# Shivaji University, Kolhapur

# Department of Technology

| **Vision** |
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| To be a leader in engineering and technology education, a research centre of global standards to provide valuable resources for industry and society through development of competent technical human resources. |
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| **Mission** |
| 1. To develop technocrats of national & international stature committed to the task of nation building.<br>2. To organize teaching learning programs to facilitate the development of competent and committed professionals for practice, research and academics.<br>3. To undertake collaborative research projects that offer opportunities for consistent interaction with industries. |

# Name of Programme: B.Tech. (Computer Science and Technology)

| **Program Outcomes** |
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| 1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| 2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences |
| 3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations |
| 4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions |
| 5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| 6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| 7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| 8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |

9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## Program Specific Outcomes

1. Provide effective and efficient knowledge of technology and free open source software (FOSS)through IIT Bombay Spoken Tutorial Project

2. To create the awareness of foreign language among students to meet global needs and look for opportunities in multinational companies.

3. Provide platform to students to develop a new and innovative project which will improve local industry needs.

## Course Outcomes

### Part-I Semester-I

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| 67895 | Engineering Mathematics-I | 1. Students in this course will apply the Procedure and methods to solve technical problems.<br>2 .Student can understand how to model real world scenario using Mathematics<br>3. Students will be able to solve computational problems using Scilab/Matlab. |
| 67896/67942 | Engineering Physics | 1. The student would be able to apply the concepts of physics in various branches of engineering<br>2 The student would be able to use the techniques, skills, and modern tools necessary for physics and engineering careers<br>3. Understands and apply the concepts of light in optical fibers, light wave communication systems, holography.<br>4. Use lasers as light sources for low and high energy applications.<br>5.Understand the nature and characteristics of ultrasonic waves and its various engineering applications. |
| 67897/67943 | Engineering Mechanics | 1. Differentiate between Scalar and Vector Quantities<br>2. Understand the characteristics of force, system of forces , learn to resolve forces.<br>3. Understand the moment and couple of forces and |

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| | | effect of moment on rigid body<br>4. Compute resultant of coplanar concurrent and non-<br>concurrent force system.<br>5. Distinguish between C.G. and Centroid, Compute<br>moment of inertia of plane figures and composite figures.<br>6. Understand and analyze beam as a structure and compute support reactions using Lami's theorem &<br>equilibrium Conditions for concurrent, parallel and<br>general force system.<br>7. Understand Truss as a structural member and analyze plane trusses by the method of joints And sections<br>8. Understand the concept of dynamic as applied to particle.<br>9. Introduce & define Kinematics of Rigid body, get idea about translation, rotation, general<br>Plane motion<br>10.To Know principle of work. |
| 67899/67945 | Electronic Component Devices | 1. 1 Understand the basics of Electronics component, different materials and their applications.<br>2. Understand the construction , V-I characteristics and application of semiconductor devices<br>3. Analyze different electronic circuits based on diode , transistor and SCR<br>4. Explain the working principle, construction, applications of relays, display devices and transducer.<br>5. Test and verify results of diode and BJT circuits |
| 67898/67944 | Fundamentals of Mechanical Engineering | 1. Recall the terms, basic concepts and laws of thermodynamics.<br>2. Explain the working of various mechanical systems like I.C.Engines, Refrigeration and air conditioning systems, power plants, energy conversion devices and power transmission devices.<br>3. Explain various types of manufacturing processes.<br>4. Explain heat and mass transfer and its modes of transfer.<br>5. Analyze power transmission devices with their functions. |
| 67900/67946 | Lab-I | 1.The student would be able to use spectrometer, |

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| | Engineering Physics | polar meter, LASER, photodiode for various measurements.<br>2.Test optical components using principles of interference and diffraction of light<br>3.Determine the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements.<br>4.Use ultrasonic interferometer for measuring velocity of ultrasound in various liquids. |
| 67901/67947 | Lab.-II Engineering Mechanics | After successful completion of this course, the student will able to:<br>1. Verify and correlate law of polygon of forces.<br>2. Verify Lami's theorem.<br>3. Verify Equilibrium conditions.<br>4. Determine coefficient of friction for two sliding surfaces.<br>5. Verify Law of Moments.<br>6. Find value of local gravitational acceleration. |
| 67902/67948 | Lab.–III Fundamentals of Mechanical Engineering | 1. Explain and **demonstrate**the working of various mechanical systems like I.C.Engines, Refrigeration andair conditioning systems, power plants and steam generators.<br>2. Explain and **demonstrate** the construction and working of mechanical power transmission devices.<br>3. Explain and **demonstrate** the construction and working of energy conversion devices.<br>4. Explain and **demonstrate** the manufacturing processes. |
| 67903/67949 | Lab.–IV Electronic Components of Devices | 1. Understand the diode and transistor characteristics.<br>2. Verify the rectifier circuits using diodes and filter circuits.<br>3. Design various amplifiers like CE, CC, common source amplifiers<br>4. Study experimentally the characteristics of SCR and JFET |
| 67904/67950 | Lab-V Professional Communication | 1. Students will be able to communicate language effectively.<br>2. Students learn to use grammar rules in spoken and written English.<br>3. Students will be able to learn personality traits and soft skills.<br>4. Students acquire required skills for technical writings. |

