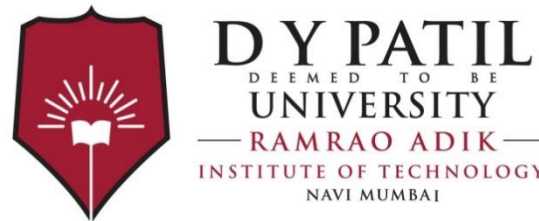


# **Ramrao Adik Institute of Technology**

*Department of Computer Engineering*

## **B. Tech. in Computer Engineering**



**Scheme with Description**

*Academic Year 2020-21*



**Ramrao Adik Institute of Technology, Nerul, Navi Mumbai.**  
**Department of Computer Engineering**

**Bachelor of Technology in Computer Engineering**

**Semester-III**

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
CEC301	Engineering Mathematics III	03	-	01	03	-	01	04
CEC302	Basic Electronics and Digital Logic	03	02	-	03	01	-	04
CEC303	Data Structures	03	02	-	03	01	-	04
CEC304	Computer Organization and Architecture	03	-	01	03	-	01	04
CEC305	Database Management Systems	03	02	-	03	01	-	04
HBSO301	Sustainable Business Strategy Program (Online)	-	-	-	-	-	-	01
CEL301	Object Oriented Programming Methodology	-	4(2+2)	-	-	02	-	02
	<b>Total</b>	<b>15</b>	<b>10</b>	<b>02</b>	<b>15</b>	<b>05</b>	<b>02</b>	<b>23</b>

**Evaluation Scheme**

**Semester-III**

Course Code	Course Name	T1	T2	AVG	MSE	ESE	Exam Hrs	TW	Pr/Or	Total
CEC301	Engineering Mathematics III	20	20	20	20	60	02	-	-	100
CEC302	Basic Electronics and Digital Logic	20	20	20	20	60	02	25	25	150
CEC303	Data Structures	20	20	20	20	60	02	25	25	150
CEC304	Computer Organization and Architecture	20	20	20	20	60	02	25	-	125
CEC305	Database Management Systems	20	20	20	20	60	02	25	25	150
HBSO301	Sustainable Business Strategy Program (Online)	-	-	-	-	-	-	-	-	-
CEL301	Object Oriented Programming Methodology	-	-	-	-	-	-	25	25	50
	<b>Total</b>									<b>725</b>



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**Subject Description**

**Semester-III**

Course Code	Course
<b>CEC301</b>	<b>Engineering Mathematics- III</b>
<p>In this course, students will be provided the requisite and relevant background necessary to understand other important engineering mathematics courses offered in higher semesters. The students will be introduced important topics of applied mathematics, like Laplace transforms, Z- Transform and Fourier Series. These topics are very useful for signal processing and communication engineering. The areas like Probability, Sampling theory and testing of Hypothesis will be explored for further business and engineering techniques. The students will be able to identify the direction and strength of a linear correlation between two factors and each source of variation in an analysis of regression. These techniques are very useful in recent trends of industry.</p>	

Course Code	Course
<b>CEC302</b>	<b>Basic Electronics and Logic Design</b>
<p>Digital logic is the representation of signals and sequences of a digital circuit through numbers. It is the basis for digital computing and provides a fundamental understanding on how circuits and hardware communicate within a computer. It is typically embedded into most electronic devices, including calculators, computers, video games, and watches. On the completion of this course, student will be able to understand basic principles of electronics</p>	



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and logic gates using which digital electronic circuits are made up of. This course will also help students to understand how different digital circuits like sequential, combinational circuits are designed with their functioning, methods to minimize logic redundancy in order to reduce the circuit complexity. Further in this course students will assess the nomenclature and technology in the area of memory devices and apply the memory devices in different types of digital circuits for real world application.

Course Code	Course
<b>CEC303</b>	<b>Data Structures</b>
Data structures is a way of organizing and collecting data in such a way that we can perform operations in an efficient way. Data structures study covers representation of data in memory, operations performed on that data and various applications to solve practical engineering problems.	

Course Code	Course
<b>CEC304</b>	<b>Computer Organization and Architecture</b>
In this course, students will be able to understand the basic structure of a computer and perform computer arithmetic operations. Interpret the ISA of simple RISC and write assembly language programs. This course will help the student to understand the concept of cache mapping techniques, I/O organization and conceptualize instruction-level parallelism and multiprogramming.	



