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| | **Pimpri Chinchwad Education Trust's**<br>**Pimpri Chinchwad College of Engineering &Research**<br>**Ravet, Pune** | |
| **Academic Year:** 2022-23 | **Course Outcomes** | **Term-** I |

**Department: Computer Engineering**

| **SE Computer** | | |
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| **CourseName** | **DM** | **CourseCode: 210241** |
| Subject Name | CO Number | CO statement |
| Discrete Mathematics | C201.1 | Analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using Mathematical Induction. |
| | C201.2 | Specify, Manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems. |
| | C201.3 | Solve counting problems by applying elementary counting techniques using the product and sum rules, permutations, combinations, the pigeon-hole principle, and binomial expansion |
| | C201.4 | Model and solve computing problems using trees and graphs and solve problems using appropriate algorithms. |
| | C201.5 | Analyze the properties of binary operations, apply abstract algebra in coding theory and evaluate algebraic structures. |
| **CourseName** | **FDS** | **CourseCode:210242** |
| Subject Name | CO Number | COstatement |
| Fundamentals of Data Structures | C202.1 | Analyze different data structures based on time and space complexity. |
| | C202.2 | Implement a program using sequential Static data structure. |
| | C202.3 | Analyze the different searching and sorting techniques based on computational efficiency of the algorithms. |
| | C202.4 | Implement a program using sequential Dynamic data structure. |
| | C202.5 | Apply principles of data structures-stack in approaching the problem solution. |
| | C202.6 | Apply principles of data structures-Queue in approaching the problem solution. |

| **Course Name** | **OOPS** | **CourseCode: 210243** |
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| Subject Name | CO Number | CO statement |
| Object Oriented Programming | C203.1 | Analyze the strengths of object-oriented programming. |
| | C203.2 | Design object-oriented solution for small system involving multiple objects by considering S/W principles. |
| | C203.3 | Develop programming applications using object-oriented programming language C++. |
| | C203.4 | Able to understand file handling concepts. |
| | C203.5 | Design and apply to use the concept of generic programming & exception handling. |
| | C203.6 | Apply construct-sequence, selection and iteration, classes and objects, inheritance, use of predefined classes from libraries while developing software. |
| **CourseName** | **CG** | **Course Code:210244** |
| Subject Name | CO Number | CO statement |
| Computer Graphics | C204.1 | Identify the basic terminologies of Computer Graphics and Apply mathematics to develop Computer programs for elementary graphic operations. |
| | C204.2 | Illustrate the concepts of windowing and clipping and Apply various algorithms to fill and clip polygons. |
| | C204.3 | Apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection. |
| | C204.4 | Apply the concepts of color models, lighting, shading models and hidden surface elimination. |
| | C204.5 | Create effective programs using concepts of curves, fractals. |
| | C204.6 | Create effective programs using concepts of animation and gaming. |
| **CourseName** | **DELD** | **Course Code: 210245** |
| Subject Name | CO Number | COstatement |
| Digital Electronics and Logic Design | C205.1 | Simplify Boolean Expressions using K Map. |
| | C205.2 | Design and implement combinational circuits and sequential circuits. |
| | C205.3 | Develop simple real-world applications using ASM and PLD. |
| | C205.4 | Differentiate and Choose appropriate logic families IC packages as per the given design specifications. |
| | C205.5 | Explain organization and architecture of computer system |