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| | | 5. Students learn fluency and pronunciation.<br>6. Students acquire techniques for presentation skills. |
| 67905/67951 | Lab- VI Matlab & Scilab | 1. To familiarize the student in introducing and exploring MATLAB & SCILAB software's.<br>2. Understand the main features of the MATLAB and SCILAB<br>3. To enable the student on how to approach for solving Engineering Mathematics problems using MATLAB and SCILAB.<br>4. To solve complicated numerical problems by writing MATLAB and SCILAB programs<br>5. Interpret and visualize simple mathematical functions and operations using MATLAB and SCILAB. |
| **Part-I Semester-II** | | |
| 67931 | Engineering Mathematic-II | 1. Students in this course will apply the Procedure and methods to solve technical problems<br>2. Student can understand how to model real world scenario using Mathematics.<br>3. Students will be able to solve computational problems using Scilab/Matlab. |
| 67932/67906 | Engineering Chemistry | After successful completion of this course, the student will able to:<br>1 Have knowledge of water quality parameters and water softening processes, and calculate hardness of water.<br>2 Classify and describe properties and applications of engineering material.<br>3 Explain mechanism and properties of lubricants and select lubricants for different service conditions.<br>4 Understand the mechanism and control methods of corrosion and apply their knowledge for protection of different metals from corrosion.<br>5 Use instrumental methods for the analysis of material. |
| 67933/67907 | Fundamental Of Civil Engineering | 1. Understand how civil engineering is related to other branches.<br>2. Find out linear and angular measurements required to prepare a plan or map by using traditional as well as modern instruments.<br>3. Find out vertical distances, reduced levels and angles by using total station.<br>4. Calculate area of irregular surface by using Mechanical and Digital Planimeter.<br>5. Identify building materials required for construction |

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| | | with current market rates.<br>6. Understand use, necessity of submission and working drawing.<br>7. Prepare site visit report. |
| 67935/67909 | Fundamental Of Electrical Engineering | 1. Develop fundamental understanding about basics of DC and AC circuit .<br>2. Differentiate between electrical and magnetic circuit.<br>3. Explain the working principle, construction, applications of DC machines and AC machines.<br>4. Understand electrical power system, wiring and Ear thing .<br>5. Apply different circuit laws to solve electrical circuits and verify results experimentally . |
| 67934/67908 | Engineering Graphics | 1. Identify basic concepts of BIS conventions and their application.<br>2. Interpret first angle and third angle projection system.<br>3. Construct orthographic projections of points, lines and planes.<br>4. Apply principles of projection and construct orthographic and isometric views of an object.<br>5. Develop a skill of visualization to understand and read the drawing. |
| 67936/67910 | Lab-I Engineering Chemistry | 1 Apply basic concepts of chemistry for analysis.<br>2 Determine the various water quality parameters and preparation of polymers<br>3 Determine the viscosity of liquid<br>4 Estimate the amount of copper and zinc from brass solution<br>5 Understand the use of instrumental methods for analysis of the material |
| 67937/67911 | Lab-II Fundamental of Civil Engineering | After successful completion of this course, the student will able to:<br>1. Understand how civil engineering is related to other branches.<br>2. Find out linear and angular measurements required to prepare a plan or map by using traditional as well as modern instruments.<br>3. Find out vertical distances, reduced levels and angles by using total station.<br>4. Calculate area of irregular surface by using Mechanical and Digital Planimeter.<br>5. Identify building materials required for construction with current market rates.<br>6. Understand use, necessity of submission and working drawing.<br>7. Prepare site visit report. |
| 67938/67912 | Lab. -III | 1. Identify and implement basic concepts of BIS |