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Course Code	Course
<b>CEC305</b>	<b>Database Management Systems</b>
<p>Data is nothing but facts and statistics stored or free flowing over a network, generally it's raw and unprocessed. Data becomes information when it is processed, turning it into something meaningful. A Database is a collection of related data organized in a way that data can be easily accessed, managed and updated. A DBMS is software that allows creation, definition and manipulation of database, allowing users to store, process and analyse data easily. The purpose of this course to gain knowledge of following characteristics like how to stored data into tables, by using normalization concept to reduce redundancy, maintaining data consistency and how to manage concurrent access, using query language learn to fetched, inserted, deleted and updated in a database. Also learn how to take care of the security of data, protecting the data from un-authorized access how to apply security and manage data integrity by supports of transactions.</p>	

Course Code	Course
<b>HBSO301</b>	<b>Sustainable Business Strategy Program</b>
<p>Sustainable Business Strategy provides participants with the knowledge and tools to become a purpose-driven business leader. This course explores the different business models that companies can use to drive change and explains why purpose-driven businesses are particularly well positioned to tackle the world's biggest problems. The student will learn how to influence management and other key stakeholders on the competitive advantages of being a purpose-driven firm, and how to integrate the values into the work so that it can help transform firms into catalysts for system level change.</p>	



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Course Code	Course
<b>CEL301</b>	<b>Object Oriented Programming Methodology</b>
<p>With the growth in Information and Communication Technology, there is a need to develop large and complex applications which are used in real life to ease the things. These applications should be user friendly, secure and easy to understand. To meet this requirement object-oriented paradigm has been developed. An object-oriented programming is a way programming which enables programmers to think like they are working with real-life entities or objects. In real-life, people have knowledge and can do various works similarly in OOP; objects have fields to store knowledge or data and can do various works. Java is based on OOP approach and it is best in programming language. Hence this course aims to cover the essential topics of Java programming so that the students can improve their skills to cope with the current requirement of IT industries, to solve many problems in their own field of studies and to design real time applications also.</p>	

**Bachelor of Technology in Computer Engineering**

**Semester-IV**

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
<b>CEC401</b>	<b>Engineering Mathematics IV</b>	03	-	01	03	-	01	04
<b>CEC402</b>	<b>Operating Systems</b>	03	02	-	03	01	-	04
<b>CEC403</b>	<b>Theoretical Computer Science</b>	03	-	01	03	-	01	04
<b>CEC404</b>	<b>Computer Networks</b>	03	02	-	03	01	-	04
<b>CEC405</b>	<b>Design and Analysis of Algorithm</b>	03	02		03	01	-	04
<b>HBSO401</b>	<b>Entrepreneurship Essential program (Online)</b>	-	-	-	-	-	-	01
<b>CEL401</b>	<b>Open Source Lab</b>	-	4(2+2)	-	-	02	-	02
	<b>Total</b>	<b>15</b>	<b>10</b>	<b>02</b>	<b>15</b>	<b>05</b>	<b>02</b>	<b>23</b>



**Evaluation Scheme**

**Semester-IV**

Course Code	Course Name	T1	T2	AVG	MSE	ESE	Exam Hrs	TW	Pr/Or	Total
CEC401	Engineering Mathematics IV	20	20	20	20	60	02	-	-	100
CEC402	Operating Systems	20	20	20	20	60	02	25	25	150
CEC403	Theoretical Computer Science	20	20	20	20	60	-	-	-	100
CEC404	Computer Networks	20	20	20	20	60	02	25	25	150
CEC405	Design and Analysis of Algorithm	20	20	20	20	60	02	25	25	150
HBSO401	Entrepreneurship Essential program (Online)	-	-	-	-	-	-	-	-	-
CEL401	Open Source Lab	-	-	-	-	-	-	25	25	50
	<b>Total</b>									<b>700</b>



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**Subject Description**  
**Semester IV**

Course Code	Course
<b>CEC401</b>	<b>Engineering Mathematics-IV</b>
<p>In this course, students will be provided the requisite and relevant background necessary to understand other important engineering mathematics courses offered in higher semesters. The students will be introduced the important topics like Fourier Series, Fourier transform and Z-transform. These topics are very useful for signal processing and communication engineering and other branches of engineering. The area of Complex Analysis will also be introduced to students which will be useful in further studies and competitive examinations like GRE, GATE and civil services. The areas like Probability, Sampling theory and testing of Hypothesis will be explored for further business and engineering techniques. The students will be able to gain basic and advanced knowledge of graph theory which is useful for solving many engineering problems and networking problems. The basic concepts and techniques correlation and regression analysis will be explored in this course. These techniques are very useful in recent trends of industry.</p>	
Course Code	Course
<b>CEC402</b>	<b>Operating Systems</b>
<p>The Operating System acts as a platform of information exchange between your computer's hardware and the applications running on it. The purpose of this course is to provide an overview of computer operating systems, design principles and implementation techniques. The primary goal of this course is to ensure that students gain a solid understanding of the fundamental concepts of Address spaces, system call interface, process/threads, concurrency and resource management, virtual memory, I/O, file systems. While the course is designed to ground the aforementioned concepts in some practical experience, implementation on Linux system will be focus of this course.</p>	



