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Every Good Work

# SACRED HEART COLLEGE (AUTONOMOUS)

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A Don Bosco Institution of Higher Education, Founded in 1951 \* Affiliated to Thiruvalluvar University, Vellore \* Autonomous since 1987

Accredited by NAAC (4<sup>th</sup> Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

## Name of the Programme: M Sc. Computer Science

S No	Title of the Paper	Course Code	Course Objectives	Course Outcomes	Relevance
1	PRINCIPLES OF COMPILER DESIGN	MCS170T	<ul style="list-style-type: none"><li>To know the basic concepts of compilers.</li><li>To explore the phases of a compiler</li><li>To know how the source program is executed in the compiler.</li><li>To bring in the types of grammar</li><li>To develop opcode for the code generation phase.</li></ul>	<ul style="list-style-type: none"><li>On successful completion of this Course, students will be able to</li><li>Clarify the role of compiler in programming language.</li><li>Describe the lexical analysis, syntax analysis, intermediate code generation, code optimization and code generation.</li><li>Demonstrate the need and role of the parser, context free grammars.</li><li>Organize the syntax tree for any given expressions.</li><li>Compare the different phases of the compiler and its uses.</li><li>Develop opcode for the code</li></ul>	global developmental needs

				generation phase.	
2	ADVANCED JAVA PROGRAMMING	MCS171T	<ul style="list-style-type: none"> <li>To introduce programming with Applet and AWT.</li> <li>To give an overview of database access and details for managing information using the JDBC API.</li> <li>To examine the use of networking and collections.</li> <li>To learn how to program Servlet and JSP.</li> <li>To understand the web programming concepts in the perspective of Client and Server.</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Discover various techniques used Applet Programming.</li> <li>Relate Abstract Window Toolkit(AWT) and Events to design Java Applications</li> <li>Infer CRUD operations of the database using JDBC</li> <li>Examine collections and networking with jav.net and java.net packages</li> <li>Evaluate various server side programming in java.</li> <li>Produce web based java Applications using Servlet and JSP.</li> </ul>	global developmental needs
3	WINDOWS APPLICATIONS	MCS172T	<ul style="list-style-type: none"> <li>To know the differences between desktop and web application.</li> <li>To construct classes, methods, and accessor and instantiate objects.</li> <li>To create and manipulate GUI components in C#.</li> <li>To code solutions and compile C# projects within the .NET framework.</li> <li>To build own desktop</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Recognize the differences between desktop and web applications</li> <li>Demonstrate the classes, methods, accessor and instantiate objects</li> <li>Build own desktop application with Database</li> </ul>	global developmental needs

			application with Database	<ul style="list-style-type: none"> <li>Analyze the features of Windows Presentation Foundation (WPF)</li> <li>Find the way to code solutions and compile C# projects within the .NET framework</li> <li>Create and manipulate GUI components in C#.</li> </ul>	
4	OPEN SOURCE TECHNOLOGIES	MCS173T	<ul style="list-style-type: none"> <li>To learn designing webpage using HTML &amp; CSS</li> <li>To understand the concept of Database</li> <li>To learn Server-side scripting language</li> <li>To introduce applications using PHP with MYSQL</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Clarify the concept of open source technologies and tools.</li> <li>Describe the basics of the Internet like WWW, DNS, web hosting, web publishing, search engines, and protocols.</li> <li>Solve programs using HTML for web page creation and updating.</li> <li>Examine the working process of any website in real time.</li> <li>Compare between client side script and server side script.</li> <li>Develop websites using HTML, CSS, PHP, MySQL tools.</li> </ul>	global developmental needs
5	ELECTIVE – I: A. WEB SERVICES	MCS174A	<ul style="list-style-type: none"> <li>To examine fundamental XML technology</li> <li>To understand the use of JSON</li> <li>To gain an understanding about</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Understand the use of web</li> </ul>	global developmental needs

