basic elements and principles of photo editing software to achieve a great photo effect	**K3**
CO4	Discover layers, rotation and overlapping of an image	**K4**
CO5	Design a brochure for different situations and assess it	**K5, K6**

COURSE CODE: 22UCS4SEC1P **COURSE TITLE: WEB DESIGNING (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recognize the usage of tags and styles in web designing	**K2**
CO2	Plan to build a web site	**K3**
CO3	Analyze the various tags, styles and scripting in html and CSS and apply them in web page designing	**K4**
CO4	Assess the web page with different validation test cases	**K5**
CO5	Design dynamic web pages that apply various dynamic effects on the web site for real time applications.	**K6**

COURSE CODE: 19UCS5CC5 COURSE TITLE: PYTHON PROGRAMMING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Describe the basic built-in functions and syntax of Python programming	**K1**
CO2	Understand the concepts of arrays and file operations	**K2**
CO3	Use external libraries and packages with python	**K3**
CO4	Apply the concepts of decision making and construct statements	**K3**
CO5	Implementing database concepts	**K3**

COURSE CODE: 19UCS5CC5P COURSE TITLE: PYTHON PROGRAMMING LAB		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Identify the basic concepts of Python	**K2**
CO2	Write and debug simple Python programs with loops and conditions	**K3**
CO3	Use Python lists, tuples, dictionaries for representing compound data and apply file concept in Python	**K3**
CO4	Developing simple applications using MySql	**K3**
CO5	Construct Python programs step-wise by defining functions and calling them	**K4**

COURSE CODE: 19UCS5CC6 COURSE TITLE: COMPUTER GRAPHICS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Identify the basic attributes of various output primitives	**K1**
CO2	Explain about the basic principles of Graphics systems	**K2**
CO3	Describe various input techniques and Methods	**K2**
CO4	Apply algorithm to draw different mathematical objects	**K3**
CO5	Illustrate various 2D & 3D Geometric & modeling Techniques	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19UCS5CC7 **COURSE TITLE: COMPUTER NETWORKS**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Describe the basics of data communication	**K1**
CO2	Identify the different types of network topologies and the layers of OSI model.	**K1**
CO3	Explain contemporary issues in networking technologies	**K2**
CO4	Illustrate about Internetworking	**K3**

COURSE CODE: 19UCS5MBE1A **COURSE TITLE: COMPUTER ARCHITECTURE**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Describe the basic structure of computer	**K1**
CO2	Express computer arithmetic operations	**K2**
CO3	Demonstrate the control unit operations	**K3**
CO4	Analyse the concept of IO organization	**K3**

COURSE CODE: 19UCS5MBE1B **COURSE TITLE: SOFTWARE ENGINEERING**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Describe about Software engineering concepts and process	**K1**
CO2	Recall the importance on Measurement & Metrics	**K1**
CO3	Identify various software computing cost	**K2**
CO4	Discuss on software Implementation and Maintenance	**K2**
CO5	Illustration on software design and modules	**K3**
CO6	Demonstrate the subject knowledge on coupling, cohesion and testing strategies	**K3**
CO7	Describe about Emerging Trends in Web Engineering, Cloud Computing, open source	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19UCS5MBE1C **COURSE TITLE: CYBER SECURITY**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand threat, risk, attack and motivations behind them	**K2**
CO2	Design and develop secured architecture for an organization	**K3**
CO3	Determine software vulnerabilities to reduce the risk of exploitation	**K3**

COURSE CODE: 19UCS5SBE2AP **COURSE TITLE: MOBILE APPLICATION DEVELOPMENT LAB**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Install and configure Android application development tools	**K1**
CO2	Analyze and discover own mobile app for simple needs	**K3**
CO3	Deploy applications to hand held devices	**K5**

COURSE CODE: 19UCS5SBE2BP **COURSE TITLE: COMPUTER NETWORKS LAB USING JAVA**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the basic concept of networking	**K1**
CO2	Implement the socket programming for client server architecture	**K2**
CO3	Illustrate various protocols implementation	**K3**

COURSE CODE: 19UCS5SBE3AP **COURSE TITLE: SOFTWARE TESTING TOOL – SELENIUM**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	State how to install and run open-source software testing tool Selenium	**K1**
CO2	Understand Selenium tool to perform testing	**K2**
CO3	Prepare test suits for different applications	**K3**
CO4	Use test suits and test simple programs	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19UCS5SBE3BP **COURSE TITLE: COMPUTER GRAPHICS LAB USING C**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	State how to install and run open-source software testing tool Selenium	**K1**
CO2	Understand Selenium tool to perform testing	**K2**
CO3	Prepare test suits for different applications	**K3**
CO4	Use test suits and test simple programs	**K3**

COURSE CODE: 19UCS6CC8 **COURSE TITLE: OPERATING SYSTEMS**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	State the basic concepts of operating system and its components	**K1**
CO2	Explain the concepts of Memory allocation Schemes	**K2**
CO3	Apply different process scheduling algorithms to minimize the waiting time	**K3**
CO4	Analyze the various file management techniques	**K3**
CO5	Classify the various types of Devices	**K3**

COURSE CODE: 19UCS6CC9 **COURSE TITLE: WEB TECHNOLOGY**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Analyze and design a static webpage by applying HTML elements.	**K3**
CO2	Develop a dynamic webpage by the use of JavaScript and DHTML.	**K3**
CO3	Analyze and use appropriate Client-side or Server-side applications	**K3**
CO4	Understand any suitable real time web application	**K2**

CRITERION I **POs and COs**

COURSE CODE: 19UCS6MBE2A **COURSE TITLE: CLOUD COMPUTING**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Classify the concepts of Cloud deployment Models	**K2**
CO2	Apply the Virtualization Technologies	**K3**
CO3	Examine basic terminologies in service-oriented architecture and cloud security	**K4**
CO4	Elucidate the applications of Cloud Computing	**K4**
CO5	Expose the concept of Cloud Computing Technologies, Platforms and Services	**K4**

COURSE CODE: 19UCS6MBE2B **COURSE TITLE: FUNDAMENTALS OF BIG DATA & IOT**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the basic concepts of Big Data	**K2**
CO2	Analyze the Hadoop framework	**K4**
CO3	Elucidate the application areas of the Internet of Things	**K3**
CO4	Explore the building blocks of IoT	**K4**

COURSE CODE: 19UCS6MBE2C **COURSE TITLE: ARTIFICIAL INTELLIGENCE**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the AI problems	**K2**
CO2	Describe various AI techniques	**K2**
CO3	Apply basic AI algorithms for real time situations	**K3**
CO4	Explore the concepts of Knowledge Representations	**K4**

CRITERION I **POs and COs**

COURSE CODE: 19UCS6MBE3AP **COURSE TITLE: OPERATING SYSTEMS LAB**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the basic command with examples and shell programming	**K2**
CO2	Implement memory management schemes, page replacement schemes and file allocation	**K3**
CO3	Analyze the performance of process scheduling algorithms and seek strategies	**K4**
CO4	Simulate Bankers algorithm for deadlock avoidance	**K5**

COURSE CODE: 19UCS6MBE3BP **COURSE TITLE: R PROGRAMMING LAB**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Demonstrates data manipulation operations	**K2**
CO2	Develop programs using Loop constructs	**K3**
CO3	Use R for Descriptive statistics	**K3**
CO4	Apply the knowledge of R in data Analytics for real life applications	**K3**
CO5	Predict unknown values from known dataset	**K6**

COURSE CODE: 19UCS6MBE3CP **COURSE TITLE: WEB TECHNOLOGY LAB**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Identify the basic tags used in HTML document	**K1**
CO2	Able to write HTML, CSS codes.	**K3**
CO3	Demonstrate JavaScript and related technologies	**K3**
CO4	Create dynamic web pages using JSP	**K6**

CRITERION I **POs and COs**

COURSE CODE:19UCS6PW **COURSE TITLE: PROJECT WORK**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Apply the knowledge gained through various courses in solving a real life problem	K3
CO2	Demonstrate the different phases of software/system development life cycle	K2
CO3	Use time and resource management	K3
CO4	Develop programs accustomed to professional environment and/or style typical of a global IT industry	K3
CO5	Analyze different testing strategies for project evaluation	K4

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 10:43:47

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2019-2020 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

M. Sc-Computer Science

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of M. Sc Computer Science Programme, the students will be able to
PO1	Ability to identify, formulate and develop solutions for computational challenges
PO2	Inculcate broad knowledge in core areas of Computer Science and emerging technologies in IT
PO3	Develop Analytical and Technical skills to enhance employment potential
PO4	Capable of integrating knowledge and to provide a gateway for research

COURSE OUTCOMES (COs)

COURSE CODE: 19PCS1CC1 COURSE TITLE: MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain the concepts of Permutation	K2
CO2	Apply the concepts of connectives , theory of inference for the statement calculus and fuzzy set theory	K3
CO3	Examine basic terminologies in graph to draw various kindsof graphs	K4
CO4	Differentiate the theory of Boolean Algebra and Lattices	K4
CO5	Develop the concepts of trees	K6

COURSE CODE: 19PCS1CC2 COURSE TITLE: DESIGN AND ANALYSIS OF ALGORITHMS		
CO Number	**CO Statement**	**Knowledge level**
CO1	Design algorithms for various computing problems.	**K3**
CO2	Analyze the time and space complexity of algorithms.	**K4**
CO3	Critically analyze the different algorithm design techniques for agiven problem	**K5**
CO4	Assess/Compare the efficiency of the algorithm	**K6**

COURSE CODE: 19PCS1CC3 COURSE TITLE: WEB TECHNOLOGIES		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the processing of XML Data with Java	**K2**
CO2	Apply suitable scripting languages for Client side and Server side programming	**K3**
CO3	Analyze the basics involved in publishing content on the World Wide web	**K4**
CO4	Assess oneself to get employment with these practical hands on training.	**K6**