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Course Code	Course
<b>CEC403</b>	<b>Theoretical Computer Science</b>
<p>In this course, students will be learning basics of set theory and mathematical logic in solving real life and engineering problems. The students will be provided the knowledge of permutation, combination and discrete probability. The students will be given the basics of relations and functions and its applications which provide the foundations for parallel computing and processing. The students will get acquainted to graph theory, algebraic system, coding theory and its applications. The knowledge of algebraic system to explore its applicability in cryptography, scientific computation will be illustrated in this course. The concepts of coding theory used in Encoding and Decoding applications will be also explored.</p>	

Course Code	Course
<b>CEC404</b>	<b>Computer Networks</b>
<p>It's merely impossible to imagine a world now without emails, online newspapers, blogs and chat services like WhatsApp. Computer networks makes these communication possibilities faster than other facilities. Because of the optimal information and communication possibilities, computer networks may increase the organizational learning rate, which can be said as a true advantage in competition. On completion of the course, the peers will able be to share the resources and data in real time using networks. By studying the course, a student will be able to access remote programs and remote databases either of the same organization or from other enterprises or public sources.</p>	



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Course Code	Course
<b>CEC405</b>	<b>Design and Analysis of Algorithm</b>
<p>Algorithms are the core of most technologies used in contemporary computers. Practical applications of algorithms are ubiquitous. This course provides the knowledge of the fundamental techniques for designing and analysing algorithms, including asymptotic analysis; divide-and-conquer algorithms; greedy algorithms; dynamic programming; backtracking and branch-and-bound; string matching algorithms and NP-completeness.</p>	
Course Code	Course
<b>HBSO401</b>	<b>Entrepreneurship Essential program</b>
<p>The course introduces the entrepreneurial journey from finding an idea, to gaining traction in the marketplace and to raising capital. This course explains how entrepreneurs run structured experiments to validate ideas and refine business strategy. The course explores deep into the numbers behind how entrepreneurs and their investors make financial decisions to create value and grow operations.</p>	
Course Code	Course
<b>CEL401</b>	<b>Open Source Lab (Python)</b>
<p>This Open Source Lab (Python) course leads the students from the basics of writing and running Python scripts to more advanced features such as OOP, Exception Handling, file operations, Networking, Databases, GUI development and Web development.</p>	

**Bachelor of Technology in Computer Engineering**

**Semester-V**

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
CEC501	Software Engineering	02	02	01	02	01	01	04
CEC502	Compiler Design	03	02	01	03	01	01	05
CEC503	Machine Learning	03	02	-	03	01	-	04
CEC504	Distributed Systems & Cloud Computing	03	02	-	03	01	-	04
CEC505	Professional Communication and Ethics	-	4(2+2)	-	-	02	-	02
AUC501	Constitution of India	01	-	-	-	-	-	-
HBSO501	Financial accounting (Online)	-	-	-	-	-	-	01
CEL501	Web Programming		4(2+2)	-		02	-	02
	<b>Total</b>	<b>12</b>	<b>16</b>	<b>02</b>	<b>11</b>	<b>08</b>	<b>02</b>	<b>22</b>

**Evaluation Scheme**

**Semester-V**

Course Code	Course Name	T1	T2	AVG	MSE	ESE	Exam Hrs	TW	Pr/Or	Total
CEC501	Software Engineering	20	20	20	20	60	02	25	25	150
CEC502	Compiler Design	20	20	20	20	60	02	25	25	150
CEC503	Machine Learning	20	20	20	20	60	02	25	25	150
CEC504	Distributed Systems & Cloud Computing	20	20	20	20	60	02	25	25	150
CEC505	Professional Communication and Ethics	-	-	-	-	-	-	50	-	50
AUC501	Constitution of India	-	-	-	-	-	-	-	-	-
HBSO501	Financial accounting (Online)	-	-	-	-	-	-	-	-	-
CEL501	Web Programming	-	-	-	-	-	-	25	25	50
	<b>Total</b>									<b>700</b>



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**Subject Description**

**Semester-V**

Course Code	Course
<b>CEC501</b>	<b>Software Engineering</b>
<p>This course is aimed at helping students build up an understanding of how to develop a software system from scratch by guiding them through the development process and giving them the fundamental principles of system development with object-oriented technology using UML. The course will initiate students to the different software process models, project management, software requirements engineering process, systems analysis and design as a problem-solving activity, key elements of analysis and design, and the place of the analysis and design phases within the system development life cycle.</p>	

Course Code	Course
<b>CEC502</b>	<b>Compiler Design</b>
<p>The course is intended to teach the students the basic techniques of Compiler Design. The course will introduce the theory and tools that can be used in order to perform syntax-directed translation of a high-level programming language into an executable code. In addition to the exposition of techniques for compilation, the course will also discuss various aspects of the run-time environment into which the high-level code is translated. This will provide deeper insights into the more advanced semantics aspects of programming languages, such dynamic memory allocation. On completion of this subject students will be able to understand how language translator works and its importance. Students will be able to design compiler for language. The course also generates understanding of latest or advanced compilers.</p>	