			<p>the role of web services in commercial applications</p> <ul style="list-style-type: none"> <li>• To learn the emerging standard protocols like SOAP, WSDL and UDDI.</li> <li>• To introduce the role of web services in CMS</li> </ul>	<p>services in B2C and B2B applications.</p> <ul style="list-style-type: none"> <li>• Efficiently design principles and application of SOAP and REST based web services.</li> <li>• Identify and select the appropriate framework components in creation of web service solution</li> <li>• Apply OOP principles to creation of web service solutions.</li> <li>• Implement an application that uses multiple web services in a realistic business scenario.</li> <li>• Design collaborating web services according to a specification.</li> </ul>	
6	ELECTIVE-I : B. DATA MINING AND WAREHOUSING	MCS174B	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Recognize the basic concepts of data mining</li> <li>• Understand the techniques of data classification using various algorithms</li> <li>• Characterize the role of data mining techniques in various fields</li> <li>• Apply various clustering methods for analysis</li> <li>• Develop skill in selecting the</li> </ul>	<ul style="list-style-type: none"> <li>• To understand data mining principles and techniques.</li> <li>• To expose the students to the concepts of data warehousing architecture and implementation.</li> <li>• To study the overview of developing areas – web mining, text mining and</li> <li>• ethical aspects of data mining.</li> <li>• To identify business applications and trends of data mining.</li> </ul>	global developmental needs

			<p>appropriate data mining algorithm for solving practical problems</p> <ul style="list-style-type: none"> <li>• Handle the process of data analysis, identifying the problems, and choosing the relevant models and algorithms to apply.</li> </ul>	<ul style="list-style-type: none"> <li>• To understand the concept of web mining.</li> </ul>	
7	PRACTICAL - I: ADVANCED JAVA PROGRAMMING	MCS175P	<ul style="list-style-type: none"> <li>• To introduce programming with Applet and AWT.</li> <li>• To give an overview of database access and details for managing information using the JDBC API.</li> <li>• To Examine the use of networking and collections.</li> <li>• To learn how to program Servlet and JSP.</li> <li>• To understand the web programming concepts in the perspective of Client and Server.</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Experiment Applet Programming using various techniques</li> <li>• Tabulate simple window Abstract Window Toolkit(AWT) and Events to design window based applications</li> <li>• Demonstrate CRUD operations of the database using JDBC</li> <li>• Examine collections and networking with java.util and java.net packages</li> <li>• Develop server side programs in the form of Servlets</li> <li>• Interpret the Java Applications using JSP Tags</li> </ul>	global developmental needs

8	PRACTICAL - II: WINDOWS APPLICATIONS	MCS176P	<ul style="list-style-type: none"> <li>• To show the behavior of the Reflection</li> <li>• To Demonstrate the basic concepts of OOPS</li> <li>• To Apply the ADO.NET to establish the connection with database</li> <li>• To focus the windows forms controls to create windows applications</li> <li>• To create the desktop applications with database</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Show the behavior of Reflection</li> <li>• Demonstrate the basic concepts of OOPS</li> <li>• Apply the ADO.NET to establish the connection with database</li> <li>• Focus the windows forms controls to create windows applications</li> <li>• Find the way to code solutions and compile C# projects with WPF</li> <li>• Create desktop application with database</li> </ul>	global developmental needs
9	PRACTICAL - III: OPEN SOURCE TECHNOLOGIES	MCS177P	<ul style="list-style-type: none"> <li>• learn designing webpage using HTML &amp; CSS</li> <li>• understand the concept of Database</li> <li>• learn Server-side scripting language</li> <li>• introduce applications using PHP with MYSQL</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Find the usages of open sources technologies.</li> <li>• Explain the process of website creation to any kind of real time problem.</li> <li>• Solve the problem using HTML, CSS, PHP, MySQL, and JSON.</li> <li>• Examine the methods to develop and design web pages.</li> <li>• Justify the selection of technology for given problem.</li> <li>• Create web pages using HTML, CSS, PHP,</li> </ul>	global developmental needs