| CourseName | DS Lab | Course Code: 210246 |
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| Subject Name | CO Number | COstatement |
| Data Structures Laboratory | C206.1 | Use algorithms on various linear data structure using sequential organization to solve real life problems. |
| | C206.2 | Analyze problems to apply suitable searching and sorting algorithm to various applications. |
| | C206.3 | Analyze problems to use variants of linked list and solve various real-life problems. |
| | C206.4 | Implement stack and queue data structures and algorithms for solving different kinds of problems. |
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| **CourseName** | **OOPCGL Lab** | **Course Code: 210247** |
| Subject Name | CO Number | COstatement |
| Object Oriented Programming and Computer Graphics Laboratory | C207.1 | Understand and apply the concepts like class, object, inheritance, polymorphism, exception handling and generic structures for implementing reusable programming codes. |
| | C207.2 | Analyze the concept of file and apply it while storing and retrieving the data from secondary storages. |
| | C207.3 | Analyze and apply computer graphics algorithms for line-circle drawing, scan conversion and filling with the help of object oriented programming concepts. |
| | C207.4 | Understand the concept of windowing and clipping and apply various algorithms to fill and clip polygons. |
| | C207.5 | Apply logic to implement, curves, fractals, animation and gaming programs |
| **CourseName** | **DELD Lab** | **Course Code: 210248** |
| Subject Name | CO Number | COstatement |
| Digital Electronics and Logic Design Laboratory | C208.1 | Design and implement Combinational digital circuits by applying the knowledge to appropriate ICs as per the design specifications. |
| | C208.2 | Design and implement Sequential digital circuits by applying the knowledge to appropriate ICs as per the design specifications. |

| CourseName | BCS | Course Code: 210249 |
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| Subject Name | CO Number | COstatement |
| Business Comm.skills | C209.1 | Express effectively through verbal/oral communication and improve listening skills |
| | C209.2 | Write precise briefs or reports and technical document |
| | C209.3 | Prepare for group discussion / meetings / interviews and presentations |
| | C209.4 | Explore goal/target setting, self-motivation and practicing creative thinking. |
| | C209.5 | Operate effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, |

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| | | Interpersonal relationships, conflict management and leadership qualities. |
| **CourseName** | **HSS** | **Course Code: 210250** |
| Subject Name | CO Number | COstatement |
| Humanity and Social Sciences | C210.1 | Aware of the various issues concerning humans and society. |
| | C210.2 | Aware about their responsibilities towards society. |
| | C210.3 | Sensitized about broader issues regarding the social, cultural, economic and human aspects, involved in social changes. |
| | C210.4 | Able to understand the nature of the individual and the relationship between self and the community. |
| | C210.5 | Able to understand major ideas, values, beliefs, and experiences that have shaped human history and cultures. |

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| **CourseName** | **DBMS** | **Course Code : 310241** |
| Subject Name | CONumber | COstatement |
| Database Management System | C301.1 | Design Database Management System using ER model |
| | C301.2 | Use SQL and PLSQL for processing structured data |
| | C301.3 | Analyze the database design using normal forms of Normalization |
| | C301.4 | Apply transaction Management in relational database System |
| | C301.5 | Use NoSQL databases for processing unstructured data |
| | C301.6 | Apply emerging advanced database concepts. |
| **CourseName** | **TOC** | **CourseCode:310242** |
| Subject Name | CONumber | COstatement |
| Theory Of Computation | C302.1 | Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design finite automata and its variants. |
| | C302.2 | Construct Regular Expression to present regular language and understand pumping lemma for RE |
| | C302.3 | Design Context Free Grammar and learn to simplify the Context Free Language. |