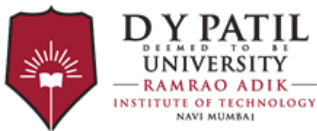


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Course Code	Course
<b>CEC503</b>	<b>Machine Learning</b>
<p>Machine learning uses interdisciplinary techniques such as statistics, linear algebra, optimization, and computer science to create automated systems that can examine through large volumes of data at high speed to make predictions or decisions without human intervention. Machine learning as a field is now incredibly pervasive, with applications spanning from business intelligence to homeland security, from analysing biochemical interactions to structural monitoring of aging bridges, and from emissions to astrophysics, etc. This course will familiarize students with a broad cross-section of models and algorithms for machine learning and prepare students for research or industry application of machine learning techniques.</p>	

Course Code	Course
<b>CEC504</b>	<b>Distributed Systems &amp; Cloud Computing</b>
<p>This subject provides the knowledge of different computing paradigm such as distributed computing and cloud computing. In distributed computing students will study of distributed systems. A distributed system is a system whose components are located on different networked computers, which communicate and coordinate their actions by passing messages to one another. Further, this subject provides significant characteristics of distributed systems are concurrency of components, lack of a global clock, and independent failure of components. In cloud computing students will be familiar with different deployment architectures of cloud computing. Students will also learn different types of services provided by cloud computing. Types of virtualization and overview of cloud operating system is also a part of this subject.</p>	





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Course Code	Course
<b>CEC505</b>	<b>Professional Communication and Ethics</b>
<p>In this course learners will develop the skills of drafting professional documents like ‘Technical Reports’ and ‘Technical Proposal’ with an understanding of ethical practices required in this domain. This practice of preparing professional documents with the required proficiency will enable them to meet the demands of the industry. Learners will gain the training to prepare job search documents and foster the skills to indulge actively in group discussions and job interviews. Interpersonal skills like emotional intelligence, leadership, time management, team spirit, negotiation and assertiveness will be enrooted by class room interactions, role plays and case studies to cultivate a positive approach, that will help them to adapt and overcome the challenges in personal , professional and social life. The course will also help learners to imbibe the codes of ethical conduct and norms of organizational behaviour.</p>	

Course Code	Course
<b>AUC501</b>	<b>Constitution of India</b>
<p>This course intends, Constitution’ meaning of the term, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy. Election Commission: Role and Functioning. State Government and its Administration Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions.</p>	



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Course Code	Course
<b>HBSO501</b>	<b>Financial accounting</b>
<p>This course teaches the fundamentals of financing accounting from the ground up. It explores the preparation of balance sheet, income statement and cash flow statements. It teaches analysis of financial statements and to calculate and interpret critical ratios. The role of managerial judgment in choosing accounting estimates and methods are explored. The course concludes with an introduction to forecasting and valuation.</p>	

Course Code	Course
<b>CEL501</b>	<b>Web Programming</b>
<p>Given the potential of the Web of the future, it is important to learn how to exploit it through the construction of modern applications. Therefore, the aim of this course is to teach students fundamental concepts and show them how they are applied in the construction of Web applications. The course will show through technological tools the key issues to address for building useful dynamic and usable Web applications, the new trends and open issues. This course will also help learner importance of web security and its implementation in real time web application.</p>	

**Bachelor of Technology in Computer Engineering**

**Semester VI**

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
<b>CEDLO601X</b>	<b>Department Elective-I</b>	03	02	-	03	01	-	04
<b>CEDLO602X</b>	<b>Department Elective-II</b>	03	02	-	03	01	-	04
<b>CEDLO603X</b>	<b>Department Elective-III</b>	03	02	-	03	01	-	04
<b>CEDLO604X</b>	<b>Department Elective-IV</b>	03	02	-	03	01	-	04
<b>ILO601X</b>	<b>Institute Elective I</b>	03	-	-	03	-	-	03
<b>HBSO601</b>	<b>Economics for Manager (Online)</b>	-	-	-	-	-	-	01
<b>CEMP601</b>	<b>Mini Project I</b>	-	04	-	-	02	-	02
	<b>Total</b>	<b>15</b>	<b>12</b>	<b>-</b>	<b>15</b>	<b>06</b>	<b>-</b>	<b>22</b>

**Evaluation Scheme**

**Semester-VI**

<b>Course Code</b>	<b>Course Name</b>	<b>T1</b>	<b>T2</b>	<b>AVG</b>	<b>MSE</b>	<b>ESE</b>	<b>Exam Hrs</b>	<b>TW</b>	<b>Pr/Or</b>	<b>Total</b>
<b>CEDLO601X</b>	<b>Department Elective-I</b>	20	20	20	20	60	02	25	25	150
<b>CEDLO602X</b>	<b>Department Elective-II</b>	20	20	20	20	60	02	25	25	150
<b>CEDLO603X</b>	<b>Department Elective-III</b>	20	20	20	20	60	02	25	25	150
<b>CEDLO604X</b>	<b>Department Elective-IV</b>	20	20	20	20	60	02	25	25	150
<b>ILO601X</b>	<b>Institute Elective I</b>	20	20	20	20	60	02	-	-	100
<b>HBSO601</b>	<b>Economics for Manager (Online)</b>	-	-	-	-	-	-	-	-	-
	<b>Total</b>									<b>750</b>