				MySQL and JSON.	
10	EMPLOYABILITY SKILLS	MCS178S	<ul style="list-style-type: none"> <li>To know the basic requirements of the JOB.</li> <li>To know the problem in the process of interview.</li> <li>Preparation towards taking part in the interview</li> <li>To know about the communication process</li> <li>To improve oneself in facing interview</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Identify the basic requirements of the Job.</li> <li>Observe the problem in the process of interview.</li> <li>Establish the preparation towards taking part in the interview.</li> <li>Focus and improve the communication process.</li> <li>Find the ways to improve the body language and self-grooming</li> <li>Develop the skills to improve oneself in facing interview.</li> </ul>	global developmental needs
11	DISTRIBUTED OPERATING SYSTEMS	MCS270T	<ul style="list-style-type: none"> <li>To understand the fundamental concepts of operating systems</li> <li>To understand the need for distributed systems.</li> <li>To get acquainted with the design principles of distributed operating systems.</li> <li>To explore the concept of synchronization</li> <li>To handle the process in distributed environment</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Find the meaning of distributed operating system with examples.</li> <li>Summarize various types of distributed computing models.</li> <li>Illustrate the process, message, packet, IPC.</li> <li>Discussion on two types of communication methods like synchronous and asynchronous.</li> </ul>	global developmental needs

				<ul style="list-style-type: none"> <li>Summarize centralized system and Distributed systems.</li> <li>Describe the various communication methods like synchronous communication and asynchronous communication.</li> </ul>	
12	ENTERPRISE JAVA PROGRAMMING	MCS271T	<ul style="list-style-type: none"> <li>To expose the knowledge of MVC and Java server faces</li> <li>To provide the knowledge and skills required to develop web applications using the MVC framework provided by Apache Struts</li> <li>To develop Enterprise web application using EJB.</li> <li>To understand and implement the object-relation mapping using Hibernate</li> <li>To explore the knowledge of Aspect Oriented Programming using Spring and Spring MVC.</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Associate JSP and Servlet using MVC approach.</li> <li>Classify the ways of using JSF Tags(Core tags, HTML Tags)</li> <li>Reproduce the web applications using the MVC framework provided by Apache Struts</li> <li>Appraise the AOP(Aspect Oriented Programming) using Spring and Spring MVC</li> <li>Prepare Enterprise web application using EJB</li> <li>Integrate the Object-Relation Mapping technique with java using Hibernate</li> </ul>	global developmental needs
13	WEB APPLICATIONS	MCS272T	<ul style="list-style-type: none"> <li>To understand the difference between desktop and dynamic web applications.</li> <li>To understand the ASP.NET web application execution</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Discover the differences between static and dynamic</li> </ul>	global developmental needs



			<p>model.</p> <ul style="list-style-type: none"> <li>To create and modify multi-page Web Form applications and Web Services</li> <li>To demonstrate features like flow control, data access and data binding</li> <li>To validate forms with in an application.</li> </ul>	<p>web application.</p> <ul style="list-style-type: none"> <li>Demonstrate the ASP.NET web application execution model.</li> <li>Build own application by using the features like data access and data binding</li> <li>Analyze and implement security mechanism in web applications</li> <li>Find the way to code solutions and compile ASP.NET projects within the .NET framework</li> <li>Create and Validate web applications</li> </ul>	
14	PROGRAMMING IN PYTHON	MCS273T	<ul style="list-style-type: none"> <li>To know the basics of algorithmic problem solving</li> <li>To read and write simple Python programs.</li> <li>To develop Python programs with conditionals and loops.</li> <li>To define Python functions and call them.</li> <li>To use Python data structures – lists, tuples, dictionaries.</li> <li>To do input/output with files in Python.</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of the course students will be able to:</li> <li>Identify the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements</li> <li>Express proficiency in the handling of strings and functions.</li> <li>Interpret the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets</li> </ul>	global developmental needs

