| COURSE OUTCOMES | | | | |
|---|---|---|---|---|
| **Department of IT, CAY- (Even semester, 2023-24)** | | | | |

| **Course Name:** | Engineering Mathematics-IV | | | |
|---|---|---|---|---|
| **Course Code** | ITC401 | | | |
| **Faculty name** | Satyanarayana Nagula | | | |
| **Year** | 2 | **Sem** | IV | |

| **CO Number** | **Course Outcomes** |
|---|---|
| ITC401.1 | Students will be able to Obtain Eigen values and Eigen vectors for a given square matrix |
| ITC401.2 | Students will be able to Infer properties of Eigen values and Eigen vectors, Check if a matrix is derogatory or not, Calculate conditional Probabilities using Bayes' theorem, Obtain pdf and cdf of discrete and continuous random variables |
| ITC401.3 | Students will be able to Construct diagonal matrices using the concept of similarity, Verify Cayley- Hamilton theorem, Obtain functions of square matrices, Obtain conditional probabilities using Bayes' theorem, Obtain MGF and hence obtain the mean and variance of a random variable, Obtain moments and probabilities of Binomial, Poisson and Normal distributions |
| ITC401.4 | Students will be able to Obtain probabilities and z-values for normal distributions, Obtain Taylor's and Laurent Series, Locate zeros and poles and find residues at poles, Obtain Z transform for standard functions and their region of Convergence |
| ITC401.5 | Students will be able to Evaluate integrals using Cauchy's theorems, Use Linear and Nonlinear Programming methods to solve optimization problems, Evaluate Z transform using partial and convolution method |
| ITC401.6 | Students will be able to perform tests of significance for large and small samples Chi-square test to test to check independence of attributes and 'goodness of fit', Apply Big – M method and Dual Simplex method to optimize an LPP and analyze solutions obtained |

| **Course Name:** | Computer Network and Network Design | | |
|---|---|---|---|
| **Course Code** | ITC402 | | |
| **Faculty Name:** | Prasad Padalkar | | |
| **Year** | 2 | **Sem** | IV |

| **CO Number** | **Course Outcome** |
|---|---|
| ITC402.1 | Define the functionalities of each layer of the models and compare the Models. |
| ITC402.2 | Compare the types of transmission media and explain data link layer concepts, design issues and protocols. |
| ITC402.3 | Choose the routing protocols and assign IP address to networks. |
| ITC402.4 | Examine the data transportation and session management issues and related protocols used for end to end delivery of data. |
| ITC402.5 | Appraise the data presentation techniques and illustrate the client/server model in application layer protocols. |
| ITC402.6 | Use of networking concepts of IP address, Routing, and application services to design a network for an organization |
| | |

| Course Name: | Operating System | | |
|---|---|---|---|
| Course Code | ITC403 | | |
| Faculty Name: | Aruna Khubalkar | | |
| Year | 2 | Sem | IV |

| CO Number | Course Outcome |
|---|---|
| ITC403.1 | Describe the basic concepts related to Operating System. |
| ITC403.2 | Explain the concepts related to the different functions of Operating System. |
| ITC403.3 | Apply concepts related to process, I/O, storage and memory management. |
| ITC403.4 | Analyze different methods / functions of Operating System. Also compare the functions of various special-purpose Operating Systems. |
| ITC403.5 | Evaluate the different services provided by Operating System. |
| ITC403.6 | Propose OS functionalities for a given case study. |

| Course Name: | Automata Theory | | |
|---|---|---|---|
| Course Code | ITC404 | | |
| Faculty name | Udaychandra | | |
| Year | 2 | Sem | IV |

| CO Number | Course Outcome |
|---|---|
| ITC404.1 | Students will be able to list and define various machines , grammars and language |
| ITC404.2 | Students will be able to explain the working of various machines , grammars and language |
| ITC404.3 | Students will be apply concept of acceptor and rejector to various machines. |
| ITC404.4 | Students will be able to analyze various machines, grammar and languages suitability to solve problem. |
| ITC404.5 | Students will able to be select various machines, grammar and languages suitability to solve problem. |
| ITC404.6 | Students will be able to analyze various machines, grammar and languages suitability to solve problem. |