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| | Engineering Graphics | conventions to sketch Engineering drawing.<br>2. Create geometric constructions with hand tools.<br>3. Construct orthographic projection and sectional view of a machine part.<br>4. Create isometric projection from multiview drawings of an object.<br>5. Sketch projection of solids and development of lateral surfaces of solids. |
| 67939/67913 | Lab.- IV Fundamental Of Electrical Engineering | After completing this course the student will be able<br>1) Perform and measure the basic electric circuit experiment with knowledge of fundamental laws<br>2) Demonstrate behavior of R,L, C,AC circuit.<br>3) Understand use of various electrical measuring instruments.<br>4) Understand application of DC machines and testing of single phase transformer. |
| 67940/67914 | Lab.-V Workshop Practice | 1. Execute safety measures, while working in a workshop.<br>2. Identify and use of various hand tools and measuring instruments.<br>3. Demonstrate and use of different fitting tools and prepare a fitting job as per given drawing.<br>4. Demonstrate and use of different Carpentry tools and prepare a wooden job as per given drawing.<br>5. Perform Arc welding operation to prepare a welding joint. |
| 67941/67915 | Lab.-VI Computer Programming | 1. Illustrate the flowchart and design of an algorithm for a given problem and to develop C programs using operators.<br>2. Develop conditional and iterative statements to wite C programs.<br>3. Design C programs with the use of Pointers to access arrays, strings and functions.<br>4. Exercise user defined data types including structures and unions to solve problems.<br>5. Design C programs using pointers and to allocate memory using dynamic memory management.<br>6. Demonstrate files concept to show input and output of files in C. |
| Part-II Semester-III | | |
| MA211 | Applied | 1. Apply the fundamental concepts of |

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| | Mathematics-I | Linear Differential Equations and the basic numerical methods for their resolution.<br>2. Solve the problems choosing the most suitable method.<br>3. Understand the difficulty of solving problems analytically and the need to use numerical approximations for their resolution.<br>4. Use computational tools to solve problems and applications of Differential Equations.<br>5. Formulate and solve different problems in the field of Industrial Organisation using mathematical programming and assignment problems.<br>6. Use an adequate scientific language to formulate the basic concepts of the course. |
| CS211 | Discrete Mathematical Structure | 1. Interpret the knowledge of Theory of Numbers<br>2. Understand the basic principles of sets and operations in sets.<br>3. Demonstrate an understanding of relations and functions and be able to determine their properties.<br>4. Demonstrate different traversal methods for trees and graphs & solving problems in Computer Science using graphs and trees.<br>5. Write an argument using logical notation and determine if the argument is or is not valid.<br>6. Model problems in Computer Science using graphs and trees. |
| CS212 | Digital System and Microprocessor | 1. Understand the logical behaviour of digital circuits<br>2. Design combinational logic using Karnaugh maps<br>3. Design sequential logic using ASM charts |

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| | | 4. Analyse combinational and sequential digital circuits<br>5. Explain the architecture, pin configuration of various microprocessors<br>6. Perform various microprocessor based programs and apply the concepts of 8085 programming , interrupts, stacks & subroutines |
| CS213 | Data Structures | 1. To analyze the concepts of data structure and data type.<br>2. Develop knowledge of basic data structures for storage and retrieval of ordered or unordered data.<br>3. Implement linked list data structure to solve various problems.<br>4. Understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C-language.<br>5. Develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.<br>6. Understand the concepts of graph theory. |
| CS214 | Data Communication and Networking | 1. Understand basic computer network technology.<br>2. Understand and explain Data Communications System and its components.<br>3. Identify the different types of network topologies and protocols.<br>4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.<br>5. Identify the different types of network devices and their functions within a network<br>6. Understand the basic protocols of computer networks, and how they can be used to assist in network design and |

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| | | implementation. |
| CS212L | Digital System and Microprocessor Lab | 1. Understand the logical behaviour of digital circuits<br>2. Design combinational logic using Karnaugh maps<br>3. Analyse combinational and sequential digital circuits<br>4. Design combinational and sequential digital circuits<br>5. Explain the architecture, pin configuration of various microprocessors<br>6. Apply the concepts of 8085 programming , interrupts, stacks & subroutines |
| CS213L | Data Structures Lab | 1. Understand the importance of data structure and abstract data type, and their basic usability in different applications through different programming languages.<br>2. Analyze and differentiate different algorithms based on their time complexity.<br>3. Do the implementation of linked data structures and various kinds of searching and sorting techniques, and its uses both in linear and non-linear data structure.<br>4. Design new algorithms or modify existing ones for new applications and able to analyze the space & time efficiency of most algorithms.<br>5. Have practical knowledge on the application of data structures.<br>6. Be familiar with various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems. |
| HS211 | Environmental Studies | 1. Develop an understanding of different natural resources including renewable resources.<br>2. Realize the importance of ecosystem and biodiversity for maintaining |

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| | | ecological balance.<br>3. Aware of important acts and laws in respect of environment.<br>4. Demonstrate critical thinking skills in relation to environmental affairs<br>5. Develop an understanding of environmental pollutions and hazards due to engineering/technological activities and general measures to control them.<br>6. Demonstrate knowledge and application of communication skills and the ability to write effectively in a variety of environmental contexts.<br>7. Demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns.<br>8. Demonstrate an appreciation for need for sustainable development and role of science. |
| HS212 | Introduction to Performing Arts | 1. Students will be able to learn Fundamentals and types of Music and other allied arts.<br>2. Students will be able to analyze, appreciate, and interpret significant works of art.<br>3. Students will demonstrate critical thinking through analysis and evaluation of works of art.<br>4. Students will develop good listening and viewing skills.<br>5. Students will be able to understand the 'Gharana' system in Music.<br>6. Students will understand the classification of Musical instruments.<br>7. Students will demonstrate mastery of their designated area of concentration.<br>8. Students will demonstrate comprehension of global perspectives in visual culture. |
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| Part-II Semester-IV | | |
| CS221 | Theory of | 1. Design deterministic and |