				<ul style="list-style-type: none"> <li>• Explore the commonly used operations involving file systems and modules</li> <li>• Resolve the concepts like exception handling, data base and GUI programming.</li> <li>• Create Python programs for solving real world complex problems</li> </ul>	
15	ELECTIVE-II: A. OBJECT ORIENTED ANALYSIS AND DESIGN	MCS274A	<ul style="list-style-type: none"> <li>• To understand the fundamental concepts of UML diagrams.</li> <li>• To draw diagrams with project documentation.</li> <li>• To analyze the requirements given by stake holder</li> <li>• To design the project with examples.</li> <li>• To understand the Software Development Process</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Find the meaning of object oriented analysis and design.</li> <li>• Explain the stages of software development life cycle.</li> <li>• Solve problems using simple UML diagram.</li> <li>• Examine various class model, state model and interaction models.</li> <li>• Justify the differences between object oriented design and implementation.</li> <li>• Create UML diagrams for software development process.</li> </ul>	global developmental needs
16	ELECTIVE II: B. SOFTWARE TESTING AND QUALITY ASSURANCE	MCS274B	<ul style="list-style-type: none"> <li>• To introduce various approaches, techniques, technologies, and methodologies used in software testing and quality assurance.</li> <li>• To understand the role of testing</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Understand the key concepts and principles of software</li> </ul>	global developmental needs

			<p>in applications</p> <ul style="list-style-type: none"> <li>• To learn to design the test cases</li> <li>• To know the different levels of testing</li> <li>• To study the state-of-the-art of software testing and quality assurance.</li> </ul>	<p>testing</p> <ul style="list-style-type: none"> <li>• Specify and perform the activities involved in a testing process</li> <li>• Understand the role of ethics in the software engineering and the responsibilities of software engineers in general</li> <li>• Evaluate the work of peers constructively by following proven methods of peer-review, and by using the principles of research ethics</li> <li>• Conduct independent research in software testing and quality assurance and apply that knowledge in their future research and practice</li> <li>• Application of software testing techniques in commercial environments</li> </ul>	
17	ELECTIVE-II: C. WIRELESS SENSOR NETWORKS	MCS274C	<ul style="list-style-type: none"> <li>• To understand the concepts of wireless sensor networks</li> <li>• To understand the protocols for WSN</li> <li>• To get exposure on WSN environment with TinyOS and like</li> <li>• To understand the layered approach in sensor networks</li> <li>• To design WSN and analyze</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Identify different issues in wireless ad hoc and sensor networks.</li> <li>• Analyze protocols developed for ad hoc and sensor networks.</li> <li>• Address the security threats in</li> </ul>	global developmental needs

			performance.	<ul style="list-style-type: none"> <li>ad hoc and sensor networks</li> <li>Establish a Sensor network environment for different type of applications.</li> <li>Classify the design issues and different categories of MAC protocols</li> <li>Illustrate the issues of routing in WSN and QoS related performance measurements</li> </ul>	
18	PRACTICAL - IV: ENTERPRISE JAVA PROGRAMMING	MCS275P	<ul style="list-style-type: none"> <li>To expose the knowledge of MVC and Java server faces</li> <li>To provide the knowledge and skills required to develop web applications using the MVC framework provided by Apache Struts</li> <li>To Develop Enterprise web application using EJB.</li> <li>To understand and implement the object-relation mapping using Hibernate</li> <li>To explore the knowledge of Aspect Oriented Programming using Spring and Spring MVC.</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Connect JSP and Servlet using MVC approach.</li> <li>Classify the ways of using JSF Tags(Core tags, HTML Tags)</li> <li>Reframe the web applications using the MVC framework provided by Apache Struts</li> <li>Prepare Enterprise web application using EJB</li> <li>Integrate the Object-Relation Mapping technique with java using Hibernate</li> <li>Evaluate the AOP(Aspect Oriented Programming) using Spring and Spring MVC</li> </ul>	global developmental needs
19	PRACTICAL - V: WEB APPLICATIONS	MCS276P	<ul style="list-style-type: none"> <li>To demonstration of Web Configuration file</li> <li>To apply the web control classes</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> </ul>	global developmental needs