| Course Name: | Computer Organization and Architecture | | |
|---|---|---|---|
| Course Code | ITC405 | | |
| Faculty Name: | Janhavi B | | |
| Year | 2 | Sem | IV |

| CO Number | Course Outcome |
|---|---|
| ITC405.1 | Demonstrate the fundamentals of Digital Logic Design |
| ITC405.2 | Describe basic organization of computer, the architecture of 8086 microprocessor and implement assembly language programming for 8086 microprocessors. |
| ITC405.3 | Demonstrate control unit operations and conceptualize instruction level parallelism. |

| | |
|---|---|
| ITC405.4 | List and Identify integers and real numbers and perform computer arithmetic operations on integers. |
| ITC405.5 | Categorize memory organization and explain the function of each element of a memory hierarchy. |
| ITC405.6 | Examine different methods for computer I/O mechanism. |

| | | | |
|---|---|---|---|
| **Course Name:** | Network lab | | |
| **Course Code** | ITL401 | | |
| **Faculty Name:** | Aruna Khubalkar | | |
| **Year** | 2 | **Sem** | IV |

| CO Number | Course Outcome |
|---|---|
| ITL401.1 | State various concepts related to computer networks. |
| ITL401.2 | Demonstrate the installation and configuration of network simulator and write basic TCL scripts. |
| ITL401.3 | Use basic and network administration commands. Also able to use network simulator environment and visualize a network topology and observe its performance |
| ITL401.4 | Analyze the packet contents of different protocols. |
| ITL401.5 | Evaluate and implement socket programming for client server architecture. |
| ITL401.6 | Design and setup a organization network using packet tracer. |
| | |

| | | | |
|---|---|---|---|
| **Course Name:** | Unix Lab | | |
| **Course Code** | ITL402 | | |
| **Faculty Name:** | Prof. Udaychandra Nayak | | |
| **Year** | 2 | **Sem** | IV |

| CO Number | Course Outcome |
|---|---|
| ITL402.1 | Understand the architecture and functioning of Unix |
| ITL402.2 | Identify the Unix general purpose commands |
| ITL402.3 | Apply Unix commands for system administrative tasks such as file system management and user management |
| ITL402.4 | Execute Unix commands for system administrative tasks such as process management and memory management |
| ITL402.5 | Implement basic shell scripts for different applications |
| ITL402.6 | Implement advanced scripts using awk & perl languages and grep, sed, etc. commands for performing various tasks. |
| | |

| | | | |
|---|---|---|---|
| **Course Name:** | Microprocessor Lab | | |
| **Course Code** | ITL403 | | |
| **Faculty Name:** | Janhavi B. | | |
| **Year** | 2 | **Sem** | IV |

| CO Number | Course Outcome |
|---|---|

| | |
|---|---|
| **ITL403.1** | Demonstrate various components and peripheral of computer system |
| **ITL403.2** | Analyze and design combinational circuits |
| **ITL403.3** | Build a program on a microprocessor using arithmetic & logical instructions of 8086 |
| **ITL403.4** | Develop the assembly level programming using 8086 loop instruction set |
| **ITL403.5** | Write programs based on string and procedure for 8086 microprocessor. |
| **ITL403.6** | Design interfacing of peripheral devices with 8086 microprocessor |

| | | | |
|---|---|---|---|
| **Course Name:** | Python Lab (SBL) | | |
| **Course Code** | ITL404 | | |
| **Faculty Name:** | Shiv Negi | | |
| **Year** | 2 | **Sem** | IV |

| **CO Number** | **Course Outcome** |
|---|---|
| **ITL404.1** | Understand the structure, syntax, and semantics of the Python language |
| **ITL404.2** | Interpret advanced data types and functions in python |
| **ITL404.3** | illustrate the concepts of object-oriented programming as used in Python |
| **ITL404.4** | Create Python applications using modules, packages, multithreading and exception handling. |
| **ITL404.5** | Gain proficiency in writing File Handling programs ,also create GUI applications and evaluate database operations in python |
| **ITL404.6** | Design and Develop cost-effective robust applications using the latest Python trends and technologies |