6 <sup>th</sup> Semester Electives					
CEDLO6011	Cryptography & Network Security	CEDLO6012	Data Warehouse and Mining	CEDLO6013	Mobile and Wireless Networks
CEDLO6021	Artificial Intelligence & Soft Computing	CEDLO6022	Artificial Intelligence	CEDLO6023	Infrastructure Security
CEDLO6031	Advanced Algorithm	CEDLO6032	Natural Language Processing	CEDLO6033	Cryptology
CEDLO6041	Virtual and Augmented Reality	CEDLO6042	Digital Image Processing	CEDLO6043	Information Theory and Coding
ILO6011	Project Management	ILO6012	Cyber and Data Laws		



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**Subject Description**

**Semester-VI**

Course Code	Course
<b>CEDLO6011</b>	<b>Cryptography &amp; Network Security</b>
<p>The computing entails risks to the privacy and integrity of data or operation of computer. Networks are under siege from many different types of threat, including internet-based hackers, worms, viruses etc. Hence the need for development of secure system has grown tremendously. The course helps to develop understanding of risks for secure computing. The course explores the working of cryptographic algorithms, authentication protocols and concept of secure communication. The course also helps to understand the importance of network security and different issues, protocols used for securing networks.</p>	

Course Code	Course
<b>CEDLO6021</b>	<b>Artificial Intelligence &amp; Soft Computing</b>
<p>The course contents introduce the basics of artificial intelligence and soft computing which requires identifying various types of intelligent agents, structures and the difference between hard computing and soft computing applications, initiates discovering interesting characteristics of expert system and its architecture and hybrid approaches. It focuses on the problem solving strategies which helps in selection of an appropriate problem solving method for an agent to find a sequence of actions to reach the goal state, talks about various knowledge based agents, first order logic, reasoning to solve real world problem, introduces fuzzy logic and design of fuzzy controllers and builds strong foundation on understanding artificial neural networks.</p>	



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Course Code	Course
<b>CEDLO6031</b>	<b>Advanced Algorithm</b>
<p>This course aims at providing the knowledge of the fundamental techniques for designing and analyzing algorithms including asymptotic analysis, amortized analysis; probabilistic analysis randomized algorithms; advanced data structures; maximum flow algorithms; computational geometry; NP-completeness and approximation algorithms.</p>	
Course Code	Course
<b>CEDLO6041</b>	<b>Virtual &amp; Augmented Reality</b>
<p>The course content is designed to provide an understanding of basic concepts of virtual reality and to explore the applications of virtual reality in various domains. It introduces the rendering techniques and distributed VR environment by establishing connections with various modelling techniques. It helps in exploring augmented reality system and facilitates to implement virtual reality and augmented reality projects using different tools like VRML/X3D, OpenGL and OpenCV.</p>	
Course Code	Course
<b>CEDLO6012</b>	<b>Data warehouse and Mining</b>
<p>This course introduces the basic concepts, principles, methods, implementation techniques, and applications of Data warehouse and data mining. It focuses on two major parts: Data warehouse and Data Mining. In the first part of the course, which focuses Data warehouse module which gives idea about design of data warehouse and the ETL process. In the second part of the course which focuses on Data Mining module gives insights into different data Mining techniques like association mining, classification and clustering.</p>	



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Course Code	Course
<b>CEDLO6022</b>	<b>Artificial Intelligence</b>
<p>The course contents are divided into five parts. Part I: Artificial Intelligence, offers a view of the AI enterprise based around the idea of intelligent agents-systems that can decide what to do and then do it. Part I: Problem Solving, concentrates on methods for deciding what to do when one needs to think ahead several steps-for example in navigating across a country or playing chess. Part III: Knowledge and Reasoning, discusses ways to represent knowledge about the world-how it works, what it is currently like, and what one's actions insight do-and how to reason logically with that knowledge. Part IV: Uncertain Knowledge and Reasoning, it concentrates on reasoning and decision making in the presence of uncertainty about the world, as might be faced, for example, by a system for medical diagnosis and treatment .Part V : Planning, then discusses how to use these reasoning methods to decide what to do, particularly by constructing plans, and Learning, describes methods for generating the knowledge required by these decision-making.</p>	

Course Code	Course
<b>CEDLO6032</b>	<b>Natural Language Processing</b>
<p>Natural (Human) Languages are interesting and challenging due to their rich morphological structures. There are many real-life applications like Chatbots, Digital Assistance, Translation, Information Retrieval, Social network analysis which need Natural Language Processing (NLP) expertise to provide useful insights from the natural language text. Through this course students will get acquainted with the fundamental concepts and techniques of the excitingly growing field of NLP. Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information. Students will also be able to work on real life problems by making use of the modern tools and technologies of NLP.</p>	