			<ul style="list-style-type: none"> <li>• To develop the component programming</li> <li>• To create a secured web application with validation</li> <li>• To apply the component programming</li> </ul>	<ul style="list-style-type: none"> <li>• Show the behavior of HTML Control Classes, Control Events, Container and Input Control Classes</li> <li>• Demonstrate the implementation of Web Configuration file</li> <li>• Apply the Web control classes and control tags</li> <li>• Focus on the component programming</li> <li>• Find the way to create and code the component programming, Custom and User Controls</li> <li>• Create a secured web application with validation controls and database</li> </ul>	
20	PRACTICAL - VI: PROGRAMMING IN PYTHON	MCS277P	<ul style="list-style-type: none"> <li>• To know the basics of algorithmic problem solving</li> <li>• To read and write simple Python programs.</li> <li>• To develop Python programs with conditionals and loops.</li> <li>• To define Python functions and call them.</li> <li>• To use Python data structures – lists, tuples, dictionaries.</li> <li>• To do input/output with files in Python.</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of the course students will be able to:</li> <li>• Identify the features and steps to execute Python programs.</li> <li>• Implement Python programs with conditionals and loops.</li> <li>• Use functions for structuring Python programs.</li> <li>• Represent compound data using Python lists, tuples, and dictionaries.</li> <li>• Read and write data from/to</li> </ul>	global developmental needs

				<p>files in Python.</p> <ul style="list-style-type: none"> <li>• Develop user interface applications</li> </ul>	
21	INTERNET OF THINGS	MCS370T	<ul style="list-style-type: none"> <li>• To introduce the IoT and its baseline technologies.</li> <li>• To explore the IOT and M2M and its Connectivity technologies.</li> <li>• To understand the contribution of WSN and other networks towards IOT.</li> <li>• To implement the IOT applications using Arduino and Raspberry Pi.</li> <li>• To know the importance of SDN, Sensor cloud and Fog computing.</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Recall the basics of IoT and its baseline technologies.</li> <li>• Classify IOT and M2M and its Connectivity technologies</li> <li>• Prepare a simple IOT applications using sensors and Arduino board.</li> <li>• Integrate various Sensors with Arduino and raspberry Pi</li> <li>• Evaluate and adapt the importance of SDN, Sensor cloud and Fog computing.</li> </ul>	global developmental needs
22	ARTIFICIAL INTELLIGENCE	MCS371T	<ul style="list-style-type: none"> <li>• To provide a strong foundation of fundamental concepts in Artificial Intelligence</li> <li>• To provide a basic exposition to the goals and methods of Artificial Intelligence</li> <li>• To enable the student to apply these techniques in applications which involve perception, reasoning and learning</li> <li>• To introduce the concept of expert systems</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.</li> <li>• Explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals</li> </ul>	global developmental needs

				<ul style="list-style-type: none"> <li>• Apply these techniques in applications which involve perception, reasoning and learning.</li> <li>• Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.</li> <li>• Evaluate different machine learning techniques to design AI machine and enveloping applications for real world problems</li> <li>• Acquire the knowledge of real world Knowledge representation.</li> </ul>	
23	DESIGN AND ANALYSIS OF ALGORITHMS	MCS372T	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Prove the correctness and analyze the running time of the basic algorithms for those classic problems</li> <li>• Review the basic knowledge of algorithm design and its implementation.</li> <li>• Assess the key techniques of Divide-and-Conquer and Greedy Method.</li> <li>• Examine the various problems solved by Dynamic</li> </ul>	<ul style="list-style-type: none"> <li>• To prove the correctness and analyze the running time of the basic algorithms for those classic problems.</li> <li>• To understand the basic knowledge of algorithm design and its implementation.</li> <li>• To learn the key techniques of Divide-and-Conquer and Greedy Method.</li> <li>• To recognize the concept of Dynamic Programming and its algorithms</li> <li>• To familiarize with</li> </ul>	global developmental needs

