Course Outcomes of B.Sc./ B.Sc. (Honours) with Research			
Subject: Computer Science			
Semester	**Course Category**	**Paper Code and Course Name**	**Outcomes**
5th	**Major/Minor**	**CSC-HE-5016** **Microprocessor**	Under this course: **CO1**: Students will gain a deep understanding of the architecture and functioning of microprocessors, including the CPU, memory, and input/output interfaces. **CO2**: Students have ability to understand and use the instruction set of a specific microprocessor, including data transfer, arithmetic, logic, control, and I/O instructions. **CO3**: They can develop skills in assembly language programming, including writing, testing, and debugging code for microprocessors. **CO4**: They learn how to interface microprocessors with various peripherals, such as sensors, actuators, displays, and communication modules. **CO5**: They can apply microprocessor knowledge to design and implement embedded systems, including both hardware and software components. **CO6**: They enhance problem-solving skills by tackling real-world challenges using microprocessors, such as automation, data acquisition, and control systems. **CO7**: They can distinguish between microprocessors and microcontrollers and understand their applications in different domains. **CO8**: They analyze and optimize the performance of microprocessor-based systems, considering factors such as speed, power consumption, and cost. **CO9**: They gain practical experience through laboratory exercises and projects that involve working with actual

			microprocessor hardware and development tools. **CO10**: They stay updated with the latest trends and advancements in microprocessor technology and their applications in various industries.
5th	**Major/Minor**	**CSC-HC-5016 Internet Web Technologies**	Under this course: **CO1**: Students will understand the basic concepts and principles of the OSI and TCP/IP models and their layers. **CO2**: Students will learn Insight into how the internet is structured, including ISPs, data centers, and backbone networks. **CO3**: Students will gain detailed knowledge of how web pages are transferred and secured. **CO4**: Students understanding of data transmission and the internet's foundational protocols. **CO5**: Students have ability to explain and use the Domain Name System. **CO6**: Students will be able to create and style web pages, and add interactivity. **CO7**: Students will gain proficiency in using frameworks like React, Angular, or Vue.js. **CO8**: Students will have Knowledge of languages like PHP, Python (Django, Flask), Ruby on Rails, or Node.js. **CO9**: Students have understanding of SQL and NoSQL databases, including MySQL, PostgreSQL, and MongoDB. **CO10**: Students will have ability to design, implement, and consume REST APIs.

5th	**Major/Minor**	**CSC-HC-5026 Theory of Computation**	Under this course: **CO1**: Students will understand the fundamental concepts of automata theory, including the definition and properties of automata. **CO2**: Students will learn about finite automata (both deterministic and non-deterministic), their representations, and their applications in pattern recognition and lexical analysis. **CO3**: Students will understand regular languages and their representations using regular expressions and finite automata. They will also learn about the closure properties and decision problems of regular languages. **CO4**: Students will gain knowledge of context-free grammars (CFGs) and context-free languages (CFLs), including the construction of parse trees and the use of CFGs in syntax analysis. **CO5**: Students will learn about pushdown automata (PDAs) and their equivalence to context-free grammars in recognizing context-free languages. **CO6**: Students will understand the concept of Turing machines, including their definition, variants, and significance in defining the limits of what can be computed. **CO7**: Students will learn about decidable and undecidable problems, and be able to identify problems that can and cannot be solved by algorithms. **CO8**: Students will understand the Chomsky hierarchy of languages and grammars, including regular languages, context-free languages, context-sensitive languages, and recursively enumerable languages. **CO9**: Students will develop skills in constructing formal proofs related to automata, grammars, and languages, including proving language equivalence and closure properties. **CO10**: Students will learn techniques for minimizing deterministic finite automata (DFA) and understanding the significance of minimal DFA. **CO11**: Students will understand parsing techniques for context-free languages, including top-down and bottom-

			up parsing algorithms. **CO12**: Students will explore the applications of automata theory and formal languages in various fields, including compiler design, text processing, and artificial intelligence.
6th	**Major/Minor**	**CSC-HC-6016 Artificial Intelligence**	Under this course: **CO1**: Students will understand the fundamental concepts and principles of artificial intelligence, including its history, goals, and various subfields. **CO2**: Students will learn about search algorithms, such as depth-first search, breadth-first search, A* search, and their applications in problem-solving. **CO3**: Students will gain knowledge of machine learning algorithms and techniques, including supervised learning, unsupervised learning, reinforcement learning, and deep learning. **CO4**: Students will understand the importance of data preprocessing, including data cleaning, normalization, feature extraction, and feature selection.