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| | Computation | nondeterministic automata to recognize specified regular languages.<br>2. Analyse and design finite automata, pushdown automata, formal languages, and grammars.<br>3. Convert among equivalently powerful notations for a language, including among DFAs, NFAs, and regular expressions, and between PDAs and CFGs.<br>4. Analyse and design Turing Machine.<br>5. Understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.<br>6. Solve engineering problems using various types of turing machines and DFA, NFA, PDA. |
| CS222 | Advanced Microprocessor | 1. Get complete knowledge of architecture, instruction sets and operations of microprocessors 8086.<br>2. Develop various assembly language programs and understands the various addressing modes required for assembly language programming.<br>3. Understand 80386 microprocessor and PIC microcontroller.<br>4. Develop enough confidence to take up the challenges in building useful microprocessor based applications.<br>5. Analyze instruction sets, applying programming and gain hands-on experience of 8086 & 80386 microprocessor and microcontroller.<br>6. Outline the architecture of ARM processor and PIC microcontroller. |
| CS223 | Computer Organization | 1. Ability to understand basic structure of computer.<br>2. Ability to perform computer arithmetic operations.<br>3. Ability to understand control unit operations.<br>4. Ability to design memory organization |

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| | | that uses banks for different word size operations.<br>5. Ability to understand the concept of cache mapping techniques.<br>6. Ability to understand the concept of I/O organization.<br>7. Ability to conceptualize instruction level parallelism. |
| CS224 | Software Engineering | 1. Apply the project management and analysis principles to S/W project development.<br>2. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.<br>3. Identify and solve engineering problems and to gain Knowledge about software development life cycle.<br>4. Communicate effectively and the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.<br>5. Apply the design & testing principles to software project development to maintain software systems.<br>6. Identify and Apply methods for software quality and its control. |
| CS225 | Applied Mathematics-II | 1. Solve nonlinear equations using various numerical methods such as bisection method, Newton's method, secant method and fixed point iteration method<br>2. Solve large systems of linear equations using Gaussian elimination, factorization methods.<br>3. Approximate functions and data using polynomial and rational interpolation or polynomial and rational least squares approximation and explain the concept of error estimation. |

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| | | 4. Solve a system of ordinary differential equations using various numerical methods.<br>5. Evaluate definite integrals using numerical quadrature such as Gaussian quadrature, Newton-Cotes methods.<br>6. Numerically determine eigenvalues and eigenvectors for very large matrices using a variety of methods. |
| CS222L | Advanced Microprocessor Lab | 1. Apply the knowledge of the fundamentals of assembly level programming of microprocessors and microcontroller.<br>2. Learn MASM assembler programming.<br>3. Understand an ALP in 8086 and its interfacing circuits.<br>4. Develop ability in designing a microprocessor and microcontroller systems.<br>5. Provide practical hands-on experience with microprocessor applications and interfacing techniques.<br>6. Understand and familiarizing with the assembly level programming and microprocessor and microcontroller. |
| CS227L | Object Oriented Programming Lab | 1. Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.<br>2. Apply an object-oriented approach to developing applications of varying complexities<br>3. Take a problem and develop the structures to represent objects and the algorithms to perform operations.<br>4. Apply standards and principles to write truly readable code.<br>5. Test a program and, if necessary, find mistakes in the program and correct them.<br>6. To develop applications using object |

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| | | oriented concepts. |
| HS222 | Soft Skills Development | 1. Students are able to expertise in self-development, effective communication skills and interview skills<br>2. Understand how to handle situation and take decision<br>3. Equip to any sort of interviews particularly job interviews<br>4. Acquaintance with documentation skills<br>5. Become self-reliant and responsible<br>6. Team build up, its development and management |
| Part-III Semester-V | | |
| Course code<br><br>**CS311** | Course title<br><br>**System programming** | 1. Identify different types of system software and language specifications.<br>2. Design one pass and two pass assembler and working.<br>3. Design and Develop assembler for macro expansion.<br>4. Describe working, advantages and disadvantages of compiler and interpreter.<br>5. Describe how program gets loaded into memory at the time of execution.<br>6.Understand different programming environment and deployment tools. |
| Course code<br><br>**CS312** | Course title<br><br>**Computer Algorithm** | 1. Understand asymptotic notations to analyze the performance of algorithm.<br>2. Choose appropriate advanced data structure for given problem.<br>3. Apply the dynamic programming technique and greedy programming technique to solve the problems.<br>4. Select a proper pattern matching algorithm for given problem.<br>5. Apply algorithms for performing operations on graphs and trees.<br>6. Analyze deterministic and non-deterministic algorithm to solve complex problems. |
| Course code | Course title | 1. Study the different types of operating systems.<br>2. Understand the basic concept of process and |