			<p>Programming and its algorithms</p> <ul style="list-style-type: none"> <li>Adapt the Backtracking method to solve N-Queen, Graph coloring sum of subsets problems.</li> <li>Interpret various Branch and Bound techniques for designing the algorithms .</li> </ul>	<p>Backtracking algorithms.</p> <ul style="list-style-type: none"> <li>To understand Branch and Bound techniques for designing and analyzing algorithms.</li> </ul>	
24	MOBILE APPLICATIONS	MCS373T	<ul style="list-style-type: none"> <li>To know the basis of Android application and development environment</li> <li>To able to develop simple and professional application</li> <li>To know the different controls in Android</li> <li>To impart knowledge about handling pictures and menus</li> <li>To get ready for the job opportunity in mobile application development.</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Understand about the mobile application development environment</li> <li>Interpret the working process of Activities and Fragments</li> <li>Use the techniques in Mobile Applications</li> <li>Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.</li> <li>Compare the Native apps with Hybrid apps</li> <li>Develop interface and design and create the job opportunity in mobile application development</li> </ul>	global developmental needs
25	ELECTIVE - III: A. SEMANTIC WEB	MCS374A	<ul style="list-style-type: none"> <li>To learn the fundamentals of semantic web and to</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be</li> </ul>	global developmental



	AND APPLICATIONS		<p>conceptualize and depict ontology for semantic web.</p> <ul style="list-style-type: none"> <li>• To make a study of languages for semantic web.</li> <li>• To learn about the ontology learning algorithms and to utilize in the development of an application.</li> <li>• To know the fundamental concepts of ontology management.</li> <li>• To learn the applications related to semantic web.</li> </ul>	<p>able to.</p> <ul style="list-style-type: none"> <li>• Identify the ontology for a given domain.</li> <li>• Understand and develop an application using ontology languages and tools.</li> <li>• Discover the concepts of semantic web.</li> <li>• Analyze and use ontology related tools and technologies for application creation.</li> <li>• Evaluate the design and develop applications using semantic web.</li> <li>• Generalize the standards related to semantic web.</li> </ul>	needs
26	ELECTIVE – III: B. ETHICAL HACKING & CYBER FORENSICS	MCS374B	<ul style="list-style-type: none"> <li>• To understand the hacking techniques of computer forensics.</li> <li>• To learn about data recovery methods.</li> <li>• To know about threats and vulnerabilities</li> <li>• To identify the threats in computer forensics.</li> <li>• To get knowledge on data recovery</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to.</li> <li>• Identify between hackers and normal users.</li> <li>• Understand the principles of computer forensics for security.</li> <li>• Apply the data recovery methods.</li> <li>• Categorize between threats and the tactics.</li> <li>• Evaluate legal and ethical issues related to vulnerability and penetration testing.</li> </ul>	global developmental needs