COURSE CODE: 19PCS1CC1P URSE TITLE: WEB TECHNOLOGIES LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recognize the usage of HTML Tags	**K2**
CO2	Demonstrate the usage of Java Script	**K3**
CO3	Experiment the client/server application using RMI	**K4**
CO4	Develop web application using XML, Servlet	**K5**

COURSE CODE: 19PCS1CC4 COURSE TITLE: DISTRIBUTED OPERATING SYSTEM		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the architecture of DSM	**K2**
CO2	Determine the difficulties of distributed memory management	**K3**
CO3	Compare centralized and distributed system	**K4**
CO4	Predict effective synchronization techniques to beperformed to run a task in a distributed system	**K6**

COURSE CODE: 19PCS2CC5 COURSE TITLE: DATA MINING AND WAREHOUSING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recognize basic concepts of data mining	**K2**
CO2	Review data mining techniques like classifications, clustering,association rule mining, prediction and related algorithm	**K3**
CO3	Assess the methods and techniques appropriate for the task	**K5**

COURSE CODE: 19PCS2CC2P COURSE TITLE: DATA MININGLAB AND MATLAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Demonstrate the features of data mining tools	**K3**
CO2	Analyze the performance of various classification andclustering algorithm	**K4**
CO3	Interpret Regression techniques using MATLAB	**K6**
CO4	Apply Basic graphic applications in MATLAB	**K3**

COURSE CODE: 19PCS2CC6 COURSE TITLE: ARTIFICIAL INTELLIGENCE		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Apply the basic knowledge representation and learningmethods	**K3**
CO2	Examine techniques for handling incomplete and uncertainmodels	**K4**
CO3	Formulate a system for solving a particular problem	**K5**

COURSE CODE: 19PCS2EC1A COURSE TITLE: NETWORKSECURITY		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand cryptography, network security concepts withits applications	**K2**
CO2	Apply security principle in system design	**K3**
CO3	Analyze network security protocols	**K4**
CO4	Detect network security threat	**K5**
CO5	Design the code to implement a cryptographic algorithm	**K6**

COURSE CODE: 19PCS2EC1B COURSE TITLE: SOFT COMPUTING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the concepts of soft computing and theirapplications	**K1**
CO2	Discuss supervised and unsupervised learning in neuralnetworks	**K2**
CO3	Apply soft computing techniques for small applications	**K3**
CO4	Analyze various soft computing techniques suitable forreal time	**K4**

COURSE CODE: 19PCS2EC1C COURSE TITLE: ADVANCED COMPUTER ARCHITECTURE		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Review Instruction level parallelism	**K2**
CO2	Analyze the Performance of different level parallelismtechniques	**K4**
CO3	Manage Cache and Memory Related Issues in Multi-Processors	**K5**

CRITERION I **POs and COs**

COURSE CODE: 19PCS2EC2A **COURSE TITLE: BIOINFORMATICS**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Define molecular biology and bioinformatics applications	**K1**
CO2	Discuss the sequences using data analysis tool	**K2**
CO3	Sketch the data mining and pattern matching tools	**K3**
CO4	Summarize the molecular modeling and simulation technologies and software that are used to study a wide range of molecular phenomena in biology and medicine	**K5**
CO5	Interpret the BLAST and FASTA algorithms to find the similarity between protein and DNA sequences.	**K6**

COURSE CODE: 19PCS2EC2B **COURSE TITLE: ADVANCED DATABASE SYSTEM**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the concepts of parallel database andquery	**K2**
CO2	Apply distributed transaction and concurrency control	**K3**
CO3	Test various queries ORDBMS and OODBMS	**K4**
CO4	Combine Advanced databases like Spatial and XMLdatabases for handling data	**K5**
CO5	Deduct applications with Map Reduce concept	**K6**

COURSE CODE: 19PCS2EC2C **COURSE TITLE: SOFTWARE PROJECT MANAGEMENT**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Discuss software development project plans	**K2**
CO2	Apply schedule and cost techniques to determine a basis ofestimate	**K3**
CO3	Differentiate software life cycle support and the role of thesoftware engineering supervisor	**K4**
CO4	Formulate software project management practices within an organization and recommend practical improvements based upon evaluation.	**K5**

COURSE CODE: 19PCS3CC7 COURSE TITLE: COMPUTER SCIENCE FOR COMPETITIVE EXAMINATIONS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain concepts of computer science core subjects	**K2**
CO2	Apply the knowledge to solve various types of problems	**K3**
CO3	Examine various computer science concepts on real timeapplications	**K4**
CO4	Develop a scientific aptitude and sense of reasoning	**K5**

COURSE CODE: 19PCS3CC8 COURSE TITLE: BIG DATA ANALYTICS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the fundamentals of Bigdata analytics	**K2**
CO2	Describe the Hadoop architecture and File system	**K2**
CO3	Apply the MapReduce Programming model for real-worldproblems	**K3**
CO4	Explore the concepts of NoSQL databases	**K4**
CO5	Develop a complete business data analytics solution	**K6**

COURSE CODE: 19PCS3CC3P COURSE TITLE: PYTHON AND R LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Write and debug simple Python programs with loopsand conditions	**K3**
CO2	Use Python lists, tuples, dictionaries for representingcompound data and apply file concept in Python	**K4**
CO3	Construct Python programs step-wise by definingfunctions and calling them	**K5**
CO4	Create a dataframe and exporting data into various fileformats in R.	**K5**
CO5	Apply Machine Learning algorithm in R	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19PCS3EC3A **COURSE TITLE: BLOCKCHAIN**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Define blockchain, types, applications &limitations	**K1**
CO2	Explore blockchain, cryptography concepts	**K2**
CO3	Enumerate bitcoin and other alternatives	**K3**
CO4	Differentiate various contracts	**K4**
CO5	Propose IoT in various sectors	**K5**

COURSE CODE: 19PCS3EC3B **COURSE TITLE: PARALLEL PROCESSING**		
CO Number	**CO Statement**	**KnowledgeLevel**
CO1	Discuss the concepts of parallel processing including various kinds of system architectures	**K2**
CO2	Illustrate the issues and techniques in improving performance of SIMD Computers	**K3**
CO3	Compare the pipeline and parallel concepts	**K4**
CO4	Categorize the Multiprocessor systems, cache coherence and Interconnection networks	**K5**

COURSE CODE: 19PCS3EC3C **COURSE TITLE: COMPILER DESIGN**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Construct grammars and automata for regular language	**K3**
CO2	Analyze the knowledge of patterns, tokens & regularexpressions for solving a problem	**K4**
CO3	Develop new code optimization techniques for improvingthe performance of a program in terms of speed & space	**K5**
CO4	Predict symbol table and generate intermediate code	**K6**

CRITERION I **POs and COs**

COURSE CODE: 19PCS3EC4A **COURSE TITLE: ROBOTIC PROCESS AUTOMATION**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Learn Robotic Process Automation and its Features	**K1**
CO2	Explore Control Flow and Decision Making	**K2**
CO3	Enumerate Clipboard Management	**K3**
CO4	Differentiate various controls	**K4**

COURSE CODE: 19PCS3EC4B **COURSE TITLE: MACHINE LEARNING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the theory underlying machine learning	**K1**
CO2	Classify knowledge about Modeling and prediction andbasic feature engineering	**K2**
CO3	Use linear models and non-linear models	**K3**
CO4	Make inferences on algorithm using tree, rule based models and analyze reinforcement learning techniques	**K4**
CO5	Construct algorithms using Python and R	**K5**

COURSE CODE: 19PCS3EC4C **COURSE TITLE: IoT**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Illustrate IoT enabling Technologies	**K3**
CO2	Analyze applications of IoT in real time scenario	**K4**
CO3	Design a portable IoT using Raspberry pi / equivalentboards and relevant protocols	**K5**

COURSE CODE: 19PCS4CC9 COURSE TITLE: CLOUD COMPUTING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain the cloud paradigm and its various forms of services	**K3**
CO2	Illustrate the architecture, infrastructure and delivery models	**K3**
CO3	Apply suitable virtualization concepts	**K4**
CO4	Solve problems using cloud toolkit	**K4**
CO5	Create interactive mobile services	**K5**

COURSE CODE: 19PCS4CC10 COURSE TITLE: DIGITAL IMAGE PROCESSING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the fundamentals concepts of digital image processing and image transforms	**K2**
CO2	Analyze images in the frequency domain using various transforms	**K4**
CO3	Evaluate the techniques for image enhancement and image restoration	**K5**
CO4	Interpret image segmentation techniques	**K3**
CO5	Compare various compression techniques	**K4**
CO6	Apply image processing algorithms in practical applications	**K3**

COURSE CODE: 19PCS4CC4P COURSE TITLE: FOSS LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Ability to install and run open-source operating systems	**K1**
CO2	Explain open source project structure and how to successfully setup a project	**K2**
CO3	Ability to contribute software to and interact withFree and Open Source Software development projects	**K3**
CO4	Exploring the Hadoop Distributed File System (HDFS)	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19PCS4EC5A **COURSE TITLE: WIRELESS SENSOR NETWORKS**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Define the wireless sensor, various platforms and its issues	**K1**
CO2	Review the various deployment mechanisms	**K2**
CO3	Construct the MAC layer and its issues	**K3**
CO4	Differentiate architectures, functions and performance of wireless sensor networks systemsand its platforms	**K4**
CO5	Propose various Routing Protocols	**K5**

COURSE CODE: 19PCS4EC5B **COURSE TITLE: MANET**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	State the adhoc networks, characteristics and its features	**K1**
CO2	Review the protocol design issues of adhoc networks	**K2**
CO3	Examine the transport layer issues	**K3**
CO4	Compare QoS related performance measurements of ad hocand sensor networks	**K4**

COURSE CODE: 19PCS4EC5C **COURSE TITLE: MOBILE COMPUTING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Illustrate the concepts of Multiplexing, GSM Architecture and its Protocols	**K3**
CO2	Analyze Messaging and Location based services	**K4**
CO3	Categorize Activities, Fragments, Intents & Views	**K5**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 12:00:03