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| | C302.4 | Construct Pushdown Automata Model for the Context Free Language |
| | C302.5 | Devise Turing Machine for the different requirements outlined by theoretical computers science |
| | C302.6 | Analyze different classes of problems and study concepts of NP completeness. |
| **CourseName** | **SPOS** | **CourseCode:310243** |
| Subject Name | CONumber | COstatement |
| Systems programming and operating systems | C303.1 | To analyze basic System Software and its functionality. |
| | C303.2 | To design various System Software using suitable data structure |
| | C303.3 | To compare different loading schemes and analyze the performance of linker and loader |
| | C303.4 | To analyze the performance of process scheduling algorithms |
| | C303.5 | To Identify the mechanism to deal with deadlock and concurrency issues |
| | C303.6 | To demonstrate memory organization and memory management policies |
| **CourseName** | **CNS** | **CourseCode:310244** |
| Subject Name | CONumber | COstatement |
| Computer Networks and Security | C304.1 | Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies. |
| | C304.2 | Implement the Error control and Flow control technique of the data link layer. |
| | C304.3 | Analyze the working of different routing protocols and mechanisms. |
| | C304.4 | Implement client-server applications using sockets. |
| | C304.5 | Illustrate role of application layer with its protocols, client-server architectures. |
| | C304.6 | Comprehend the basics of Network Security. |
| **CourseName** | **HCI** | **CourseCode:310245(B)** |
| Subject Name | CO Number | CO statement |
| Human Computer Interface | C305.1 | Identify the different capabilities of human and computer interaction models to design effective interfaces. |
| | C305.2 | Apply and analyze the user-interface with respect to golden rules of interface |
| | C305.3 | Analyze and evaluate the different interaction styles. |
| | C305.4 | Design interactive designs for feasible data search and retrieval. |
| | C305.5 | Analyze the scope of HCI in various paradigms. |

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| | C305.6 | Analyze and identify user models, user support, and stakeholder requirements of HCI systems |
| **CourseName** | **DBMS Lab** | **CourseCode:310246** |
| Subject Name | CONumber | COstatement |
| Database management system Laboratory | C306.1 | Design E-R Model for given requirements and convert the same into database tables |
| | C306.2 | Design schema in appropriate normal form considering actual requirements |
| | C306.3 | Implement SQL queries for given requirements, using different SQL concepts |
| | C306.4 | Implement PL/SQL Code block for given requirements |
| | C306.5 | Implement NoSQL queries using MongoDB |
| | C306.6 | Design and develop application considering actual requirements and using database concepts |
| **CourseName** | **CNL** | **CourseCode: 310247** |
| Subject Name | CO Number | CO statement |
| Computer network Lab | C307.1 | Analyze the requirements of network types, topology and transmission media |
| | C307.2 | Demonstrate error control, flow control techniques and protocols and analyze them |
| | C307.3 | Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms |
| | C307.4 | Develop Client-Server architectures and prototypes |
| | C307.5 | Implement web applications and services using application layer protocols |
| | C307.6 | Use network security services and mechanisms |
| **CourseName** | **LP-1** | **CourseCode:310248** |
| Subject Name | CONumber | COstatement |
| LAB Practice-1 | C308.1 | To design various System Software using suitable data structure |
| | C308.2 | To implement scheduling policies and memory management concepts of operating system |
| | C308.3 | Apply the principles of HCI to design interactive user interfaces. |
| | C308.4 | Apply and analyze GOMS model for suitable application. |
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| **CourseName** | **STC** | **CourseCode:310249** |
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| Subject Name | CONumber | COstatement |
| Seminar & Technical Communication | C309.1 | Analyze a latest topic of professional interest |
| | C309.2 | Enhance technical writing skills |
| | C309.3 | Identify an engineering problem, analyze it and propose a work plan to solve it |
| | C309.4 | Communicate with professional technical presentation skill |

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| **CourseName** | **DAA** | **Course Code :410241** |
| Subject Name | CONumber | COstatement |
| Design and Analysis of Algorithms | C401.1 | Apply algorithmic and problem solving principles |
| | C401.2 | Analyze the asymptotic performance of algorithms |
| | C401.3 | Decide and apply algorithmic strategies to solve given problem |
| | C401.4 | Find optimal solution by applying various methods |
| | C401.5 | Analyze and Apply Scheduling and Sorting Algorithms. |
| | C401.6 | Solve problems for multi-core or distributed or concurrent environments |
| **Course Name** | **ML** | **CourseCode:410242** |
| Subject Name | CONumber | COstatement |
| Machine learning | C402.1 | Identify the needs and challenges of machine learning for real time applications. |
| | C402.2 | Apply various data pre-processing techniques to simplify and speed up machine learning algorithms. |
| | C402.3 | Select and apply appropriately supervised machine learning algorithms for real time applications. |
| | C402.4 | Implement variants of multi-class classifiers and measure its performance. |
| | C402.5 | Compare and contrast different clustering algorithms. |
| | C402.6 | Design a neural network for solving engineering problems. |
| **Course Name** | **BT** | **CourseCode:410243** |
| Subject Name | CONumber | COstatement |
| | C403.1 | Interpret the fundamentals and basic concepts in Blockchain |
| | C403.2 | Compare the working of different blockchain platforms |