| | | | |
|---|---|---|---|
| **Course Name:** | Mini Project – 1 B Based for Python basedautomation projects | | |
| **Course Code** | ITM401 | | |
| **Faculty Name:** | Shiv Negi | | |
| **Year** | 2 | **Sem** | IV |

| **CO Number** | **Course Outcome** |
|---|---|
| **ITL404.1** | Identify problems based on societal /research needs |
| **ITL404.2** | Use standard norms of engineering practices |
| **ITL404.3** | Apply Knowledge and skill to solve societal problems in a group |
| **ITL404.4** | Excel in written and oral communication. |
| **ITL404.5** | Develop interpersonal skills to work as member of a group or leader. |
| **ITL404.6** | Demonstrate project management principles during project work. |

| | |
|---|---|
| **Course Name:** | Data Mining and Business Intelligence |
| **Course Code** | ITC601 |
| **Faculty name** | Aruna Khubalkar |

| Year | 3 | Sem | VI |
|---|---|---|---|

| CO Number | Course Outcome |
|---|---|
| ITC601.1 | Identify sources of data for mining. Also define metrics to measure the performance of various data mining algorithms. |
| ITC601.2 | Demonstrate an understanding of the importance of data warehousing and data mining and the principles of business intelligence. Also describe various data mining algorithms. |
| ITC601.3 | Organize and Prepare the data needed for data mining using preprocessing techniques. Also solve appropriate data mining methods like classification, clustering or Frequent Pattern mining on given data sets. |
| ITC601.4 | Perform exploratory analysis of the data to be used for mining. |
| ITC601.5 | Evaluate different data mining methods like classification, clustering or Frequent Pattern mining. |
| ITC601.6 | Design BI to solve practical problem : Analyze the problem domain, data and interpret / visualize the results and provide decision support. |

| Course Name: | Web X.0 | | |
|---|---|---|---|
| Course Code | ITC602 | | |
| Faculty name | Vaishali K. | | |
| Year | 3 | Sem | VI |

| CO Number | Course Outcome |
|---|---|
| ITC602.1 | Understand the basic concepts related to web analytics and semantic web. |
| ITC602.2 | Understand how TypeScript can help you eliminate bugs in your code and enable you to scale your code. |
| ITC602.3 | Understand AngularJS framework and build dynamic, responsive single-page web applications. |
| ITC602.4 | Apply MongoDB for frontend and backend connectivity using REST API. |
| ITC602.5 | Apply Flask web development framework to build web applications with less code. |
| ITC602.6 | Develop Rich Internet Application using proper choice of Framework. |

| Course Name: | Wireless Technology | | |
|---|---|---|---|
| Course Code | ITC603 | | |
| Faculty name | Prof. Prasad P | | |
| Year | 3 | Sem | VI |

| CO Number | Course Outcome |
|---|---|
| ITC603.1 | Define the basic terms of Wireless Network and Wireless Generations |
| ITC603.2 | Explain various Wide Area Wireless Technologies |
| ITC603.3 | Identify the prevalent IEEE standards used for implementation of WLAN and WMAN Technologies |
| ITC603.4 | Compare WPAN, WSN and Ad-hoc Networks |
| ITC603.5 | Interpret various Wireless Network Security Standards |

| | |
|---|---|
| **ITC603.6** | Elaborate the design considerations for deploying the Wireless Network Infrastructure |

| | | | |
|---|---|---|---|
| **Course Name:** | AI and DS – 1 | | |
| **Course Code** | ITC604 | | |
| **Faculty name** | Sunantha K. | | |
| **Year** | 3 | **Sem** | VI |