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2020-2021 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

M. Sc-Computer Science

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of M. Sc Computer Science Programme, the students will be able to
PO1	Ability to identify, formulate and develop solutions for computational challenges
PO2	Inculcate broad knowledge in core areas of Computer Science and emerging technologies in IT
PO3	Develop Analytical and Technical skills to enhance employment potential
PO4	Capable of integrating knowledge and to provide a gateway for research

COURSE OUTCOMES (COs)

COURSE CODE: 19PCS1CC1 **COURSE TITLE: MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain the concepts of Permutation	**K2**
CO2	Apply the concepts of connectives , theory of inference for the statement calculus and fuzzy set theory	**K3**
CO3	Examine basic terminologies in graph to draw various kindsof graphs	**K4**
CO4	Differentiate the theory of Boolean Algebra and Lattices	**K4**
CO5	Develop the concepts of trees	**K6**

COURSE CODE: 19PCS1CC2 COURSE TITLE: DESIGN AND ANALYSIS OF ALGORITHMS		
CO Number	**CO Statement**	**Knowledge level**
CO1	Design algorithms for various computing problems.	**K3**
CO2	Analyze the time and space complexity of algorithms.	**K4**
CO3	Critically analyze the different algorithm design techniques for agiven problem	**K5**
CO4	Assess/Compare the efficiency of the algorithm	**K6**

COURSE CODE: 19PCS1CC3 COURSE TITLE: WEB TECHNOLOGIES		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the processing of XML Data with Java	**K2**
CO2	Apply suitable scripting languages for Client side and Server side programming	**K3**
CO3	Analyze the basics involved in publishing content on the World Wide web	**K4**
CO4	Assess oneself to get employment with this practical hands on training.	**K6**

COURSE CODE: 19PCS1CC1P COURSE TITLE: WEB TECHNOLOGIES LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recognize the usage of HTML Tags	**K2**
CO2	Demonstrate the usage of Java Script	**K3**
CO3	Experiment the client/server application using RMI	**K4**
CO4	Develop web application using XML, Servlet	**K5**

COURSE CODE: 19PCS1CC4 COURSE TITLE: DISTRIBUTED OPERATING SYSTEM		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the architecture of DSM	**K2**
CO2	Determine the difficulties of distributed memory management	**K3**
CO3	Compare centralized and distributed system	**K4**
CO4	Predict effective synchronization techniques to beperformed to run a task in a distributed system	**K6**

COURSE CODE: 19PCS2CC5 COURSE TITLE: DATA MINING AND WAREHOUSING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recognize basic concepts of data mining	**K2**
CO2	Review data mining techniques like classifications, clustering, association rule mining, prediction and related algorithm	**K3**
CO3	Assess the methods and techniques appropriate for the task	**K5**

COURSE CODE: 19PCS2CC2P COURSE TITLE: DATA MININGLAB AND MATLAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Demonstrate the features of data mining tools	**K3**
CO2	Analyze the performance of various classification andclustering algorithm	**K4**
CO3	Interpret Regression techniques using MATLAB	**K6**
CO4	Apply Basic graphic applications in MATLAB	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19PCS2CC6 **COURSE TITLE: ARTIFICIAL INTELLIGENCE**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Apply the basic knowledge representation and learningmethods	**K3**
CO2	Examine techniques for handling incomplete and uncertainmodels	**K4**
CO3	Formulate a system for solving a particular problem	**K5**

COURSE CODE: 19PCS2EC1A **COURSE TITLE: NETWORKSECURITY**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand cryptography, network security concepts withits applications	**K2**
CO2	Apply security principle in system design	**K3**
CO3	Analyze network security protocols	**K4**
CO4	Detect network security threat	**K5**
CO5	Design the code to implement a cryptographic algorithm	**K6**

COURSE CODE: 19PCS2EC1B **COURSE TITLE: SOFT COMPUTING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the concepts of soft computing and theirapplications	**K1**
CO2	Discuss supervised and unsupervised learning in neuralnetworks	**K2**
CO3	Apply soft computing techniques for small applications	**K3**
CO4	Analyze various soft computing techniques suitable forreal time	**K4**

COURSE CODE: 19PCS2EC1C **COURSE TITLE: ADVANCED COMPUTER ARCHITECTURE**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Review Instruction level parallelism	**K2**
CO2	Analyze the Performance of different level parallelismtechniques	**K4**
CO3	Manage Cache and Memory Related Issues in Multi-Processors	**K5**

COURSE CODE: 19PCS2EC2A COURSE TITLE: BIOINFORMATICS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Define molecular biology and bioinformatics applications	**K1**
CO2	Discuss the sequences using data analysis tool	**K2**
CO3	Sketch the data mining and pattern matching tools	**K3**
CO4	Summarize the molecular modeling and simulation technologies and software that are used to study a wide range of molecular phenomena in biology and medicine	**K5**
CO5	Interpret the BLAST and FASTA algorithms to find the similarity between protein and DNA sequences.	**K6**

COURSE CODE: 19PCS2EC2B COURSE TITLE: ADVANCED DATABASE SYSTEM		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the concepts of parallel database andquery	**K2**
CO2	Apply distributed transaction and concurrency control	**K3**
CO3	Test various queries ORDBMS and OODBMS	**K4**
CO4	Combine Advanced databases like Spatial and XMLdatabases for handling data	**K5**
CO5	Deduct applications with Map Reduce concept	**K6**

COURSE CODE: 19PCS2EC2C COURSE TITLE: SOFTWARE PROJECT MANAGEMENT		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Discuss software development project plans	**K2**
CO2	Apply schedule and cost techniques to determine a basis ofestimate	**K3**
CO3	Differentiate software life cycle support and the role of thesoftware engineering supervisor	**K4**
CO4	Formulate software project management practices within an organization and recommend practical improvements based upon evaluation.	**K5**

COURSE CODE: 19PCS3CC7 COURSE TITLE: COMPUTER SCIENCE FOR COMPETITIVE EXAMINATIONS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain concepts of computer science core subjects	**K2**
CO2	Apply the knowledge to solve various types of problems	**K3**
CO3	Examine various computer science concepts on real time applications	**K4**
CO4	Develop a scientific aptitude and sense of reasoning	**K5**

COURSE CODE: 19PCS3CC8 COURSE TITLE: BIG DATA ANALYTICS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the fundamentals of Bigdata analytics	**K2**
CO2	Describe the Hadoop architecture and File system	**K2**
CO3	Apply the MapReduce Programming model for real-worldproblems	**K3**
CO4	Explore the concepts of NoSQL databases	**K4**
CO5	Develop a complete business data analytics solution	**K6**

COURSE CODE: 19PCS3CC3P COURSE TITLE: PYTHON AND R LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Write and debug simple Python programs with loopsand conditions	**K3**
CO2	Use Python lists, tuples, dictionaries for representingcompound data and apply file concept in Python	**K4**
CO3	Construct Python programs step-wise by definingfunctions and calling them	**K5**
CO4	Create a dataframe and exporting data into various fileformats in R.	**K5**
CO5	Apply Machine Learning algorithm in R	**K3**

CRITERION I **POs and COs**

COURSE CODE: 19PCS3EC3A
COURSE TITLE: BLOCKCHAIN

CO Number	CO Statement	Knowledge Level
CO1	Define blockchain, types, applications &limitations	K1
CO2	Explore blockchain, cryptography concepts	K2
CO3	Enumerate bitcoin and other alternatives	K3
CO4	Differentiate various contracts	K4
CO5	Propose IoT in various sectors	K5

COURSE CODE: 19PCS3EC3B
COURSE TITLE: PARALLEL PROCESSING

CO Number	CO Statement	Knowledge Level
CO1	Discuss the concepts of parallel processing including various kinds of system architectures	K2
CO2	Illustrate the issues and techniques in improving performance of SIMD Computers	K3
CO3	Compare the pipeline and parallel concepts	K4
CO4	Categorize the Multiprocessor systems, cache coherence and Interconnection networks	K5

COURSE CODE: 19PCS3EC3C
COURSE TITLE: COMPILER DESIGN

CO Number	CO Statement	Knowledge Level
CO1	Construct grammars and automata for regular language	K3
CO2	Analyze the knowledge of patterns, tokens & regularexpressions for solving a problem	K4
CO3	Develop new code optimization techniques for improvingthe performance of a program in terms of speed & space	K5
CO4	Predict symbol table and generate intermediate code	K6

CRITERION I **POs and COs**

COURSE CODE: 19PCS3EC4A **COURSE TITLE: ROBOTIC PROCESS AUTOMATION**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Learn Robotic Process Automation and its Features	**K1**
CO2	Explore Control Flow and Decision Making	**K2**
CO3	Enumerate Clipboard Management	**K3**
CO4	Differentiate various controls	**K4**

COURSE CODE: 19PCS3EC4B **COURSE TITLE: MACHINE LEARNING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the theory underlying machine learning	**K1**
CO2	Classify knowledge about Modeling and prediction andbasic feature engineering	**K2**
CO3	Use linear models and non-linear models	**K3**
CO4	Make inferences on algorithm using tree, rule based models and analyze reinforcement learning techniques	**K4**
CO5	Construct algorithms using Python and R	**K5**

COURSE CODE: 19PCS3EC4C **COURSE TITLE: IoT**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Illustrate IoT enabling Technologies	**K3**
CO2	Analyze applications of IoT in real time scenario	**K4**
CO3	Design a portable IoT using Raspberry pi / equivalentboards and relevant protocols	**K5**

COURSE CODE: 19PCS4CC9 **COURSE TITLE: CLOUD COMPUTING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain the cloud paradigm and its various forms of services	**K3**
CO2	Illustrate the architecture, infrastructure and delivery models	**K3**
CO3	Apply suitable virtualization concepts	**K4**
CO4	Solve problems using cloud toolkit	**K4**
CO5	Create interactive mobile services	**K5**