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| **CS313** | **Operating System 1** | process scheduling algorithms used in operating system.<br>3. Give the extensive knowledge of memory management and deadlock handling algorithms.<br>4. Understand various concepts of I/O application and kernel I/O subsystem.<br>5. Analyze various algorithms required for management, scheduling, allocation and communication used in operating system. |
| Course code<br><br>**CS314** | Course title<br><br>**Software Engineering** | 1. Apply the project management and analysis principles to S/W project development.<br>2. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.<br>3. Identify and solve engineering problems and to gain Knowledge about software development life cycle.<br>4. Communicate effectively and the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.<br>5. Apply the design & testing principles to software project development to maintain software systems.<br>6.Identify and Apply methods for software quality and its control. |
| Course code<br><br>**CS315** | Course title<br><br>**Computer Graphics and Multimedia Techniques** | 1. To list the basic concepts used in computer graphics.<br>2. To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.<br>3. To describe the importance of viewing and projections.<br>4. To define the fundamentals of animation, virtual reality and its related technologies.<br>5. To understand a typical graphics pipeline.<br>6. To understand the principles of multimedia techniques. |

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| Course code<br><br>**CS311L** | Course title<br><br>**System Programming Lab** | 1. Separation of token from a statement.<br>2. Syntax error generation task of compiler<br>3. Expansion of macros by pre assembler<br>4. Generation of symbol table<br>5. Linker links subroutines in main program.<br>6.How loader calculates address. |
| Course code<br><br>**CS312L** | Course title<br><br>**Computer Graphics and Multimedia Techniques** | 1. To explain the mathematical and theoretical principles of computer graphics eg: To draw basic objects like lines, triangles and polygons.<br>2. To use matrix algebra in computer graphics and implement fundamental algorithms and transformations involved in viewing models.<br>3. To write basic graphics programs for projection models, illumination models and handling of hidden surfaces and clipping in computer graphics.<br>4. To analyze and evaluate the use of computer graphics methods in practical applications and describe effects such as antialiasing.<br>5. To apply computer graphics techniques to creating aesthetic effect. |
| Course code<br><br>**CS316L** | Course title<br><br>**Java Programming Lab** | 1. Generate an application based upon the concepts of java & advanced java.<br>2. Understand the structure and model of the Java programming language.<br>3. Understand the network and security programming using Java and know about the application of dynamic page functionality in web pages using CGI, Servlets, JSP, ASP.<br>4. Create and communicate between client and server using Java and create a good, effective and dynamic website.<br>5. Choose an engineering approach to solve problems, starting from the acquired knowledge of programming and knowledge of operating systems. |
| Course code<br><br>**RM311** | Course title<br><br>**Research Methodology** | 1. Will be able to understand some basic concepts of research and its methodologies;<br>2. Will be able to identify appropriate research topics ; |

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| | | 3. Will be able to select and define appropriate research problem and parameters;<br>4. Will be able to prepare a project proposal (to undertake a project) ;<br>5. Will be able to organize and conduct research (advanced project) in a more appropriate manner |
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| Part-III Semester-VI | | |
| Course code<br><br>**CS321** | Course title<br><br>**Compiler Construction** | 1. Describe different phases of compiler.<br>2. Implement generation of token in Lexical analysis.<br>3. Identify checking of code for syntax errors using grammar.<br>4. Understand steps for generating syntax tree and memory allocation.<br>5. Implement generation of intermediate code and applying optimization principles on for code optimization.<br>6. Apply optimization principles on given code for e machine code generated by the compiler to make it faster and more efficient. |
| Course code<br><br>**CS322** | Course title<br><br>**Operating System11** | 1. Analyze architecture of UNIX and windows operating system.<br>2. Conceptualize the knowledge of basic issues with fundamental of buffer cache and internal representation of files.<br>3. Study process and Structure of Process this covers a broad range of engineering aspects.<br>4.Understand various concepts of Process and Process Control.<br>5.Analyze basic issues in representation, scheduling, allocation and management in operating system. |
| Course code<br><br>**CS323** | Course title<br><br>**Object Oriented Modelling and Design** | 1. Know the concept of object-oriented development, and create a static object model and a dynamic behavioral model and a functional model of the system.<br>2. Use the approaches to system design and object design, and the techniques of translating design to implementation<br>3. Implement the object-oriented modelling and design patterns to provide solutions to the real-world software design problems.<br>4. Describe how design patterns facilitate |