| **CO Number** | **Course Outcome** |
|---|---|
| **ITC604.1** | Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents. |
| **ITC604.2** | Apply an appropriate problem-solving method and knowledge-representation scheme |
| **ITC604.3** | Develop an ability to analyse and formalize the problem (as a state space, graph, etc). They will be able to evaluate and select the appropriate search method. |
| **ITC604.4** | Apply problem solving concepts with data science and will be able to tackle them from a statistical perspective. |
| **ITC604.5** | Choose and apply appropriately from a wider range of exploratory and inferential methods for analysing data and will be able to evaluate and interpret the results contextually |
| **ITC604.6** | Understand and apply types of machine learning methods for real world problems. |

| | | | |
|---|---|---|---|
| **Course Name:** | Ethical Hacking and Forensic | | |
| **Course Code** | ITDLO-II-6014 | | |
| **Faculty name** | Janhavi Baikerikar | | |
| **Year** | 3 | **Sem** | VI |

| **CO Number** | **Course Outcome** |
|---|---|
| **ITDLO-11-6023.1** | Define the concept of ethical hacking |
| **ITDLO-11-6023.2** | Recognize the need of digital forensics and define the concept of digital evidence and incident response. |
| **ITDLO-11-6023.3** | Apply the knowledge of computer forensics using different tools and techniques. |
| **ITDLO-11-6023.4** | Detect the network attacks and analyze the evidence |
| **ITDLO-11-6023.5** | Apply the knowledge of computer forensics using different tools and techniques |
| **ITDLO-11-6023.6** | List the method to generate legal evidence and supporting investigation reports |

| | | | |
|---|---|---|---|
| **Course Name:** | BI Lab | | |
| **Course Code** | ITL601 | | |
| **Faculty name** | Aruna Khubalkar | | |
| **Year** | 3 | **Sem** | VI |

| **CO Number** | **Course Outcome** |
|---|---|
| **ITL601.1** | Identify sources of Data for mining and perform data exploration |

| | |
|---|---|
| **ITL601.2** | Organize and prepare the data needed for data mining algorithms in terms of attributes and class inputs, training, validating, and testing files. |
| **ITL601.3** | Implement the appropriate data mining methods like classification, clustering or association mining on large data sets using open source tools like WEKA |
| **ITL601.4** | Implement various data mining algorithms from scratch using languages like Python/ Java etc. |
| **ITL601.5** | Evaluate and compare performance of some available BI packages |
| **ITL601.6** | Apply BI to solve practical problems : Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support. |

| | | | |
|---|---|---|---|
| **Course Name:** | Web Lab | | |
| **Course Code** | ITL602 | | |
| **Faculty name** | Vaishali K. | | |
| **Year** | 3 | **Sem** | VI |

| **CO Number** | **Course Outcome** |
|---|---|
| **ITL602.1** | deployment. |
| **ITL602.2** | Understand the basic concepts of TypeScript for designing web applications. |
| **ITL602.3** | Implement Single Page Applications using AngularJS Framework. |
| **ITL602.4** | Develop Rich Internet Applications using AJAX. |
| **ITL602.5** | Create REST Web services using MongoDB. |
| **ITL602.6** | Design web applications using Flask. |

| | | | |
|---|---|---|---|
| **Course Name:** | Sensor Lab | | |
| **Course Code** | ITL603 | | |
| **Faculty name** | Vaishali K. | | |
| **Year** | 3 | **Sem** | VI |

| **CO Number** | **Course Outcome** |
|---|---|
| **ITL603.1** | Differentiate between various wireless communication technologies based on the range of communication, cost, propagation delay, power and throughput. |
| **ITL603.2** | Conduct a literature survey of sensors used in real world wireless applications. |
| **ITL603.3** | Demonstrate the simulation of WSN using the Network Simulators (Contiki/Tinker CAD/ Cup carbon etc) |
| **ITL603.4** | Demonstrate and build the project successfully by hardware/sensor requirements, coding, emulating and testing |
| **ITL603.5** | Report and present the findings of the study conducted in the preferred domain |
| **ITL603.6** | Demonstrate the ability to work in teams and manage the conduct of the research study. |

| Course Name: | MAD & PWA Lab | | |
|---|---|---|---|
| Course Code | ITL604 | | |
| Faculty name | Nilesh G. | | |
| Year | 3 | Sem | VI |