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Course Code	Course
<b>CEDLO6042</b>	<b>Digital Image Processing</b>
<p>Signal processing is an essential part of human life and of modern industrial systems. Basic knowledge of signal and image processing is essential to engineers. This course aims to introduce principles of signal processing, with an emphasis on discrete signal and image processing. It will provide theoretical basis for understanding linear processing schemes along with discussions concerning the use of common algorithms and their applications in signal and image processing. On the completion of this course, students will be able to understand fundamentals of signal processing and Image processing. This course will help them to study and observe frequency response of discrete-time systems using various techniques like DFT and FFT. Various approaches used for image enhancement, segmentation and representation will give complete image understanding. This course will also provide an exposure to the real-time digital signal processing application and the implementation of common real-time audio, image and video processing</p>	

Course Code	Course
<b>CEDLO6013</b>	<b>Mobile and Wireless Networks</b>
<p>This course aims to provide the knowledge of fundamental differences between wired /wireless/ Mobile networks, The course is organised in a layered fashion so that there will be a complete understanding of each OSI layer and the fundamental changes made at every layer along with its basic understanding of layered protocols. In addition to that, this course discusses about latest technologies till 5G along with its architectures. Each chapter also discusses about basic understanding of Ad-Hoc capabilities along with its differences with infrastructure network. On completion of this course, the students will be able to complete understanding of wireless/mobile /ad-hoc mobile networks.</p>	



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Course Code	Course
<b>CEDLO6023</b>	<b>Infrastructure Security</b>
<p>Security is a main concern for the network Infrastructure now a days. The network security, database security, web security and cloud security is important to make Infrastructure secure. It is also important to analyse and evaluate software vulnerabilities.</p>	

Course Code	Course
<b>CEDLO6033</b>	<b>Cryptology</b>
<p>Cryptography is science for encryption &amp; Decryption to make information confidential. The objective to learn this subject is to understand the philosophy of cryptology &amp; its methods for encryption &amp; decryption. It is also important to learn hash function for message authentication.</p>	

Course Code	Course
<b>CEDLO6043</b>	<b>Information Theory and Coding</b>
<p>On completion of the course students will be able to understand different threats for data and various types of vulnerabilities. The knowledge gained can be applied to develop secure applications that satisfy the major security goals. The students can apply the authentication mechanism to guaranty secure access to data or system.</p>	



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Course Code	Course
<b>ILO6011</b>	<b>Project Management</b>
<p>On completion of the course, the students will be able to apply project selection criteria using quantitative and qualitative tools and analyse the effect of different organizational structures on the execution of projects. They understand the role of a project manager and the qualities required for success. They can perform project planning activities including risk planning, budget estimation, scheduling, team building and resource allocation, and can also perform project control activities like monitoring &amp; control, auditing, reporting, tracking, risk mitigation &amp; control, and closure of projects.</p>	

Course Code	Course
<b>ILO6012</b>	<b>Cyber and Data laws</b>
<p>The course aims to put the foundation of cyber world and cyber law. Learn regulation of cyber space at national and international level. Understand cybercrime and related concepts and ethics behind them. They will be aware of the arising out of online platforms, social medias and Intellectual Property issues in the cyber space.</p>	

Course Code	Course
<b>HBSO601</b>	<b>Economics for manager</b>
<p>On completion of the course students will be able to Develop effective pricing strategies and understand powerful analytical tools like relative cost analysis and conjoint analysis. They can Identify sources of competitive advantage through differentiation. They will be able to apply course concepts in the context of a growing online retailer, an events ticket broker, a multi-national publishing company, and other firms.</p>	



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Course Code	Course
<b>CEMP601</b>	<b>Miniproject I</b>
<p>The students will undergo the experience of developing a project by applying the all stages of project development life cycle. They are expected to learn the skills of teamwork, survey of the problem domain and understand the issues to be addressed. Implement some of the issues identified to meet the real time requirements and to give a good GUI. A quality report exploring technical report writing skills will be generated as part of activity.</p>	

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**Semester-VII**

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
<b>CEDLO701X</b>	<b>Department Elective-I</b>	03	02	-	03	01	-	04
<b>CEDLO702X</b>	<b>Department Elective-II</b>	03	02	-	03	01	-	04
<b>CEDLO703X</b>	<b>Department Elective-III</b>	03	02	-	03	01	-	04
<b>CEDLO704X</b>	<b>Department Elective-IV</b>	03	02	-	03	01	-	04
<b>ILO701X</b>	<b>Institute Elective-II</b>	03	-	-	03	-	-	03
<b>AUC701</b>	<b>Environmental Studies</b>	01	--	-	-	-	-	-
<b>CEMP701</b>	<b>Mini Project II</b>	-	04	-	-	02	-	02
	<b>Total</b>	<b>16</b>	<b>12</b>	<b>-</b>	<b>15</b>	<b>06</b>	<b>-</b>	<b>21</b>