COURSE CODE: 19PCS4CC10 COURSE TITLE: DIGITAL IMAGE PROCESSING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the fundamentals concepts of digital image processing and image transforms	**K2**
CO2	Analyze images in the frequency domain using various transforms	**K4**
CO3	Evaluate the techniques for image enhancement and image restoration	**K5**
CO4	Interpret image segmentation techniques	**K3**
CO5	Compare various compression techniques	**K4**
CO 6	Apply image processing algorithms in practical applications	**K3**

COURSE CODE: 19PCS4CC4P COURSE TITLE: FOSS LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Ability to install and run open-source operating systems	**K1**
CO2	Explain open source project structure and how to successfully setup a project	**K2**
CO3	Ability to contribute software to and interact withFree and Open Source Software development projects	**K3**
CO4	Exploring the Hadoop Distributed File System (HDFS)	**K3**

COURSE CODE: 19PCS4EC5A COURSE TITLE: WIRELESS SENSOR NETWORKS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Define the wireless sensor, various platforms and its issues	**K1**
CO2	Review the various deployment mechanisms	**K2**
CO3	Construct the MAC layer and its issues	**K3**
CO4	Differentiate architectures, functions and performance of wireless sensor networks systemsand its platforms	**K4**
CO5	Propose various Routing Protocols	**K5**

CRITERION I **POs and COs**

COURSE CODE: 19PCS4EC5B **COURSE TITLE: MANET**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	State the adhoc networks, characteristics and its features	**K1**
CO2	Review the protocol design issues of adhoc networks	**K2**
CO3	Examine the transport layer issues	**K3**
CO4	Compare QoS related performance measurements of ad hocand sensor networks	**K4**

COURSE CODE: 19PCS4EC5C **COURSE TITLE: MOBILE COMPUTING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Illustrate the concepts of Multiplexing, GSM Architecture and its Protocols	**K3**
CO2	Analyze Messaging and Location based services	**K4**
CO3	Categorize Activities, Fragments, Intents & Views	**K5**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 12:00:04

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2021-2022 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

M. Sc-Computer Science

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of M. Sc Computer Science Programme, the students will be able to
PO1	Ability to identify, formulate and develop solutions for computational challenges
PO2	Inculcate broad knowledge in core areas of Computer Science and emerging technologies in IT
PO3	Develop Analytical and Technical skills to enhance employment potential
PO4	Capable of integrating knowledge and to provide a gateway for research

COURSE OUTCOMES (COs)

COURSE CODE: 19PCS1CC1 **COURSE TITLE: MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain the concepts of Permutation	**K2**
CO2	Apply the concepts of connectives, theory of inference for the statement calculus and fuzzy set theory	**K3**
CO3	Examine basic terminologies in graph to draw various kindsof graphs	**K4**
CO4	Differentiate the theory of Boolean Algebra and Lattices	**K4**
CO5	Develop the concepts of trees	**K6**

CRITERION I **POs and COs**

COURSE CODE: 19PCS1CC2 **COURSE TITLE: DESIGN AND ANALYSIS OF ALGORITHMS**		
CO Number	**CO Statement**	**Knowledge level**
CO1	Design algorithms for various computing problems.	**K3**
CO2	Analyze the time and space complexity of algorithms.	**K4**
CO3	Critically analyze the different algorithm design techniques for agiven problem	**K5**
CO4	Assess/Compare the efficiency of the algorithm	**K6**

COURSE CODE: 19PCS1CC3 **COURSE TITLE: WEB TECHNOLOGIES**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the processing of XML Data with Java	**K2**
CO2	Apply suitable scripting languages for Client side and Server side programming	**K3**
CO3	Analyze the basics involved in publishing content on the World Wide web	**K4**
CO4	Assess oneself to get employment with this practical hands on training.	**K6**

COURSE CODE: 19PCS1CC1P **COURSE TITLE: WEB TECHNOLOGIES LAB**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recognize the usage of HTML Tags	**K2**
CO2	Demonstrate the usage of Java Script	**K3**
CO3	Experiment the client/server application using RMI	**K4**
CO4	Develop web application using XML, Servlet	**K5**

COURSE CODE: 19PCS1CC4 COURSE TITLE: DISTRIBUTED OPERATING SYSTEM		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the architecture of DSM	**K2**
CO2	Determine the difficulties of distributed memory management	**K3**
CO3	Compare centralized and distributed system	**K4**
CO4	Predict effective synchronization techniques to beperformed to run a task in a distributed system	**K6**

COURSE CODE: 19PCS2CC5 COURSE TITLE: DATA MINING AND WAREHOUSING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Recognize basic concepts of data mining	**K2**
CO2	Review data mining techniques like classifications, clustering, association rule mining, prediction and related algorithm	**K3**
CO3	Assess the methods and techniques appropriate for the task	**K5**

COURSE CODE: 19PCS2CC2P COURSE TITLE: DATA MININGLAB AND MATLAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Demonstrate the features of data mining tools	**K3**
CO2	Analyze the performance of various classification andclustering algorithm	**K4**
CO3	Interpret Regression techniques using MATLAB	**K6**
CO4	Apply Basic graphic applications in MATLAB	**K3**

COURSE CODE: 19PCS2CC6 COURSE TITLE: ARTIFICIAL INTELLIGENCE		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Apply the basic knowledge representation and learningmethods	**K3**
CO2	Examine techniques for handling incomplete and uncertainmodels	**K4**
CO3	Formulate a system for solving a particular problem	**K5**

CRITERION I **POs and COs**

COURSE CODE: 19PCS2EC1A **COURSE TITLE: NETWORKSECURITY**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand cryptography, network security concepts withits applications	**K2**
CO2	Apply security principle in system design	**K3**
CO3	Analyze network security protocols	**K4**
CO4	Detect network security threat	**K5**
CO5	Design the code to implement a cryptographic algorithm	**K6**

COURSE CODE: 19PCS2EC1B **COURSE TITLE: SOFT COMPUTING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the concepts of soft computing and their applications	**K1**
CO2	Discuss supervised and unsupervised learning in neuralnetworks	**K2**
CO3	Apply soft computing techniques for small applications	**K3**
CO4	Analyze various soft computing techniques suitable forreal time	**K4**

COURSE CODE: 19PCS2EC1C **COURSE TITLE: ADVANCED COMPUTER ARCHITECTURE**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Review Instruction level parallelism	**K2**
CO2	Analyze the Performance of different level parallelismtechniques	**K4**
CO3	Manage Cache and Memory Related Issues in Multi-Processors	**K5**

CRITERION I **POs and COs**

COURSE CODE: 19PCS2EC2A **COURSE TITLE: BIOINFORMATICS**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Define molecular biology and bioinformatics applications	**K1**
CO2	Discuss the sequences using data analysis tool	**K2**
CO3	Sketch the data mining and pattern matching tools	**K3**
CO4	Summarize the molecular modeling and simulation technologies and software that are used to study a wide range of molecular phenomena in biology and medicine	**K5**
CO5	Interpret the BLAST and FASTA algorithms to find the similarity between protein and DNA sequences.	**K6**

COURSE CODE: 19PCS2EC2B **COURSE TITLE: ADVANCED DATABASE SYSTEM**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the concepts of parallel database andquery	**K2**
CO2	Apply distributed transaction and concurrency control	**K3**
CO3	Test various queries ORDBMS and OODBMS	**K4**
CO4	Combine Advanced databases like Spatial and XMLdatabases for handling data	**K5**
CO5	Deduct applications with Map Reduce concept	**K6**

COURSE CODE: 19PCS2EC2C **COURSE TITLE: SOFTWARE PROJECT MANAGEMENT**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Discuss software development project plans	**K2**
CO2	Apply schedule and cost techniques to determine a basis of estimate	**K3**
CO3	Differentiate software life cycle support and the role of thesoftware engineering supervisor	**K4**
CO4	Formulate software project management practices within an organization and recommend practical improvements based upon evaluation.	**K5**

COURSE CODE: 19PCS3CC7 COURSE TITLE: COMPUTER SCIENCE FOR COMPETITIVE EXAMINATIONS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain concepts of computer science core subjects	**K2**
CO2	Apply the knowledge to solve various types of problems	**K3**
CO3	Examine various computer science concepts on real time applications	**K4**
CO4	Develop a scientific aptitude and sense of reasoning	**K5**

COURSE CODE: 19PCS3CC8 COURSE TITLE: BIG DATA ANALYTICS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the fundamentals of Bigdata analytics	**K2**
CO2	Describe the Hadoop architecture and File system	**K2**
CO3	Apply the MapReduce Programming model for real-world problems	**K3**
CO4	Explore the concepts of NoSQL databases	**K4**
CO5	Develop a complete business data analytics solution	**K6**

COURSE CODE: 19PCS3CC3P COURSE TITLE: PYTHON AND R LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Write and debug simple Python programs with loopsand conditions	**K3**
CO2	Use Python lists, tuples, dictionaries for representingcompound data and apply file concept in Python	**K4**
CO3	Construct Python programs step-wise by definingfunctions and calling them	**K5**
CO4	Create a data frame and exporting data into various fileformats in R.	**K5**
CO5	Apply Machine Learning algorithm in R	**K3**

COURSE CODE: 19PCS3EC3A COURSE TITLE: BLOCKCHAIN		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Define blockchain, types, applications &limitations	**K1**
CO2	Explore blockchain, cryptography concepts	**K2**
CO3	Enumerate bitcoin and other alternatives	**K3**
CO4	Differentiate various contracts	**K4**
CO5	Propose IoT in various sectors	**K5**

COURSE CODE: 19PCS3EC3B COURSE TITLE: PARALLEL PROCESSING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Discuss the concepts of parallel processing including various kinds of system architectures	**K2**
CO2	Illustrate the issues and techniques in improving performance of SIMD Computers	**K3**
CO3	Compare the pipeline and parallel concepts	**K4**
CO4	Categorize the Multiprocessor systems, cache coherence and Interconnection networks	**K5**