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| | | development.<br>5. Measure the Level of User satisfaction and software quality assurance.<br>6.Design all structural and behavioral views of the software system. |
| Course code<br><br>**CS324** | Course title<br><br>**Database Engineering** | 1. Explain the features of database management systems and Relational database with different issues such as design, implementation and its applications.<br>2. Design conceptual models of a database using ER model for real life applications and transform it to construct queries in Relational Algebra.<br>3. Create and Design SQL for a real-life application, with constraints and keys.<br>4. Formulate complex queries with data manipulation language to query, update, retrieve and manage any type of information from the Database.<br>5. Apply database normalization principals to analyze the existing design of a database schema and to design an optimal database.<br>6. Create and construct indexing mechanisms for efficient retrieval of information. |
| Course code<br><br>**CS325** | Course title<br><br>**Engineering Economics** | 1.Develop a thorough understanding on engineering decision making.<br>2.Understand the principles of economics analysis of design process<br>3.Understand the different costs (fixed cost, variable cost, direct cost, indirect cost, standard cost and opportunity cost)<br>4.Realize the money-time relationships<br>5.Understand price changes and inflation<br>6.Understand price and relations using graphical approach |
| Course code<br><br>**CS323L** | Course title<br><br>**Object Oriented Modelling and Design Lab** | 1. Master the concepts of Object-Oriented modelling, designing and should have attained practical skills in applying these concepts.<br>2. Understand UML in detail, its diagrams as modelling tool for large and complex software systems.<br>3. Draw a Object Oriented model and implement it |

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| | | using UML tool.<br>4. Have better understanding of requirements cleaner designs and more maintainable systems.<br>5. Create use case, interaction & Deployment diagrams for documents that capture requirements of software system and that model the dynamic aspects of a software system. |
| Course code<br><br>**CS324L** | Course title<br><br>**Database Engineering Lab** | 1. Construct problem statements for real life applications and design a database for the same<br>2. Design ER model for real life applications and to construct queries with Relational Algebra.<br>3. Create and populate queries using SQL to query, update and retrieve information from the Database.<br>4. Analyze and apply concepts of normalization to existing database schema.<br>5. Design and Implement indices for a database.<br>6. Design and Implement concurrency control protocol and database recovery protocol. |
| Course code<br><br>**CS326L** | Course title<br><br>**Advanced Programming Lab** | 1. Describe .net Architecture.<br>2. Write program using OOPS concepts in C#<br>3. Describe exception handling in C#<br>4. Implement inheritance in c#<br>5. Develop windows applications.<br>6. Handle data using ADO.net in C#. |
| Course code<br><br>**HS321** | Course title<br><br>**Introduction of Foreign Language** | 1. The students will be able to acquire a good knowledge the basic grammar of foreign language and learn Alphabet, Common Words and Phrases in foreign language.<br>2.The students will also be able to learn to read the simple texts in foreign language.<br>3.The students would be able to speak a little using the greetings, well wishes etc. in Foreign Language.<br>4.The students will learn to count numbers, answer to the questions like, what is your name, surname, tell age, and can initiate little communication in Foreign Language.<br>5.The students can also translate simple sentences in foreign language. |

| Part-IV Semester-VII | | |
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| Course code<br>CS411 | Course title<br>Advanced Computer Architecture | 1. Understand and apply concept of Parallel processing and Parallel Processing Architecture<br>2. Justify need if high performance provided by Parallel Computer Architecture<br>3. Comprehend and differentiate various computer architectures.<br>4. Interpret performance of different pipelined processors and multiprocessing configurations<br>5. Describe and Apply concept of distributed memory architecture and parallel program network properties<br>6. Understand concept of programmability issues, parallel programming models and Use of the programming environment like p threads, open Mp and MPI. |
| Course code<br>CS 412 | Course title<br>Advanced Database Management System | 1. Explain and evaluate the fundamental theories for advanced database architectures and query operators.<br>2. Design and implement parallel database systems with evaluating different methods of storing, managing of parallel database.<br>3. Assess and apply database functions of distributed database.<br>4. Evaluate different database designs and architecture.<br>5. Administer and analyze database with query optimization techniques and develop Web interface with database.<br>6. Understand advanced querying and decision support system. |
| Course code<br>CS413 | Course title<br>Distributed Systems | 1. Demonstrate knowledge of the core architectural aspects of distributed Systems.<br>2. Demonstrate distributed systems using various interposes communication techniques, such as remote procedure call, remote method invocation.<br>3. Summarize key mechanisms and models for distributed systems including logical clocks, election algorithms, distributed mutual exclusion, consistency and replication.<br>4. Describe the various design issues in distributed system e.g. system performance and reliability, distributed file system etc.<br>5. Use and apply important methods in distributed systems to support scalability and fault tolerance. 6. To compare state-of-the-art distributed systems, such as Google File System. |
| Course code<br>CS414 | Course title<br>Network Engineering | 1. To identify the various networking devices like switches, hub, routers, and gateways with their functioning and understand Microsoft windows O.S. Concept and terms.<br>2. To learn overall system architecture of windows with its key components.<br>3. To learn security system components and analyze |