			CO5: Students will learn the basics of neural networks, including perceptrons, backpropagation, convolutional neural networks (CNNs), and recurrent neural networks (RNNs). **CO6**: Students will understand the principles of NLP, including text processing, sentiment analysis, language modeling, and machine translation. **CO7**: Students will gain knowledge of computer vision techniques, including image processing, object detection, and image classification. **CO8**: Students will understand the ethical implications of AI, including issues related to bias, fairness, transparency, and the societal impact of AI technologies. **CO9**: Students will learn about different methods for representing knowledge, such as logic, semantic networks, and ontologies, and reasoning techniques like inference and deduction. **CO10**: Students will understand the concept of intelligent agents, their architectures, and the interaction among multiple agents in a system. **CO11**: Students will gain an introduction to robotics, including robot perception, planning, and control.
6th	**Major/Minor**	**CSC-HC-6026 Computer Graphics**	Under this course: **CO1**: Students will understand the basic principles and concepts of computer graphics, including the mathematical foundations. **CO2**: Students will gain proficiency in graphics programming using languages and APIs such as OpenGL, WebGL, DirectX, or Vulkan. **CO3**: Students will learn techniques for creating and manipulating 2D graphics, including drawing shapes, handling colors, and implementing transformations like translation, rotation, and scaling. **CO4**: Students will understand the principles of 3D graphics, including geometric modeling, 3D transformations, projection, and viewing.

			CO5: Students will learn about various rendering techniques, such as rasterization, ray tracing, and shading models (Phong, Gouraud). **CO6**: Students will understand the concepts of lighting and shading in computer graphics, including ambient, diffuse, and specular reflection, and be able to implement shading algorithms. **CO7**: Students will learn techniques for applying textures to 3D models to enhance visual detail. **CO8**: Students will understand the basics of computer animation, including keyframe animation, interpolation techniques, and the principles of motion. **CO9**: Students will gain skills in handling user input and interaction in graphical applications, including event-driven programming. **CO10**: Students will understand the architecture of graphics hardware, including GPUs, and how they are used to accelerate rendering processes.
6th	**Major/Minor**	**CSC-HE-6016 Network Programming**	Under this course: **CO1**: Students can gtain a deep understanding of key network protocols, including TCP/IP, UDP, HTTP, FTP, and DNS. **CO2**: They can develop skills in socket programming, including the creation, management, and utilization of sockets for communication between networked devices. **CO3**: They learn the principles of client-server architecture and develop applications that use this model for communication. **CO4**: They understand network security principles, including encryption, authentication, and secure communication techniques. **CO5**: They learn about concurrent programming concepts such as multithreading and asynchronous I/O to handle multiple network connections efficiently. **CO6**: They develop robust error handling and debugging techniques specific to network programming.

			CO7: They can understand and implement data serialization techniques to enable structured data exchange over the network. **CO8**: They analyze and optimize the performance of networked applications, focusing on latency, throughput, and resource utilization.
6th	**Major/Minor**	**CSC-HE-6046 Data Mining**	Under this course: **CO1**: They gain a foundational understanding of data mining principles, techniques, and their applications in various fields. **CO2**: They learn techniques for data cleaning, normalization, transformation, and reduction to prepare raw data for mining. **CO3**: They can develop skills in EDA to summarize the main characteristics of datasets, often using visual methods. **CO4**: They understand and apply algorithms like Apriori and FP-Growth to discover interesting relationships between variables in large databases. **CO5**: They gain proficiency in classification algorithms such as Decision Trees, Naive Bayes, k-Nearest Neighbours, Support Vector Machines, and Neural Networks. **CO6**: The can learn clustering techniques such as k-Means, Hierarchical Clustering, and DBSCAN to group similar data points. **CO7**: They can identify outliers and unusual patterns in data that do not conform to expected behavior. **CO8**: Students can apply techniques like Principal Component Analysis (PCA) and t-Distributed Stochastic Neighbor Embedding (t-SNE) to reduce the number of variables under consideration. **CO9**: They understand methods for evaluating the performance of data mining models, including accuracy, precision, recall, F1 score, and ROC curves. **CO10**: They explore techniques for extracting information from textual data, including tokenization, sentiment analysis, and topic modeling.

			CO11: They gain knowledge of big data frameworks like Hadoop and Spark for handling and processing large datasets. **CO12**: They understand the ethical implications of data mining, including privacy concerns, data security, and responsible usage of mined information.