COURSE CODE: 19PCS3EC3C COURSE TITLE: COMPILER DESIGN		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Construct grammars and automata for regular language	**K3**
CO2	Analyze the knowledge of patterns, tokens & regularexpressions for solving a problem	**K4**
CO3	Develop new code optimization techniques for improvingthe performance of a program in terms of speed & space	**K5**
CO4	Predict symbol table and generate intermediate code	**K6**

CRITERION I **POs and COs**

COURSE CODE: 19PCS3EC4A **COURSE TITLE: ROBOTIC PROCESS AUTOMATION**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Learn Robotic Process Automation and its Features	**K1**
CO2	Explore Control Flow and Decision Making	**K2**
CO3	Enumerate Clipboard Management	**K3**
CO4	Differentiate various controls	**K4**

COURSE CODE: 19PCS3EC4B **COURSE TITLE: MACHINE LEARNING**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the theory underlying machine learning	**K1**
CO2	Classify knowledge about Modeling and prediction andbasic feature engineering	**K2**
CO3	Use linear models and non-linear models	**K3**
CO4	Make inferences on algorithm using tree, rule-based models and analyze reinforcement learning techniques	**K4**
CO5	Construct algorithms using Python and R	**K5**

COURSE CODE: 19PCS3EC4C **COURSE TITLE: IoT**		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Illustrate IoT enabling Technologies	**K3**
CO2	Analyze applications of IoT in real time scenario	**K4**
CO3	Design a portable IoT using Raspberry pi / equivalentboards and relevant protocols	**K5**

COURSE CODE: 19PCS4CC9 COURSE TITLE: CLOUD COMPUTING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Explain the cloud paradigm and its various forms of services	**K3**
CO2	Illustrate the architecture, infrastructure and delivery models	**K3**
CO3	Apply suitable virtualization concepts	**K4**
CO4	Solve problems using cloud toolkit	**K4**
CO5	Create interactive mobile services	**K5**

COURSE CODE: 19PCS4CC10 COURSE TITLE: DIGITAL IMAGE PROCESSING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the fundamentals concepts of digital image processing and image transforms	**K2**
CO2	Analyze images in the frequency domain using various transforms	**K4**
CO3	Evaluate the techniques for image enhancement and image restoration	**K5**
CO4	Interpret image segmentation techniques	**K3**
CO5	Compare various compression techniques	**K4**
CO6	Apply image processing algorithms in practical applications	**K3**

COURSE CODE: 19PCS4CC4P COURSE TITLE: FOSS LAB		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Ability to install and run open-source operating systems	**K1**
CO2	Explain open source project structure and how to successfully setup a project	**K2**
CO3	Ability to contribute software to and interact withFree an Open Source Software development projects	**K3**
CO4	Exploring the Hadoop Distributed File System (HDFS)	**K3**

COURSE CODE: 19PCS4EC5A COURSE TITLE: WIRELESS SENSOR NETWORKS		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Define the wireless sensor, various platforms and its issues	**K1**
CO2	Review the various deployment mechanisms	**K2**
CO3	Construct the MAC layer and its issues	**K3**
CO4	Differentiate architectures, functions and performance of wireless sensor networks systemsand its platforms	**K4**
CO5	Propose various Routing Protocols	**K5**

COURSE CODE: 19PCS4EC5B COURSE TITLE: MANET		
CO Number	**CO Statement**	**Knowledge Level**
CO1	State the adhoc networks, characteristics and its features	**K1**
CO2	Review the protocol design issues of adhoc networks	**K2**
CO3	Examine the transport layer issues	**K3**
CO4	Compare QoS related performance measurements of ad hocand sensor networks	**K4**

COURSE CODE: 19PCS4EC5C COURSE TITLE: MOBILE COMPUTING		
CO Number	**CO Statement**	**Knowledge Level**
CO1	Illustrate the concepts of Multiplexing, GSM Architecture and its Protocols	**K3**
CO2	Analyze Messaging and Location based services	**K4**
CO3	Categorize Activities, Fragments, Intents & Views	**K5**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 12:00:03

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2022-2023 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

M. Sc-Computer Science

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovativelearning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture thespirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenarioand gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development ofthe nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contextsand demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES (POs)

PO NO.	Programme Outcome On completion of M.Sc., Computer Science the students will be able to,
PO1	**DOMAIN KNOWLEDGE** Acquire the in-depth computing knowledge both conceptual and applied pertaining tothe core discipline
PO2	**PROBLEM SOLVING** Procure knowledge-based skills to satisfy the needs of society and the industry byproviding hands on experience of various technologies in Computer Science
PO 3	**INNOVATION AND CRITICAL THINKING** Critically evaluate global issues, recognize the need and identify sustainable solutionsthrough research capabilities towards Nation building initiatives
PO 4	**LIFE LONG LEARNING** Capable of upgrading and advancing knowledge through innovation and technology asevidenced by current developments
PO 5	**LEADERSHIP AND TEAMWORK** Work in collaborative environment through applications of scientific reasoning andcommunicate effectively to the stakeholders

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO NO.	Programme Specific Outcomes Students of M. Sc Computer Science will be able to,	POs Addressed
PSO1	Identify, formulate and develop solutions for computational challenges	PO1 PO2
PSO2	Inculcate broad knowledge in core areas of Computer Science and emerging technologies in related domains	PO1 PO2
PSO3	Integrate computing knowledge on crafting innovative solutions andto provide a gateway for research.	PO2 PO3 PO4
PSO4	Develop analytical and technical skills to enhance employment potential and entrepreneurship	PO3 PO4 PO5
PSO5	Imbibe professional and ethical skills to become a competent citizen for the betterment of society	PO3 PO4 PO5

COURSE OUTCOMES (COs)

COURSE CODE: 22PCS1CC1 COURSE TITLE: MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Define the various concepts in Discrete Mathematics and Fuzzy Set Theory.	**K1**
CO2	Understand the different terminologies of Discrete Mathematics and Fuzzy set theory.	**K2**
CO3	Analyze the problems in different aspects and give solutions in their respective streams.	**K3**
CO4	Examine some methodologies for the related area in an effective manner.	**K4**
CO5	Apply the notions to distinct problems and get solutions in a easy way.	**K5**

COURSE CODE: 22PCS1CC2 COURSE TITLE: WEB TECHNOLOGIES		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall, Understand and Analyze the fundamentals of web application and web services	**K1, K2, K3**
CO2	Determine the essential elements and the attributes to design a web page	**K3, K5, K6**
CO3	Identify and Apply appropriate Client Side and Server Side programming for creating interactive web design	**K3, K5**
CO4	Examine and recommend a solution to complexproblems using appropriate method, technologies and web services	**K4, K5**
CO5	Create and deploy real time web applications in web servers	**K6**

COURSE CODE: 22PCS1CC3 COURSE TITLE: MACHINE LEARNING TECHNIQUES		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recognize and Understand the rudiments of MachineLearning	**K1, K2**
CO2	Examine and Infer the hypothesis, limitations of MachineLearning methods	**K2, K4**
CO3	Identify, Analyze and Interpret various Learning algorithms	**K3, K4, K5**
CO4	Apply and Evaluate the solutions of various MachineLearning techniques	**K4, K5**
CO5	Assess, Distinguish and Determine the Machine Learningtechniques for Real-world applications	**K3, K4, K5**

COURSE CODE: 22PCS1CC1P COURSE TITLE: WEB TECHNOLOGIES (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	List and Illustrate the usage of HTML Tags	**K1, K2**
CO2	Demonstrate and make use of Java Script in webapplications	**K2, K3**
CO3	Apply and compare JSP tags to create a web page	**K3, K4**
CO4	Examine and Evaluate the client/server application usingRMI	**K4, K5**
CO5	Interpret and Develop web application using Servlet	**K5, K6**

COURSE CODE: 22PCS1DSE1A COURSE TITLE: ADVANCED COMPUTER ARCHITECTURE		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Remember and Understand the computer architecture	**K1, K2**
CO2	Interpret and Experiment with different pipelined processor	**K2, K3, K5**
CO3	Organize and Analyze the architectural features of advanced processors	**K3, K4**
CO4	Examine and Evaluate the cache and memoryrelated issues in multiprocessors	**K4, K5**
CO5	Assess the historical and current developments in computer architecture andadopt to the needs	**K5, K6**

COURSE CODE: 22PCS1DSE1B COURSE TITLE: ADVANCEDDATABASE SYSTEM		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Remember and Understand the concepts of databases	**K1, K2**
CO2	Demonstrate and make use of different kinds of databases	**K2, K3**
CO3	Identify and analyze databases for real life applications	**K3, K4**
CO4	Compare and evaluate the performance of databases based on its transaction and concurrency control feature	**K4, K5**
CO5	Interpret and develop parallel, distributed, object orientedand advanced databases for handling real time data	**K5, K6**

COURSE CODE: 22PCS1DSE1C COURSE TITLE: SOFTWARE TESTING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Remember and Understand testing approaches for the software	**K1, K2**
CO2	Compare and Identify the testing strategies to be used for efficient software construction	**K2, K3, K4**
CO3	Identify and Inspect the quality factors and best practices in various testing	**K3, K4**
CO4	Examine and explain the different phases of testing for the software development	**K4, K5**
CO5	Analyze and Interpret the tools for software testing	**K4, K5**

COURSE CODE: 22PCS2CC4 COURSE TITLE: DATA MINING AND WAREHOUSING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recognize the basic concepts and functionality of data miningand warehousing.	**K1, K2**
CO2	Identify and Choose appropriate data mining techniques	**K2, K3**
CO3	Apply and Analyse the suitable solution to the problem	**K3, K4**
CO4	Build and Justify the results produced by data mining	**K3, K5**
CO5	Categorize and evaluate skills in selecting the appropriate datamining algorithm for solving practical problems	**K4, K5**