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| | | design issues of Window security system.<br>4. To understand and analyze I/O system components of Windows Network operating system.<br>5. To identity various programming models and protocol support for implementing windows network applications. |
| Course code<br>CS415 | Course title<br>Elective I Internet of Things | 1. Describe key technologies in Internet of Things.<br>2. Compare and contrast the deployment of smart objects and the technologies to connect them.<br>3. Compare the role of IoT protocols for efficient network communication.<br>4. Summarize the need for Data Analytics and Security in IoT 5. Describe different sensor technologies for sensing real world entities and identify the applications of IoT in Industry. 6. To understand IoT platforms such as Raspberry-Pi and Arduino |
| | Course title<br>Elective-1 Project Management | 1. Understand the selection and initiation of individual projects and of portfolios of projects in the enterprise.<br>2. Conduct project planning activities that accurately forecast project costs, timelines, and quality. Implement processes for successful resource, communication, and risk and change management.<br>3. Demonstrate effective project execution and control techniques that result in successful projects.<br>4. Conduct project closure activities and obtain formal project acceptance.<br>5. Demonstrate a strong working knowledge of ethics and professional responsibility and effective organizational leadership and change skills for managing projects, project teams, and stakeholders. |
| | Course title<br>Elective-1 Cyber Laws | 1. Explain the Object and Scope of the IT Act<br>2. Understand E-Governance and IT Act 2000 and use of electronic records and digital signatures in Government and its agencies<br>3. Understand Certifying Authority and Digital Signature Certifications<br>4. Explain an overview of Domain Name Disputes and Trademark Law<br>5. Discuss knowledge of Cyber Crimes 6. Describe the concept of E-banking and legal issues |
| Course code<br>CS414L | Course title<br>Network Engineering Lab | 1. Analyze and resolve networking problems through the application of systematic approaches and diagnostics tools.<br>2. Students will be able to understand and implementation of socket programming.<br>3. To gain over all knowledge about installation of different operating system.<br>4. Student will understand the different networking services. 5. Analyze the IIS server, NIC and Simulation of Netsim. |
| Course code | Course title<br>Web Technology | 1. Apply technical knowledge and perform specific technical skills |

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| CS416L | Lab-1 | 2. Design web applications using XML<br>3. Use design XML controls.<br>4. Create database driven applications using Apache server<br>5. Handle database using jsp applications |
| Course code<br><br>CS417L | Course title<br>Major Project Phase - I | 1. Conduct a survey of several available literatures in the preferred field of study. Apply knowledge of computer science for real world problem<br>2. Formulate and propose a plan for creating a solution for the identified problem and apply Software Development Lifecycle effectively.<br>3. Report and present the findings of the study conducted in the preferred domain<br>4. Develop good communication skills and team work<br>5. Demonstrate a strong working knowledge of ethics and professional responsibility |
| Course code<br><br>HS411 | Course title<br>Professional Ethics | 1. To improve verbal and non verbal communication.<br>2. To learn recent trends and technologies in area of computer science and information technology.<br>3. To recognize problems after doing research literature survey using various resources<br>4. To prepare concise, comprehend and conclude selective topic in area of computer science and information technology Effective outcomes. |
| Part-IV Semester-VIII | | |
| Course code<br>CS421 | Course title<br>Mobile Technology | 1. To learn basics facts about signal, antenna and signal propagation, and different Data transmission techniques.<br>2. To learn medium access control algorithms and compare SDMA, FDMA, CDMA mechanisms.<br>3. To identify the architecture, services and protocol of GSM and DECT system.<br>4. To identify architectures and data transmission technologies used in IEEE 802.11, HIPERLAN, Bluetooth, WATM.<br>5. To identify the design issues of network layer and transport layer with its approaches for wireless communication. |
| Course code<br>CS422 | Course title<br>Information Security | 1. Understand the need of information security to Industry and Society.<br>2. Explain the concepts related to applied cryptography, including plaintext, cipher text, symmetric cryptography, asymmetric cryptography<br>3. Evaluate Encryption, Key Exchange, Authentication and Hash Algorithms<br>4. Demonstrate the understanding of common network vulnerabilities and attacks, defense mechanisms against network attacks, and cryptographic protection mechanisms. 5. Summarize the Basic concepts of system level security, intrusion detection and its solutions to overcome the attacks. |