**Evaluation Scheme**

**Semester-VII**

Course Code	Course Name	T1	T2	AVG	MSE	ESE	Exam Hrs	TW	Pr/Or	Total
<b>CEDLO701X</b>	<b>Department Elective-I</b>	20	20	20	20	60	02	25	25	150
<b>CEDLO702X</b>	<b>Department Elective-II</b>	20	20	20	20	60	02	25	25	150
<b>CEDLO703X</b>	<b>Department Elective-III</b>	20	20	20	20	60	02	25	25	150
<b>CEDLO704X</b>	<b>Department Elective-IV</b>	20	20	20	20	60	02	25	25	150
<b>ILO701X</b>	<b>Institute Elective-II</b>	20	20	20	20	60	02	-	-	100
<b>AUC701</b>	<b>Environmental Studies</b>	-	-	-	-	-	-	-	-	-
<b>CEMP701</b>	<b>Mini Project II</b>	-	-	-	-	-	-	25	25	50
	<b>Total</b>									<b>750</b>

**7<sup>th</sup> Semester Electives**

<b>CEDLO7011</b>	High Performance Computing	<b>CEDLO7012</b>	Soft Computing	<b>CEDLO7013</b>	Intrusion Detection System
<b>CEDLO7021</b>	Human Machine Interaction	<b>CEDLO7022</b>	High Performance Computing	<b>CEDLO7023</b>	Block chain technology and Application
<b>CEDLO7031</b>	Advanced Computer Network	<b>CEDLO7032</b>	Big Data Analytics	<b>CEDLO7033</b>	Malware Analysis
<b>CEDLO7041</b>	Software Testing and Analysis	<b>CEDLO7042</b>	Internet of Things	<b>CEDLO7043</b>	Cyber Security and Forensic
<b>ILO7011</b>	Intellectual Property Rights	<b>ILO7012</b>	Operations Research		



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**Subject Description**

**Semester-VII**

Course Code	Course
<b>CEDLO7011 / CEDLO7022</b>	<b>High Performance Computing</b>
<p>High-performance computing refers to a specialized use and programming of (parallel) supercomputers, computer clusters, and everything from software to hardware to speed up computations. In this course students will learn how to write faster code that is highly optimized for modern multi-core processors and clusters, using modern software development tools, performance profilers, specialized algorithms, parallelization strategies, and advanced parallel programming constructs in OpenMP and MPI and CUDA. On completion of this subject student will be able to understand parallel computer architecture and apply parallel programming concepts.</p>	

Course Code	Course
<b>CEDLO7021</b>	<b>Human Machine Interaction</b>
<p>Human Machine Interface (HMI) is a user interface that connects a person to a machine, system or device. The study covers the way human interact with computers and design technologies that let human interact with computers in a novel ways. This course integrates theories and methodologies from computer science, cognitive psychology, design, and many other areas</p>	





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Course Code	Course
<b>CEDLO7031</b>	<b>Advanced Computer Network</b>
<p>This is a second graduate-level course on computer networks, which will cover various advanced topics in computer networking. The course begins with a brief retrospection on the design of the Internet, its basic mechanisms and protocols. The course helps to provide strong understanding of routing at layer 2 and 3 applying traffic engineering principles. In addition, this course will cover some recent proposals to improve network performance, functionality and scalability to meet emergent applications requirement and enterprise network security. On completion of this course, learners will be able to design networks to solve the enterprise network issues.</p>	

Course Code	Course
<b>CEDLO7041</b>	<b>Software Testing &amp; Analysis</b>
<p>Software testing helps in finalizing the software application or product against business and user requirements. It is very important to have good test coverage in order to test the software application completely and make it sure that it's performing well and as per the specifications. This course aims to provide in depth coverage of various software verification and validation testing methods &amp; explore software Quality assurance and to prepare with technical competencies to get growing career as software tester or software development engineer. On the completion of this course, students will able to understand the basic concepts of Software testing &amp; fundamentals of testing approach in software development. This course will help them to decide different strategies for testing and quality management. Various automation techniques can be explored and used to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.</p>	



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Course Code	Course
<b>CEDLO7012</b>	<b>Soft Computing</b>
<p>This subject provides the basic concept of soft computing, difference between soft computing and hard computing. Students will learn the concept of optimization and how to apply different searching techniques to solve the optimization problem. Fuzzy sets and fuzzy reasoning, rule-based models and linguistic variables, fuzzy controls, fuzzy decision will be useful for the students to design an intelligent system. Further, study of different types of neural networks and evolutionary algorithms is also a part of this subject.</p>	

Course Code	Course
<b>CEDLO7032</b>	<b>Big Data Analytics</b>
<p>With the exceptional flood of data today, there is immense pressure on the data processing environment which gains the attention of industries, researches and academicians towards the field of Big Data Analytics. The objective of the course is to provide fundamental knowledge of this growing field and to introduce technologies and tools used for Big Data Analytics. The course will cover various algorithms used to get insights from big data. At the end of the course students will achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.</p>	