COURSE CODE: 22PCS2CC5 COURSE TITLE: DESIGN AND ANALYSIS OF ALGORITHMS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand & Identify the suitable data structures and Design algorithms for various computing problems.	**K1, K2, K3**
CO2	Explain the algorithm design technique & demonstrate the complexity of algorithms.	**K2, K3, K4**
CO3	Analyze the different algorithm design techniques for a given problem and time & space complexity of the algorithm	**K3, K4, K5**
CO4	Assess and Compare the efficiency of the algorithm	**K4, K5**
CO5	Determine and Recommend the suitable algorithmic design techniques for a given problem	**K3, K4, K5**

COURSE CODE: 22PCS2CCC1A COURSE TITLE: MOBILE COMPUTING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Define and Outline the Mobile Computing frameworks	**K1, K2**
CO2	Demonstrate the network concepts and Identify Routing protocols	**K2, K3**
CO3	Identify and Analyze the basics of Android Programming	**K3, K4**
CO4	Examine and Assess the Interfaces for the Android platform	**K4, K5**
CO5	Explain and Build the key Android programming concepts	**K5, K6**

COURSE CODE: 22PCS2CCC1B COURSE TITLE: WIRELESS SENSOR NETWORKS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	List and Summarize the applications, challenges of wireless sensornetworks	**K1, K2**
CO2	Interpret and Make use of the architecture for the wireless networks	**K2, K3**
CO3	Apply and Correlate the concepts in sensor networking	**K3, K4**
CO4	Categorize and compare the different routing protocols	**K4, K5**
CO5	Evaluate and Conclude the QoS in wireless networks	**K5**

CRITERION I **POs and COs**

COURSE CODE: 22PCS2CCC1C **COURSE TITLE: MANET**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall and Understand the fundamentals of Mobile ad-hoc Networks.	**K1, K2**
CO2	Identify and analyze the current features of MANET and WSN	**K3, K4**
CO3	Determine and Classify the functions of various routing protocols and their implications	**K3, K4**
CO4	Identify the issues of architecture and its protocol, and Design solutions to overcome the issues	**K3, K5**
CO5	Discriminate the current trends in MANETs and WSNs from industry and research point of views.	**K5**

COURSE CODE: 22PCS2CC2P **COURSE TITLE: DATA MINING (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Interpret on data insights to evaluate preprocessing techniques	**K2**
CO2	Identify various algorithms used in information analysis of data mining Techniques	**K3**
CO3	Evaluate the performance of various data mining algorithms	**K5**
CO4	Visualize the results produced by data mining techniques	**K6**
CO5	Formulate library functions of Python and R	**K6**

COURSE CODE: 22PCS2DSE2A **COURSE TITLE: CRYPTOGRAPHY AND NETWORK SECURITY**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand and state the Network security concepts	**K1, K2**
CO2	Classify and apply network security principles	**K2, K3**
CO3	Interpret and analyze network security protocols	**K3, K4**
CO4	Examine and Defend network security threat	**K4, K5**
CO5	Interpret with various network security applications	**K5**

COURSE CODE: 22PCS2DSE2B COURSE TITLE: BLOCKCHAIN AND CRYPTOCURRENCIES		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the various technologies and its business use	**K1**
CO2	Summarize the blockchain applications in a structured manner	**K2**
CO3	Make use of the modern concepts of blockchain technology	**K3**
CO4	Compare the modern currencies	**K4**
CO5	Interpret the applications in real world scenario	**K5**

COURSE CODE: 22PCS2DSE2C COURSE TITLE: ETHICAL HACKING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall and Understand the vulnerabilities in hacking	**K1, K2**
CO2	Analyze and apply testing for security	**K3, K4**
CO3	Plan and Execute vulnerability assessment test for a network	**K4, K5**
CO4	Assess the various kinds of standard attacks	**K5**
CO5	Determine the target system vulnerability and make use of penetration test using standard hacking methods in an ethical manner	**K5**

COURSE CODE: 22PCS3CC6 COURSE TITLE: COMPILER DESIGN		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the structure of compiler, applications of finite automata, regular expressions, Grammar and identify the significance of different phases of the compiler.	**K1, K2**
CO2	Demonstrate the construction of finite automaton, various parsing, intermediate, target code generation and code optimization techniques.	**K2**
CO3	Construct the finite automaton, various parsing tables and develop intermediate and target code by using storage allocation strategies.	**K3, K4**
CO4	Analyze and explain the relationship among the phases of compiler, variousparsingand code optimizationtechniques	**K4, K5**
CO5	Assess and Recommend tools, methods, and techniques tobuild compiler	**K4, K5**

COURSE CODE: 22PCS3CC7 COURSE TITLE: CLOUD COMPUTING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand and discuss the fundamentals of various cloudmodels	**K1, K2**
CO2	Determine the applications and the architectures of cloud	**K3, K5**
CO3	Identify and Examine services and appropriate virtualization concepts	**K3, K4**
CO4	Explore and recommend cloud solutions for mobile cloudand mobile web services	**K4, K5**
CO5	Justify and enhance real time cloud applications to itsappropriate environment	**K5, K6**

COURSE CODE: 22PGCS3CCC2A COURSE TITLE: CYBER SECURITY		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the cyber security threat landscape	**K1,K2**
CO2	Develop a deeper understanding and familiarity with various types, cyber crimes, vulnerabilities, and remediesthereto.	**K2, K3**
CO3	Analyse and evaluate existing legal frameworks and lawson cyber security.	**K4, k5**
CO4	Analyse and evaluate the digital payment system securityand remedial measures.	**K4, K5**
CO5	Analyse and evaluate the cyber security risks, plan suitablesecurity controls	**K4, k5**

COURSE CODE: 22PCS3CCC2B COURSE TITLE: IoT		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand and Describe the basic concepts of IoT	**K1,K2**
CO2	Apply and Analyze the IoT based sensor systems	**K3,K4**
CO3	Illustrate and Analyze the various IoT enabling Technologies	**K3,K4**
CO4	Design and Evaluate portable IoT using Raspberry /equivalent boards	**K4,K5**
CO5	Create and Design real time applications	**K5,K6**

COURSE CODE: 22PCS3CCC2C COURSE TITLE: NATURAL LANGUAGE PROCESSING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand how key concepts from NLP and linguistics areused to describe and analyze language	**K1, K2, K4**
CO2	Identify the suitable data structures and algorithms used inNLP	**K3**
CO3	Analyze data stored in standard formats	**K4**
CO4	Analyze and compare the methods and algorithms used to process different types of textual data	**K4, K5**
CO5	Formulate how to extract grammatical features and to know the basics of first order logic and propositional logic	**K6**

COURSE CODE: 22PCS3CC3P COURSE TITLE: CLOUD COMPUTING (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	List and illustrate the usage of Python and HTML Tags in web applications	**K1, K2**
CO2	Demonstrate and make use of Google App Engine (GAE) in web applications	**K2, K3**
CO3	Apply and Compare python for cloud-based applications	**K3, K4**
CO4	Examine and evaluate the web applications with CloudSim	**K4, K5**
CO5	Interpret and Develop web application using Hadoop	**K5, K6**

COURSE CODE: 22PCS3DSE3A COURSE TITLE: COMPUTER SCIENCE FOR COMPETITIVE EXAMINATIONS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Explain concepts of computer science core subjects	**K2**
CO2	Apply the knowledge to solve various types of problems	**K3**
CO3	Examine various computer science concepts on real time applications	**K4**
CO4	Develop a scientific aptitude and sense of reasoning	**K6**
CO5	Develop students with professional and ethical attitude	**K6**

COURSE CODE: 22PCS3DSE3BP COURSE TITLE: IoT (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the basic concepts of IoT	**K2**
CO2	Design Embedded platforms in IoT using Microprocessor	**K3**
CO3	Apply wireless peripherals for exchange of data.	**K4**
CO4	Apply Cloud Platform to Upload and Analyze the Sensor Data	**K5**
CO5	Deploy simple application of IoT for Realtime	**K6**

COURSE CODE: 22PCS3DSE3CP COURSE TITLE: NATURAL LANGUAGE PROCESSING (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand NLP pipeline	**K2**
CO2	Apply different Machine translation techniques fortranslating a source to target language(s)	**K3**
CO3	Analyze and compare the methods and algorithms used toprocess different types of textual data	**K4, K5**
CO4	Determine the concepts of morphology, syntactic analysis, semantic interpretation and pragmatics of the language, and understanding them to apply in different research areas	**K5**
CO5	Design an innovative application using NLP components	**K6**

COURSE CODE: 22PCS3GEC1P COURSE TITLE: DATA ANALYSIS (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall and understand the different types of data analysisand their use cases	**K1, K2**
CO2	Apply Exploratory Data Analysis on a real-world dataset	**K3**
CO3	Analyze the various methods and functions in Excel	**K4**
CO4	Compare and recommend external libraries in Python for analysing the data	**K4, K5**
CO5	Create powerful and dynamic Excel dashboard	**K6**

COURSE CODE: 22PCS4CC8 COURSE TITLE: BIG DATA ANALYTICS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the fundamentals of Big data analytics	**K2**
CO2	Describe the Hadoop architecture and Filesystem	**K2**
CO3	Apply the MapReduce Programming model for real-world problems	**K3**
CO4	Explore the concepts of NoSQL databases	**K4**
CO5	Design and assess a complete business data analytics solution	**K5,K6**

COURSE CODE: 22PCS4CCC3A COURSE TITLE: ROBOTIC PROCESS AUTOMATION		
CO Number	**CO Statement**	**Cognitive Level**
CO1	List and Interpret RPA, where it can be applied	**K1,K2**
CO2	Explain and identify the usage of AI	**K2,K3**
CO3	Make use of and distinguish the process and its automation	**K3,K4**
CO4	Compare and evaluate the bots	**K4,K5**
CO5	Assess the RPA and its use cases in various domains	**K5**