				<ul style="list-style-type: none"> <li>Construct on the strengths and vulnerabilities of the tested network.</li> </ul>	
27	ELECTIVE – III: C. CLOUD COMPUTING	MCS374C	<ul style="list-style-type: none"> <li>To introduce the broad perceptive of cloud architecture and model.</li> <li>To understand the concept of Virtualization and design of cloud Services</li> <li>To be familiar with the lead players in cloud.</li> <li>To understand the features of cloud simulator</li> <li>To apply different cloud programming model as per need.</li> <li>To learn to design the trusted cloud Computing system</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to.</li> <li>Discover the broad perceptive of cloud architecture and model.</li> <li>Explain the Virtualization and design of cloud Services</li> <li>Construct the features of cloud services</li> <li>Analyze the different cloud programming model as per need.</li> <li>Summarize the trusted cloud Computing system</li> <li>Create and use current cloud technologies</li> </ul>	global developmental needs
28	PRACTICAL - VII: DESIGN AND ANALYSIS OF ALGORITHMS	MCS375P	<ul style="list-style-type: none"> <li>To prove the correctness and analyze the running time of the basic algorithms for those classic problems.</li> <li>To understand the basic knowledge of algorithm design and its implementation.</li> <li>To learn the key techniques of Divide-and-Conquer and Greedy Method.</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Prove the correctness and analyze the running time of the basic algorithms for those classic problems</li> <li>Review the basic knowledge of algorithm design and its implementation.</li> </ul>	global developmental needs

			<ul style="list-style-type: none"> <li>• To recognize the concept of Dynamic Programming and its algorithms</li> <li>• To familiarize with Backtracking algorithms.</li> <li>• To understand Branch and Bound techniques for designing and analyzing algorithms.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess the key techniques of Divide-and-Conquer and Greedy Method.</li> <li>• Examine the various problems solved by Dynamic Programming and its algorithms</li> <li>• Adapt the Backtracking method to solve N-Queen, Graph coloring sum of subsets problems.</li> <li>• Interpret various Branch and Bound techniques for designing the algorithms .</li> </ul>	
29	PRACTICAL - VIII: MOBILE APPLICATIONS	MCS376P	<ul style="list-style-type: none"> <li>• To understand the mobile application development</li> <li>• To interpret the working process of Activities and Fragments</li> <li>• To Develop mobile application using Telephony</li> <li>• To create a mobile application using SMS manager</li> <li>• To develop the mobile application</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Understand about the mobile application development environment</li> <li>• Interpret the working process of Activities and Fragments</li> <li>• Use the techniques in Mobile Applications</li> <li>• Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.</li> <li>• Compare the Native apps with Hybrid apps</li> </ul>	global developmental needs

				<ul style="list-style-type: none"> <li>Develop interface and design and create the job opportunity in mobile application development</li> </ul>	
30	BIG DATA ANALYTICS	MCS470T	<ul style="list-style-type: none"> <li>To understand the needs for Big Data and its environments.</li> <li>To learn the basic requirements of Big Data Technologies.</li> <li>To expose the knowledge of MapReduce programming framework (Hadoop).</li> <li>To be familiar with NoSQL DB's Cassandra and MongoDB</li> <li>To understand Hive and Pig technologies for analyzing the Big Data.</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Recall various types of digital data and big data</li> <li>Review of various Big data analytics and its Technologies</li> <li>Incorporate the knowledge of various NoSQL databases.</li> <li>Demonstrate the NoSQL databases such as MongoDB and Cassandra</li> <li>Design &amp; assess the Big data queries using Hive and Pig</li> </ul>	global developmental needs
31	DATA SCIENCE WITH PYTHON	MCS471T	<ul style="list-style-type: none"> <li>To know the fundamental algorithmic ideas to process data.</li> <li>To learn to apply hypotheses and data into actionable predictions.</li> <li>To document and transfer the results and effectively communicate the findings using visualization techniques.</li> <li>To employ the Map reduce technique</li> </ul>	<ul style="list-style-type: none"> <li>On successful completion of this Course, students will be able to</li> <li>Review the basic understanding of NumPy and Pandas</li> <li>Illustrate to use conditional loops and list by python</li> <li>Visualizing the results of analytics effectively</li> <li>Solve a simple application for data loading, Storing the files with various file formats.</li> </ul>	global developmental needs