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Course Code	Course
<b>CEDLO7042</b>	<b>Internet of Things</b>
<p>The Internet of Things (IOT) is the next wave, world is going to witness. Today we live in an era of connected devices (mobile phones, computers etc.), the future is of connected things (Eg: home appliances, vehicles, lamp-posts, personal accessories, your pets, industrial equipment and everything which you use in day-to-day life). Internet of Things is a term given to the attempt of connecting objects to the internet and also to each other - allowing people and objects themselves to analyze data from various sources in real-time and take necessary actions in an intelligent fashion. This course focuses on the latest trends in IOT with application development, product design and prototyping.</p>	

Course Code	Course
<b>CEDLO7013</b>	<b>Intrusion Detection System</b>
<p>This subject is focuses on the Intrusion Detection system. The objective of this course is to learn incites of the IDS Frame works for Anomaly detection. It is also important to understand the concept of Security of IDS and IDS sensor.</p>	

Course Code	Course
<b>CEDLO7023</b>	<b>Block Chain Technology and Application</b>
<p>The decentralization of block chain network removes the need of a middleman, like a bank or an agent. Transactions of digital asset transfer can be done directly in a peer-to-peer manner. It is required to understand the mechanism of Bitcoin, Ethereum and Hyperledger fabric.</p>	



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Course Code	Course
<b>CEDLO7033</b>	<b>Malware Analysis</b>
<p>This subject provides the basic concept of the nature of malware, its capabilities, and how it is combated through detection and classification. The tools and methodologies used to perform static and dynamic analysis on unknown executables. It also provides the concept of intimate understanding of executable formats, It also understand the underlying scientific and logical limitations on society's ability to combat malware. This subject provides broad understanding of the social, economic, and historical context in which malware occurs.</p>	

Course Code	Course
<b>CEDLO7043</b>	<b>Cyber Security and Forensic</b>
<p>This course familiarizes students with the types of crime that can occur through computers and the Internet, such as e-mail scams, identity theft, hacking, Internet harassment, and phishing. Students learn investigation techniques and discuss how cybercrime is changing and growing. The digital forensic aspects of the course teach students how to conduct forensic examinations, establish chains of custody, and how to handle and preserve digital media safely. Computer forensic students learn about the types of crimes associated with computer evidence, and they gain professional-level knowledge about related legal and privacy issues.</p>	



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Course Code	Course
<b>ILO7011</b>	<b>Intellectual property Rights</b>
<p>This course familiarises students with Intellectual Property assets, rights, registration process, agreements and legislations and Digital Products and Law. Students will be able to work for development, promotion, protection, compliance, and enforcement of Intellectual property. They gain the ability to manage Intellectual Property portfolio to enhance the value of the firm by understanding the environment and Emerging issues in IPRs.</p>	

Course Code	Course
<b>ILO7012</b>	<b>Operations Research</b>
<p>Operations Research deals with modelling, analysis and solution to real life problems. This course will focus on mathematical modelling and will use deterministic and probability techniques for optimization and decision making. Linear and Integer Programming techniques will be introduced. At the end of the course, students will have the skills to build their own formulations, to expand existing formulations, to critically evaluate the impact of model assumptions and to choose an appropriate solution technique for solving real world problems.</p>	

Course Code	Course
<b>AUC701</b>	<b>Environmental Studies</b>
<p>This course will introduce the students to identify the major challenges in environmental issues and evaluate possible solutions. Develop analytical skills, critical thinking and demonstrate socio-economic skills for sustainable development. To analyze an overall impact of specific issues and develop environmental management plan. Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale, Develop critical thinking and/or</p>	



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observation skills, and apply them to the analysis of a problem or question related to the environment, Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components. Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues

Course Code	Course
<b>CEMP701</b>	<b>Mini Project II</b>
<p>The students will undergo the next level of exploring project development They are expected to enhance the team building qualities. With respect to the problem chosen, the team should analyse the issues critically and do technology survey to know the current research work happenings. The team should Design a detailed plan of action and then Implement the core issues identified. Finally team should Test and validate the results. A quality report in standard format will be generated as part of activity.</p>	

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**Semester-VIII**

Course Code	Course Title	Hours per week			Credits
		Lecture	Tutorial	Practical	
CEP801	Project/Internship	-	-	30	15
Total					<b>15</b>
Course Code	Course Title	Mid Semester Evaluation	End Semester Evaluation		Marks
			TW	OR	
CEP801	Project/Internship	50	100	100	<b>250</b>



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**Subject Description**

**Semester-VIII**

Course Code	Course
<b>CEP801</b>	<b>Project/Internship</b>
The students can take a comprehensive research problem as a project or can undergo a comprehensive Internship under a reputed industry. The project work undertaken should lead to a publication / patent / copy rights and for project competitions.	