COURSE CODE: 22PCS4CCC3B COURSE TITLE: VIRTUAL AND AUGMENTED REALITY		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand and Identify the fundamental Computer Vision, Computer Graphics and Human - Computer Interaction Techniques related to VR/AR	**K1,K2**
CO2	Interpret and Analyze various Geometric Modeling Techniques	**K2,K3**
CO3	Apply and Analyze the Virtual Environment	**K3,K4**
CO4	Analyze the VR/AR Technologies	**K4,K5**
CO5	Examine the VR/AR Technologies on real time applications	**K5**

CRITERION I **POs and COs**

COURSE CODE: 22PCS4CCC3C **COURSE TITLE: DIGITAL IMAGE PROCESSING**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall and understand the algorithmic approach to illustrate the concepts of image processing	**K1, K2**
CO2	Understand the fundamental to the processing of digital images for specific tasks	**K2**
CO3	Solve real world problems by using digital image processing	**K3**
CO4	Analyze the images by using fundamental and advanced aspects of image processing	**K4**
CO5	Develop and evaluate the simplified tools for image processing	**K5, K6**

COURSE CODE: 22PCS4CC4P **COURSE TITLE: FOSS (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Ability to install and run open-source operating systems	**K1**
CO2	Explain open source project structure and how to successfully setup a project	**K2**
CO3	Use Github for Software development projects	**K3**
CO4	Analyze various FOSS options for any software requirement	**K4**
CO5	Develop and testing an applications using open source code	**K5, K6**

COURSE CODE: 22PCS4GEC2P **COURSE TITLE: ANIMATION (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the basic concepts behind animation	**K2**
CO2	Develop an animated movie	**K3**
CO3	Analyze the tools and techniques to create 2D and 3D animation	**K4**
CO4	Recommend the suitable methods available to create, render, and present images with professional quality	**K5**
CO5	Create simple shapes and videos using animation editing software	**K6**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 12:00:04

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2023-2024 Onwards)

DEPARTMENT OF COMPUTER SCIENCE

M. Sc-Computer Science

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovativelearning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture thespirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenarioand gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development ofthe nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contextsand demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES (POs)

PO NO.	Programme Outcome On completion of M.Sc., Computer Science the students will be able to,
PO1	**DOMAIN KNOWLEDGE** Acquire the in-depth computing knowledge both conceptual and applied pertaining tothe core discipline
PO2	**PROBLEM SOLVING** Procure knowledge-based skills to satisfy the needs of society and the industry byproviding hands on experience of various technologies in Computer Science
PO3	**INNOVATION AND CRITICAL THINKING** Critically evaluate global issues, recognize the need and identify sustainable solutionsthrough research capabilities towards Nation building initiatives
PO4	**LIFE LONG LEARNING** Capable of upgrading and advancing knowledge through innovation and technology asevidenced by current developments
PO5	**LEADERSHIP AND TEAMWORK** Work in collaborative environment through applications of scientific reasoning andcommunicate effectively to the stakeholders

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO NO.	Programme Specific Outcomes Students of M.Sc Computer Science will be able to,	POs Addressed
PSO1	Identify, formulate and develop solutions for computational challenges	PO1 PO2
PSO2	Inculcate broad knowledge in core areas of Computer Science andemerging technologies in related domains	PO1 PO2
PSO3	Integrate computing knowledge on crafting innovative solutions andto provide a gateway for research.	PO2 PO3 PO4
PSO4	Develop analytical and technical skills to enhance employment potential and entrepreneurship	PO3 PO4 PO5
PSO5	Imbibe professional and ethical skills to become a competent citizenfor the betterment of society	PO3 PO4 PO5

COURSE OUTCOMES (COs)

COURSE CODE: 23PCS1CC1 COURSE TITLE: ANALYSIS & DESIGN OF ALGORITHMS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Get knowledge about algorithms and determine their time complexity	**K1**
CO2	Demonstrate specific search and sort algorithms using divide and conquer technique	**K2**
CO3	Apply different methods to analyze the algorithm performance	**K3**
CO4	Compare the concept of various algorithm technique	**K4**
CO5	Explore the algorithm technique on Real time applications	**K5**

COURSE CODE: 23PCS1CC2 COURSE TITLE: OBJECT ORIENTED ANALYSIS AND DESIGN &C++		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the concept of Object-Oriented development and modeling techniques	**K1, K2**
CO2	Gain knowledge about the various steps performed during object design	**K2, K3**
CO3	Abstract object-based views for generic software systems	**K3**
CO4	Link OOAD with C++ language	**K4, K5**
CO5	Apply the basic concepts of OOPs and familiarize to write C++ program	**K5, K6**

COURSE CODE: 23PCS1CC3 COURSE TITLE: PYTHON PROGRAMMING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall and understand the basic concepts of Python Programming	**K1, K2**
CO2	Understand the fundamental principles of Classes and Objects	**K2**
CO3	Solve real world problems by applying Object Oriented Skills	**K3**
CO4	Analyze the concepts of Python for developing Web applications	**K4**
CO5	Develop and evaluate programs for Client Server Networking applications	**K5, K6**

CRITERION I **POs and COs**

COURSE CODE: 23PCS1CC1P **COURSE TITLE: ALGORITHM AND OOPS (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Identify and apply the suitable data structure for the given real world problem	**K2, K3**
CO2	Able to understand and implement OOPS concepts.	**K2, K3**
CO3	Apply the concepts of Stack, Queue, Tree, List using C++	**K3**
CO4	Analyze the concepts of sorting and searching algorithms using relevant data structures.	**K4**
CO5	Interpret and Solve problem involving graphs, trees and heaps	**K6**

COURSE CODE: 23PCS1DSE1A **COURSE TITLE: ADVANCED SOFTWARE ENGINEERING**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand about Software Engineering process	**K1, K2**
CO2	Make use of Software Project Management Skills, Design and Quality Management	**K3**
CO3	Analyze on Software Requirements and Specification	**K4**
CO4	Analyze and Compare Software Testing, Maintenance and Software Re-Engineering	**K4, K5**
CO5	Design and conduct various types and levels of software quality or a software project	**K5, K6**

COURSE CODE: 23PCS1DSE1B **COURSE TITLE: ADVANCED COMPUTER ARCHITECTURE**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Remember and Understand the computer architecture	**K1, K2**
CO2	Interpret and Experiment with different pipelined processor	**K2, K3, K5**
CO3	Organize and Analyze the architectural features of advanced processors	**K3, K4**
CO4	Examine and Evaluate the cache and memory related issues in multiprocessors	**K4, K5**
CO5	Assess the historical and current developments in computer architecture and adopt to the needs	**K5, K6**

CRITERION I **POs and COs**

COURSE CODE: 23PCS1DSE1C **COURSE TITLE: ADVANCED DATABASE SYSTEMS**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Remember and understand the concepts of databases	**K1, K2**
CO2	Demonstrate and make use of different kinds of databases	**K2, K3**
CO3	Identify and analyze databases for real life applications	**K3, K4**
CO4	Compare and evaluate the performance of databases based on its transaction and concurrency control feature	**K4, K5**
CO5	Interpret and develop parallel, distributed, object oriented And advanced databases for handling real time data	**K5, K6**

COURSE CODE: 22PCS2CC4 **COURSE TITLE: DATA MINING AND WAREHOUSING**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recognize the basic concepts and functionality of data mining and warehousing.	**K1, K2**
CO2	Identify and choose appropriate data mining techniques	**K2, K3**
CO3	Apply and analyse the suitable solution to the problem	**K3, K4**
CO4	Build and justify the results produced by data mining	**K3, K5**
CO5	Categorize and evaluate skills in selecting the appropriate data mining algorithm for solving practical problems	**K4, K5**

COURSE CODE: 22PCS3CC6 /23PCS2CC5 **COURSE TITLE: COMPILER DESIGN**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the structure of compiler, applications of finite automata, regular expressions, Grammar and identify the significance of different phases of the compiler.	**K1, K2**
CO2	Demonstrate the construction of finite automaton, various parsing, intermediate, target code generation and code optimization techniques.	**K2**
CO3	Construct the finite automaton, various parsing tables and develop intermediate and target code by using storage Allocation strategies.	**K3, K4**
CO4	Analyze and explain the relationship among the phases of compiler, various parsing and code optimization techniques	**K4, K5**
CO5	Assess and Recommend tools, methods, and techniques to build compiler	**K4, K5**

COURSE CODE: 22PCS2CCC1A COURSE TITLE: MOBILE COMPUTING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Define and Outline the Mobile Computing frameworks	**K1, K2**
CO2	Demonstrate the network concepts and Identify Routing protocols	**K2, K3**
CO3	Identify and Analyze the basics of Android Programming	**K3, K4**
CO4	Examine and Assess the Interfaces for the Android platform	**K4, K5**
CO5	Explain and Build the key Android programming concepts	**K5, K6**

COURSE CODE: 22PCS2CCC1B COURSE TITLE: WIRELESS SENSOR NETWORKS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	List and Summarize the applications, challenges of wireless sensornetworks	**K1, K2**
CO2	Interpret and Make use of the architecture for the wireless networks	**K2, K3**
CO3	Apply and Correlate the concepts in sensor networking	**K3, K4**
CO4	Categorize and compare the different routing protocols	**K4, K5**
CO5	Evaluate and Conclude the QoS in wireless networks	**K5**

COURSE CODE: 22PCS2CCC1C COURSE TITLE: MANET		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall and Understand the fundamentals of Mobile ad-hoc Networks.	**K1, K2**
CO2	Identify and analyze the current features of MANET and WSN	**K3, K4**
CO3	Determine and Classify the functions of various routing protocols and their implications	**K3, K4**
CO4	Identify the issues of architecture and its protocol, and Design solutions to overcome the issues	**K3, K5**
CO5	Discriminate the current trends in MANETs and WSNs from industry and research point of views.	**K5**