				<ul style="list-style-type: none"> <li>• Design &amp; assess the Visualization through Matplotlib</li> <li>• Prepare to perform pre-processing of data using Numpy and Pandas.</li> </ul>	
32	MACHINE LEARNING	MCS472T	<ul style="list-style-type: none"> <li>• To recognize and implement various ways of selecting suitable model parameters for different machine learning techniques</li> <li>• To select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.</li> <li>• To solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.</li> <li>• To analyze and design a real world problem for implementation and understand the dynamic behavior of a system.</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques</li> <li>• Select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.</li> <li>• Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.</li> <li>• Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.</li> </ul>	global developmental needs

				<ul style="list-style-type: none"> <li>• Evaluate and interpret the results of the algorithms.</li> <li>• Design and implement machine learning solutions to classification, regression, and clustering problems;</li> </ul>	
33	ELECTIVE – IV: A. CRYPTOGRAPHY AND NETWORK SECURITY	MCS473A	<ul style="list-style-type: none"> <li>• To introduce Classical Encryption techniques</li> <li>• To understand the principles of encryption algorithms</li> <li>• To have a detailed knowledge about authentication, hash functions and application-level security mechanisms.</li> <li>• To introduce Network Security Concepts</li> <li>• To understand the System level Security</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to.</li> <li>• Recognize the security of the data over the network</li> <li>• Understand the research in the emerging areas of cryptography and network security.</li> <li>• Apply the various networking protocols.</li> <li>• Analyze and Protect any network from the threats in the world.</li> <li>• Evaluate the intrusion detection and its solutions to overcome the attacks</li> <li>• Generalize about how to maintain the Confidentiality, Integrity and Availability of a data.</li> </ul>	global developmental needs

34	ELECTIVE – IV: C. SOFT COMPUTING	MCS473C	<ul style="list-style-type: none"> <li>• To learn the basic concepts of Soft Computing</li> <li>• To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.</li> <li>• To apply soft computing techniques to solve problems.</li> <li>• To introduce fuzzy systems and its applications</li> <li>• To impart knowledge on developing hybrid systems</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Understand the core concepts of soft computing techniques</li> <li>• Integrate various soft computing techniques for complex problems.</li> <li>• Apply suitable soft computing techniques for various applications.</li> <li>• Analyze and visualize from fuzzy data</li> <li>• Evaluate and interpret the soft computing techniques</li> <li>• Build a personalized recommender system</li> </ul>	global developmental needs
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35	PRACTICAL – IX: DATASCIENCE WITH PYTHON	MCS474P	<ul style="list-style-type: none"> <li>• To know the fundamental algorithmic ideas to process data.</li> <li>• To learn to apply hypotheses and data into actionable predictions.</li> <li>• To document and transfer the results and effectively communicate the findings using visualization techniques.</li> <li>• To employ the Map reduce technique</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Review the basic understanding of NumPy and Pandas</li> <li>• Illustrate to use conditional loops and list by python</li> <li>• Visualizing the results of analytics effectively</li> <li>• Solve a simple application for data loading, Storing the files with various file formats.</li> <li>• Design &amp; assess the Visualization through Matplotlib</li> <li>• Prepare to perform pre-processing of data using Numpy and Pandas.</li> </ul>	
36	PRACTICAL – X: MACHINE LEARNING	MCS475P	<ul style="list-style-type: none"> <li>• To recognize and implement various ways of selecting suitable model parameters for different machine learning</li> </ul>	<ul style="list-style-type: none"> <li>• On successful completion of this Course, students will be able to</li> <li>• Recognize and implement</li> </ul>	global developmental needs



			<p>techniques</p> <ul style="list-style-type: none"> <li>• To select and implement machine learning techniques</li> <li>• To analyze and design a real world problems for implementation and understand the dynamic behavior of a system</li> <li>• To evaluate and interpret the results of the algorithms</li> </ul>	<p>various ways of selecting suitable model parameters for different machine learning techniques</p> <ul style="list-style-type: none"> <li>• Select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.</li> <li>• Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.</li> <li>• Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.</li> <li>• Evaluate and interpret the results of the algorithms.</li> <li>• Design and implement machine learning solutions to classification, regression, and clustering problems;</li> </ul>	
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