| CO Number | Course Outcome |
|---|---|
| ITL604.1 | Understand cross platform mobile application development using Flutter framework |
| ITL604.2 | Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation |
| ITL604.3 | Analyze and Build production ready Flutter App by incorporating backend services and deploying on Android / iOS |
| ITL604.4 | Understand various PWA frameworks and their requirements |
| ITL604.5 | Design and Develop a responsive User Interface by applying PWA Design techniques |
| ITL604.6 | Develop and Analyse PWA Features and deploy it over app hosting solutions |

| Course Name: | DS using Python Skill based Lab | | |
|---|---|---|---|
| Course Code | ITL605 | | |
| Faculty name | Sunantha K. | | |
| Year | 3 | Sem | VI |

| CO Number | Course Outcome |
|---|---|
| ITL605.1 | Understand the concept of Data science process and associated terminologies to solve real-world problems. |
| ITL605.2 | Analyze the data using different statistical techniques and visualize the outcome using different types of plots |
| ITL605.3 | Analyze and apply the supervised machine learning techniques like Classification, Regression or Support Vector Machine on data for building the models of data and solve the problems. |
| ITL605.4 | Apply the different unsupervised machine learning algorithms like Clustering, Decision Trees, Random Forests or Association to solve the problems |
| ITL605.5 | Design and Build an application that performs exploratory data analysis using Apache Spark. |
| ITL605.6 | Design and develop a data science application that can have data acquisition, processing, visualization and statistical analysis methods with supported machine learning technique to solve the real-world problem |

| Course Name: | Mini Project – 2 B Based on ML | | |
|---|---|---|---|
| Course Code | ITM601 | | |
| Faculty name | Sunantha K. | | |
| Year | 3 | Sem | VI |

| CO Number | Course Outcome |
|---|---|
| ITM605.1 | Identify problems based on societal /research needs. |
| ITM605.2 | Apply Knowledge and skill to solve societal problems in a group. |

| | |
|---|---|
| **ITM605.3** | Develop interpersonal skills to work as member of a group or leader. |
| **ITM605.4** | Draw the proper inferences from available results through theoretical/ experimental/simulations |
| **ITM605.5** | Analyse the impact of solutions in societal and environmental context for sustainable development |
| **ITM605.6** | Use standard norms of engineering practices |
| **ITM605.7** | Excel in written and oral communication. |
| **ITM605.8** | Demonstrate capabilities of self-learning in a group, which leads to life long learning |
| **ITM605.9** | Demonstrate project management principles during project work. |

| | | | |
|---|---|---|---|
| **Course Name:** | Blockchain and DLT | | |
| **Course Code** | ITC801 | | |
| **Faculty name** | Tayyabali | | |
| **Year** | 4 | **Sem** | VIII |

| **CO Number** | **Course Outcome** |
|---|---|
| **ITC801.1** | Describe the basic concept of Blockchain and Distributed Ledger Technology. |
| **ITC801.2** | Interpret the knowledge of the Bitcoin network, nodes, keys, wallets and transactions |
| **ITC801.3** | Implement smart contracts in Ethereum using different development frameworks. |
| **ITC801.4** | Develop applications in permissioned Hyperledger Fabric network. |
| **ITC801.5** | Interpret different Crypto assets and Crypto currencies |
| **ITC801.6** | Analyze the use of Blockchain with AI, IoT and Cyber Security using case studies. |

| | | | |
|---|---|---|---|
| **Course Name:** | Big Data Analytics | | |
| **Course Code** | ITDO8011 | | |
| **Faculty name** | Udaychandra Nayak | | |
| **Year** | 4 | **Sem** | VIII |

| **CO Number** | **Course Outcome** |
|---|---|
| **ITDO8011.1** | Explain the motivation for big data systems and identify the main sources of Big Data in the real world |
| **ITDO8011.2** | Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store, retrieve and process Big Data for Analytics |
| **ITDO8011.3** | Implement several Data Intensive tasks using the Map Reduce Paradigm. |
| **ITDO8011.4** | Apply several newer algorithms for Clustering Classifying and finding associations in Big Data |
| **ITDO8011.5** | Design algorithms to analyze Big data like streams, Web Graphs and Social Media data |
| **ITDO8011.6** | Design and implement successful Recommendation engines for enterprises |