CRITERION I **POs and COs**

COURSE CODE: 22PCS2CC2P **COURSE TITLE: DATA MINING (P)**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Interpret on data insights to evaluate preprocessing techniques	**K2**
CO2	Identify various algorithms used in information analysis of data mining Techniques	**K3**
CO3	Evaluate the performance of various data mining algorithms	**K5**
CO4	Visualize the results produced by data mining techniques	**K6**
CO5	Formulate library functions of Python and R	**K6**

COURSE CODE: 22PCS2DSE2A **COURSE TITLE: CRYPTOGRAPHY AND NETWORK SECURITY**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand and state the Network security concepts	**K1, K2**
CO2	Classify and apply network security principles	**K2, K3**
CO3	Interpret and analyze network security protocols	**K3, K4**
CO4	Examine and Defend network security threat	**K4, K5**
CO5	Interpret with various network security applications	**K5**

COURSE CODE: 22PCS2DSE2B **COURSE TITLE: BLOCKCHAIN AND CRYPTOCURRENCIES**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the various technologies and its business use	**K1**
CO2	Summarize the blockchain applications in a structured manner	**K2**
CO3	Make use of the modern concepts of blockchain technology	**K3**
CO4	Compare the modern currencies	**K4**
CO5	Interpret the applications in real world scenario	**K5**

COURSE CODE: 22PCS2DSE2C **COURSE TITLE: ETHICAL HACKING**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Recall and Understand the vulnerabilities in hacking	**K1, K2**
CO2	Analyze and apply testing for security	**K3, K4**
CO3	Plan and Execute vulnerability assessment test for a network	**K4, K5**
CO4	Assess the various kinds of standard attacks	**K5**
CO5	Determine the target system vulnerability and make use of penetration test using standard hacking methods in an ethical manner	**K5**

CRITERION I **POs and COs**

COURSE CODE: 22PCS3CC6 **COURSE TITLE: COMPILER DESIGN**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the structure of compiler, applications of finite automata, regular expressions, Grammar and identify the significance of different phases of the compiler.	**K1, K2**
CO2	Demonstrate the construction of finite automaton, various parsing, intermediate, target code generation and code optimization techniques.	**K2**
CO3	Construct the finite automaton, various parsing tables and develop intermediate and target code by using storage allocation strategies.	**K3, K4**
CO4	Analyze and explain the relationship among the phases of compiler, variousparsingand code optimizationtechniques	**K4, K5**
CO5	Assess and Recommend tools, methods, and techniques tobuild compiler	**K4, K5**

COURSE CODE: 22PCS3CC7 **COURSE TITLE: CLOUD COMPUTING**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand and discuss the fundamentals of various cloudmodels	**K1, K2**
CO2	Determine the applications and the architectures of cloud	**K3, K5**
CO3	Identify and Examine services and appropriate virtualization concepts	**K3, K4**
CO4	Explore and recommend cloud solutions for mobile cloudand mobile web services	**K4, K5**
CO5	Justify and Enhance real time cloud applications to itsappropriate environment	**K5, K6**

COURSE CODE: 22PGCS3CCC2A **COURSE TITLE: CYBER SECURITY**		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the cyber security threat landscape	**K1,K2**
CO2	Develop a deeper understanding and familiarity with various types, cyber crimes, vulnerabilities, and remediesthereto.	**K2, K3**
CO3	Analyse and evaluate existing legal frameworks and lawson cyber security.	**K4, k5**
CO4	Analyse and evaluate the digital payment system securityand remedial measures.	**K4, K5**
CO5	Analyse and evaluate the cyber security risks, plan suitablesecurity controls	**K4, k5**

COURSE CODE: 22PCS3CCC2B COURSE TITLE: IoT		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand and Describe the basic concepts of IoT	**K1,K2**
CO2	Apply and Analyze the IoT based sensor systems	**K3,K4**
CO3	Illustrate and Analyze the various IoT enabling Technologies	**K3,K4**
CO4	Design and Evaluate portable IoT using Raspberry /equivalent boards	**K4,K5**
CO5	Create and Design real time applications	**K5,K6**

COURSE CODE: 22PCS3CCC2C COURSE TITLE: NATURAL LANGUAGE PROCESSING		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand how key concepts from NLP and linguistics areused to describe and analyze language	**K1, K2,K4**
CO2	Identify the suitable data structures and algorithms used inNLP	**K3**
CO3	Analyze data stored in standard formats	**K4**
CO4	Analyze and compare the methods and algorithms used to process different types of textual data	**K4, K5**
CO5	Formulate how to extract grammatical features and to know the basics of first order logic and propositional logic	**K6**

COURSE CODE: 22PCS3CC3P COURSE TITLE: CLOUD COMPUTING (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	List and illustrate the usage of Python and HTML Tags in web applications	**K1, K2**
CO2	Demonstrate and make use of Google App Engine (GAE) in web applications	**K2, K3**
CO3	Apply and Compare python for cloud-based applications	**K3, K4**
CO4	Examine and Evaluate the web applications with Cloud Sim	**K4, K5**
CO5	Interpret and Develop web application using Hadoop	**K5, K6**

COURSE CODE: 22PCS3DSE3A COURSE TITLE: COMPUTER SCIENCE FOR COMPETITIVE EXAMINATIONS		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Explain concepts of computer science core subjects	**K2**
CO2	Apply the knowledge to solve various types of problems	**K3**
CO3	Examine various computer science concepts on real time applications	**K4**
CO4	Develop a scientific aptitude and sense of reasoning	**K6**
CO5	Develop students with professional and ethical attitude	**K6**

COURSE CODE: 22PCS3DSE3BP COURSE TITLE: IoT (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand the basic concepts of IoT	**K2**
CO2	Design Embedded platforms in IoT using Microprocessor	**K3**
CO3	Apply wireless peripherals for exchange of data.	**K4**
CO4	Apply Cloud Platform to Upload and Analyze the Sensor Data	**K5**
CO5	Deploy simple application of IoT for Realtime	**K6**

COURSE CODE: 22PCS3DSE3CP COURSE TITLE: NATURAL LANGUAGE PROCESSING (P)		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Understand NLP pipeline	**K2**
CO2	Apply different Machine translation techniques fortranslating a source to target language(s)	**K3**
CO3	Analyze and compare the methods and algorithms used toprocess different types of textual data	**K4, K5**
CO4	Determine the concepts of morphology, syntactic analysis, semantic interpretation and pragmatics of the language, and understanding them to apply in different research areas	**K5**
CO5	Design an innovative application using NLP components	**K6**

CRITERION I **POs and COs**

COURSE CODE: 22PCS3GEC1P
COURSE TITLE: DATA ANALYSIS (P)

CO Number	CO Statement	Cognitive Level
CO1	Recall and understand the different types of data analysisand their use cases	**K1, K2**
CO2	Apply Exploratory Data Analysis on a real-world dataset	**K3**
CO3	Analyze the various methods and functions in Excel	**K4**
CO4	Compare and recommend external libraries in Python for analyzing the data	**K4, K5**
CO5	Create powerful and dynamic Excel dashboard	**K6**

COURSE CODE: 22PCS4CC8
COURSE TITLE: BIG DATA ANALYTICS

CO Number	CO Statement	Cognitive Level
CO1	Understand the fundamentals of Big data analytics	**K2**
CO2	Describe the Hadoop architecture and Filesystem	**K2**
CO3	Apply the MapReduce Programming model for real-world problems	**K3**
CO4	Explore the concepts of NoSQL databases	**K4**
CO5	Design and assess a complete business data analytics solution	**K5, K6**

COURSE CODE: 22PCS4CCC3A
COURSE TITLE: ROBOTIC PROCESS AUTOMATION

CO Number	CO Statement	Cognitive Level
CO1	List and Interpret RPA, where it can be applied	**K1,K2**
CO2	Explain and Identify the usage of AI	**K2,K3**
CO3	Make use of and distinguish the process and its automation	**K3,K4**
CO4	Compare and Evaluate the bots	**K4,K5**
CO5	Assess the RPA and its use cases in various domains	**K5**

COURSE CODE: 22PCS4CCC3B
COURSE TITLE: VIRTUAL AND AUGMENTED REALITY

CRITERION I **POs and COs**

CO Number	CO Statement	Cognitive Level
CO1	Understand and Identify the fundamental Computer Vision, Computer Graphics and Human - Computer Interaction Techniques related to VR/AR	K1,K2
CO2	Interpret and Analyze various Geometric Modeling Techniques	K2,K3
CO3	Apply and Analyze the Virtual Environment	K3,K4
CO4	Analyze the VR/AR Technologies	K4,K5
CO5	Examine the VR/AR Technologies on real time applications	K5

COURSE CODE: 22PCS4CCC3C
COURSE TITLE: DIGITAL IMAGE PROCESSING

CO Number	CO Statement	Cognitive Level
CO1	Recall and understand the algorithmic approach to illustrate the concepts of image processing	K1, K2
CO2	Understand the fundamental to the processing of digital images for specific tasks	K2
CO3	Solve real world problems by using digital image processing	K3
CO4	Analyze the images by using fundamental and advanced aspects of image processing	K4
CO5	Develop and evaluate the simplified tools for image processing	K5, K6

COURSE CODE: 22PCS4CC4P
COURSE TITLE: FOSS (P)

CO Number	CO Statement	Cognitive Level
CO1	Ability to install and run open-source operating systems	K1
CO2	Explain open source project structure and how to successfully setup a project	K2
CO3	Use Github for Software development projects	K3
CO4	Analyze various FOSS options for any software requirement	K4
CO5	Develop and testing an applications using open source code	K5, K6

CRITERION I **POs and COs**

COURSE CODE: 22PCS4GEC2P
COURSE TITLE: ANIMATION (P)

CO Number	CO Statement	Cognitive Level
CO1	Understand the basic concepts behind animation	**K2**
CO2	Develop an animated movie	**K3**
CO3	Analyze the tools and techniques to create 2D and 3D animation	**K4**
CO4	Recommend the suitable methods available to create, render, and present images with professional quality	**K5**
CO5	Create simple shapes and videos using animation editing software	**K6**