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| Blockchain Technology | C403.3 | Use Crypto wallet for cryptocurrency based transactions |
| | C403.4 | Analyze the importance of blockchain in finding the solution to the real-world problems. |
| | C403.5 | Illustrate the Ethereum public block chain platform |
| | C403.6 | Identify relative applications where block chain technology can be effectively used and implemented. |
| **CourseName** | **CSDF** | **CourseCode:410244(D)** |
| Subject Name | CONumber | COstatement |
| Cyber Security And Digital Forensics | C404.1 | Analyze threats in order to protect or defend it in cyberspace from cyber-attacks |
| | C404.2 | Apply the appropriate security solutions against cyber-attacks |
| | C404.3 | Analyze the need of digital forensic and role of digital evidences |
| | C404.4 | Understand the rules and types of evidence collection |
| | C404.5 | Analyze, validate and process crime scenes |
| | C404.6 | Identify the methods to generate legal evidence and supporting investigation reports |
| **Course Name** | **STQA** | **CourseCode:410245(B)** |
| Subject Name | CONumber | COstatement |
| Software Testing And Quality Assurance | C405D.1 | Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance. |
| | C405D.2 | Design and Develop project test plan, design test cases, test data, and conduct test operations. |
| | C405D.3 | Apply recent automation tools for various software testing for testing software. |
| | C405D.4 | Apply different approaches of quality management, assurance, and quality standard to software systems. |
| | C405D.5 | Apply and analyze effectiveness Software Quality Tools. |
| | C405D.6 | Apply tools necessary for an efficient testing framework. |

| **Course Name** | **Lab Practice III** | **CourseCode:410246** |
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| Subject | CONumber | COstatement |
| Lab Practice III | C406.1 | Apply preprocessing techniques on datasets. |
| | C406.2 | Implement and evaluate linear regression and random forest regression models. |
| | C406.3 | Apply and evaluate classification and clustering techniques. |
| | C406.4 | Analyze performance of an algorithm. |
| | C406.5 | Implement an algorithm that follows one of the following algorithm design strategies: divide and conquer, greedy, dynamic programming, backtracking, branch and bound. |
| | C406.6 | Interpret the basic concepts in Blockchain technology and its applications |
| **CourseName** | **Laboratory Practice -IV** | **CourseCode:410247** |
| Subject Name | CONumber | COstatement |
| Laboratory Practice -IV | C407.1 | Implement computer forensic application programs to analyze the various cybercrime attacks. |
| | C407.2 | Design and develop a tool for digital forensic of images, audio and video. |
| | C407.3 | Apply software testing tools to perform manual and automated testing. |

| **CourseName** | **PS-1** | **CourseCode:310248** |
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| Subject Name | CONumber | COstatement |
| Project Stage I | C408.1 | Solve real life problem by applying knowledge and skills keeping eye on current technologies and inculcating the practice of lifelong learning |
| | C408.2 | Analyze alternative approaches,apply and use the most appropriate one for feasible solutions exhibiting project |

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| | | management skills. |
| | C408.3 | Demonstrate effective communication at various levels and write precise reports and technical documents in a nutshell. |
| | C408.4 | Participate effectively in multi-disciplinary and heterogeneous teams exhibiting teamwork,interpersonal relationships,conflict management and leadership quality |
| | C408.5 | Provide solutions to problems considering social, safety, environmental, ethical and legal issues. |