| | |
|---|---|
| **Course Name:** | Clould Computing and Services |
| **Course Code** | ITDO8024 |

| Faculty name | Sunantha K | | |
|---|---|---|---|
| Year | 4 | Sem | VIII |

| CO Number | Course Outcome |
|---|---|
| ITDO80241.1 | Explain the basics concepts of cloud computing like service models, deployment models and its architecture. |
| ITDO80241.2 | Describe and apply virtualization in cloud computing. |
| ITDO80241.3 | Use and Analyze different cloud computing services. |
| ITDO80241.4 | Understand and apply various services provided by Amazon Web Services cloud platform. |
| ITDO80241.5 | Discuss the functionality of Openstack cloud platform & Severless computing |
| ITDO80241.6 | Recognize and examine the security and privacy concerns in cloud computing. |

| Course Name: | User Interface Design | | |
|---|---|---|---|
| Course Code | ITDLO8041 | | |
| Faculty name | Nilesh Ghavate | | |
| Year | 4 | Sem | VIII |

| CO Number | Course Outcome |
|---|---|
| ITDLO8041.1 | Students will be able to identify and criticize bad features of interface designs. |
| ITDLO8041.2 | Students will be able to predict good features of interface designs. |
| ITDLO8041.3 | Students will be able to illustrate and analyze user needs and formulate user design specifications. |
| ITDLO8041.4 | Students will be able to interpret and evaluate the data collected during the process. |
| ITDLO8041.5 | Students will be able to evaluate designs based on theoretical frameworks and methodological approaches. |
| ITDLO8041.6 | Students will be able to produce/show better techniques to improve the user interaction design Interfaces. |

| Course Name: | Blockchain Lab | | |
|---|---|---|---|
| Course Code | ITL801 | | |
| Faculty name | Prof. Tayyabali S | | |
| Year | 4 | Sem | VIII |

| CO Number | Course Outcome |
|---|---|
| ITL801.1 | Develop and test smart contract on local Blockchain. |
| ITL801.2 | Develop and test smart contract on Ethereum test networks. |
| ITL801.3 | Write and deploy smart contract using Remix IDE and Metamask. |
| ITL801.4 | Design and develop Cryptocurrency. |
| ITL801.5 | Write and deploy chain code in Hyperledger Fabric. |
| ITL801.6 | Develop and test a Full-fledged DApp using Ethereum/Hyperledger. |

| Course Name: | Cloud Computing | | |
|---|---|---|---|
| Course Code | ITL802 | | |
| Faculty name | Prasad Padalkar | | |
| Year | 4 | Sem | VIII |

| CO Number | Course Outcome |
|---|---|
| ITL802.1 | List the different types of virtualization techniques. |
| ITL802.2 | Explain various cloud computing service models and understand the given business problems. |
| ITL802.3 | Build as web app and host on the commercial clouds on CSP |
| ITL802.4 | Analyze major security issues in the cloud and mechanisms to prioritize them for solution. |
| ITL802.5 | Compare various commercially available cloud services and recommend the appropriate one for the given requirement |
| ITL802.6 | Design and implement the concept of containerization |

| Course Name: | Major Project-II | | |
|---|---|---|---|
| Course Code | ITP801 | | |
| Faculty name | Janhavi B. | | |
| Year | 4 | Sem | VIII |

| CO Number | Course Outcome |
|---|---|
| ITM801.1 | Discover potential research areas in the field of IT |
| ITM801.2 | Conduct a survey of several available literature in the preferred field of study |
| ITM801.3 | Compare and contrast the several existing solutions for research challenge |
| ITM801.4 | Demonstrate an ability to work in teams and manage the conduct of the research study. |
| ITM801.5 | Formulate and propose a plan for creating a solution for the research plan identified |
| ITM801.6 | To report and present the findings of the study conducted in the preferred domain |