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| Course code<br>CS423 | Course title<br>Soft Computing | 1. Understand different soft computing techniques like Genetic Algorithms, Fuzzy Logic, Neural Networks and their combination.<br>2. Design and implement computing systems by using appropriate Artificial Neural Network and tools.<br>3. Apply neural networks to pattern classification<br>4. Apply the concepts of Fuzzy Logic, Various fuzzy systems and their functions to real time systems.<br>5. Analyze the genetic algorithms and their applications to solve engineering optimization problems 6. Apply soft computing techniques to solve engineering or real life problems. |
| Course code<br>CS424 | Course title<br>ELECTIVE -2 Data Mining And Warehousing | 1. Discuss the role of data warehousing and enterprise intelligence in industry.<br>2. Compare and contrast the dominant data mining algorithms.<br>3. Evaluate and select appropriate data-mining algorithms and apply, and interpret, report the output appropriately.<br>4. Design and implement of a data-mining application using sample, realistic data sets and modern tools.<br>5. Evaluate and implement a wide range of emerging and newly-adopted methodologies and Technologies to facilitate the knowledge discovery. |
| | Course title<br>ELECTIVE - 2 Big Data Technology | 1. Understand the concept and challenge of big data<br>2. Collect, manage, store, query, and analyze various forms of big data.<br>3. Gain knowledge of large-scale analytics tools to solve some open big data problems.<br>4. Understand the impact of big data for business decisions and strategy. |
| | Course title<br>ELECTIVE - 2 Service Oriented Architecture | 1. Gain knowledge of fundamental principle of service-oriented systems.<br>2. Obtain an overview of the different platforms, in particular the Web Services platforms, in particular the Web Services Framework<br>3. Study different SOA programming model<br>4. Understand concept of Portals 5. Learn and implement Web Applications and Web services. |
| Course code<br><br>CS 425 | Course title<br>Elective-3 Industrial Management | 1. Apply and improve a component, process, or integrated system of people, materials, information, Equipment, and energy to meet desired needs within realistic constraints.<br>2. Use the available resources to achieve the desired goal in a more efficient and effective way.<br>3. Identify the comparison between selected theories of management.<br>4. Perform the Management Functions & functions in the Marketing Mix.<br>5. Use basic Business Application Software & assess ethical issues in Business situations. |

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| | Course title<br><br>ELECTIVE-3 Real Time Operating System | 1. Understand the concepts of real-time system and modelling.<br>2. Design architecture, present mathematical model of system.<br>3. Recognize the characteristics of real time system.<br>4. Analyze task scheduling, resources management, real time operating system and fault tolerance application of real time system.<br>5. Estimate usage of various methods, programs, operating systems and other components for real time environment<br>6. Demonstrate usability of POSIX interface for adapting task scheduling, task synchronization and communication. |
| | Course title<br><br>ELECTIVE-3 Optimization Techniques | 1. Estimate to model engineering minima/maxima problems as optimization problems.<br>2. Demonstrate the use Matlab to implement optimization algorithms.<br>3. Understand importance of optimization of industrial process management<br>4. Apply basic concepts of mathematics to formulate an optimization problem<br>5. Analyze and appreciate variety of performance measures for various optimization problems<br>6. Apply knowledge of mathematics, science, and engineering. |
| Course code<br><br>CS 422L | Course title<br><br>Soft Computing Lab | 1. Understand different soft computing techniques like Genetic Algorithms, Fuzzy Logic, Neural Networks and their combination.<br>2. Design and implement computing systems by using appropriate Artificial Neural Network and tools.<br>3. Apply neural networks to pattern classification<br>4. Apply the concepts of Fuzzy Logic, Various fuzzy systems and their functions to real time systems.<br>5. Analyze the genetic algorithms and their applications to solve engineering optimization problems<br>6. Apply soft computing techniques to solve engineering or real life problems. |
| Course code<br><br>CS426L | Course title<br><br>Web Technology Lab-2 | 1. Upon completion of this course, the student will be able apply technical knowledge and perform specific technical skills, including:<br>2. Successful students will able to design web applications using ASP.NET<br>3. Successful students will be able to use ASP.NET controls in web applications.<br>4. Successful students will be able to create database driven ASP.NET web applications and web services<br>5. Successful students will be able to handle database using MVC in ASP.NET web applications |
| Course code | Course title | 1. Implement proposed solution with the help of modern tools and analyze the solution. |

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| CS 427L | Major Project Phase - II | 2. Apply Project management and time management Skills Effectively.<br>3. Report and present the findings of the study conducted in the preferred domain.<br>4. Develop good communication skills and team work.<br>5. Demonstrate a strong working knowledge of ethics and professional responsibility. |
| Course code<br><br>HS421 | Course title<br><br>Constitution of India | 1. To understand the philosophy of Indian constitutions<br>2. To identify the causes, impact of British colonial rule.<br>Department of Technology, B.Tech. (Computer Science and Technology) Program- Syllabus w.e.f. 2019 - 20<br>Shivaji University, Kolhapur, Maharashtra State, India<br>3. To appreciate the various phases of Indian national movement.<br>4. To create value in young youth regarding the patriotism.<br>5. To understand the various Government of Indian acts their provision and reforms.<br>6. To know the salient features in making of Indian constitution. |