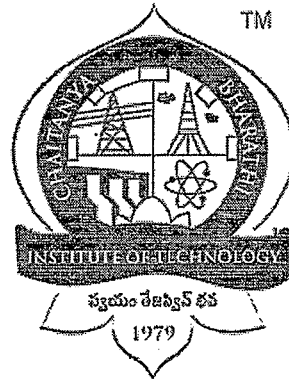


Chaitanya Bharathi Institute of Technology (Autonomous)

Department of Information Technology



Course Outcomes

Course Outcome Statements of the courses of Regulations

R-22, R-20, R-18 for the AY: 2022-23

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DEPARTMENT OF INFORMATION TECHNOLOGY

INSTITUTE VISION AND MISSION:

Vision: To be a Centre of Excellence in Technical Education and Research

Mission: To address the emerging needs through quality technical education and advanced research

DEPARTMENT VISION AND MISSION:

Vision

To be a center of excellence in the field of Information Technology that yields pioneers and research experts who can contribute for the socio-economic development of the nation.

Mission:

- To impart state-of-the-art value based education in the field of Information Technology.
- To collaborate with industries and research organizations and excel in the emerging areas of research.
- To imbibe social responsibility in students.
- To motivate students to be trend setters and technopreneurs.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

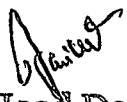
Graduates of IT will be able to:

1. Analyze and provide solutions for real world problems using state-of-the-art engineering, mathematics, computing knowledge and emerging technologies.
2. Exhibit professional leadership qualities and excel in interdisciplinary domains.
3. Demonstrate human values, professional ethics, skills and zeal for lifelong learning
4. Contribute to the research community and develop solutions to meet the needs of public and private sectors.

PROGRAM SPECIFIC OUTCOMES (PSOS):

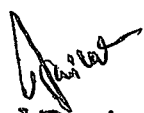
After successful completion of the program, students will be able to:

1. Contribute to the growth of the nation by providing IT enabled solutions.
2. Develop professional skills in the thrust areas like Computer Networks, Image Processing, Data Mining, Internet of Things, Cloud Computing and Information Security.
3. Pursue higher studies in specializations like Artificial Intelligence, Data Science, Cyber Security and Software Engineering in reputed Universities.


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B.E –Information Technology–Course Outcome Statements AY: 2022-23: R-22 Regulation

S.No.	Course Code	Name of the Course	Course Outcomes
2022-23 -- I Semester			
1.	22MTC01	Linear Algebra & Calculus	After completion of this course, students will be able to 1. Determine the extreme values of functions of two variables. 2. Apply the vector differential operator to scalar and vector functions 3. Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems. 4. Determine the basis and dimension of a vector space, compute linear transformation. 5. Apply the Matrix Methods to solve the system of linear equations
2.	22PYC01	Optics and Semiconductor Physics	After completion of this course, students will be able to 1. Demonstrate the physical properties of light. 2. Explain characteristic properties of lasers and fiber optics 3. Find the applications of quantum mechanics 4. Classify the solids depending upon electrical conductivity 5. Identify different types of semiconductors
3.	22CSC01	Problem Solving and Programming	After completion of this course, students will be able to 1. Understand real world problems and develop computer solutions for those problems. 2. Understand the basics of Python. 3. Apply Python for solving basic programming solutions. 4. Create algorithms/flowcharts for solving real-time problems. 5. Build and manage dictionaries to manage data. 6. Handle data using files.
4.	22EGC01	English	After completion of this course, students will be able to 1. Illustrate the nature, process and types of communication and communicate effectively without barriers. 2. Construct and compose coherent paragraphs, emails and adhering to appropriate mobile etiquette. 3. Apply techniques of precision to write a précis and formal letters by using acceptable grammar and appropriate vocabulary. 4. Distinguish formal from informal reports and demonstrate advanced writing skills by drafting formal reports. 5. Critique passages by applying effective reading techniques.
5.	22PYC03	Optics and Semiconductor Physics Lab	After completion of this course, students will be able to 1. Interpret the errors in the results of an experiment. 2. Demonstrate physical properties of light experimentally 3. Make use of lasers and optical fibers for engineering applications 4. Explain the V-I characteristics of some optoelectronic and semiconductor devices 5. Find the applications of thermistor
6.	22EGC02	English lab	After completion of this course, students will be able to 1. Define the speech sounds in English and understand the nuances of pronunciation in English. 2. Apply stress correctly and speak with the proper tone, intonation and rhythm. 3. Analyze IELTS and TOEFL listening comprehension texts to enhance their listening skills. 4. Determine the context and speak appropriately in various situations. 5. Design and present effective posters while working in teams, and discuss and participate in Group discussions.



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7.	22CSC02	Problem Solving And Programming Lab	After completion of this course, students will be able to 1. Understand various Python program development Environments. 2. Demonstrate the concepts of Python. 3. Implement algorithms/flowcharts using Python to solve real-world problems. 4. Build and manage dictionaries to manage data. 5. Write Python functions to facilitate code reuse. 6. Use Python to handle files and memory.
8.	22MEC01	CAD and Drafting	After completion of this course, students will be able to 1. Become conversant with appropriate use of CAD software for drafting. 2. Recognize BIS, ISO Standards and conventions in Engineering Drafting. 3. Construct the projections of points, lines, planes, solids 4. Analyse the internal details of solids through sectional views 5. Create an isometric projections and views
9.	22MEC38	Digital Fabrication Lab	After completion of this course, students will be able to 1. Understand safety measures to be followed in workshop to avoid accidents. 2. Identify various tools used in carpentry, house wiring and plumbing. 3. Make a given model by using workshop trades like carpentry, plumbing, House wiring and 3d modeling using solid works software for Additive Manufacturing. 4. Perform pre-processing operations on STL files for 3D printing, also understand reverse engineering process. 5. Conceptualize and produce simple device/mechanism of their choice.
2022-23 -- II Semester			
10.	22MTC04	Differential Equations & Numerical Methods	After completion of this course, students will be able to 1. Calculate the solutions of first order linear differential equations. 2. Calculate the solutions of higher order linear differential equations. 3. Solve the algebraic, transcendental and system of equations. 4. Apply interpolation and numerical differentiation techniques for given data. 5. Test the convergence and divergence of Infinite series.
11.	22CYC01	Chemistry	After completion of this course, students will be able to 1. Identify the microscopic chemistry in terms of molecular orbitals, intermolecular forces and rate of chemical reactions. 2. Discuss the properties and processes using thermodynamic functions, electrochemical cells and their role in batteries and fuel cells. 3. Illustrate the major chemical reactions that are used in the synthesis of organic molecules. 4. Classify the various methods used in treatment of water for domestic and industrial use. 5. Outline the synthesis of various Engineering materials & Drugs.
12.	22EEC01	Basic Electrical Engineering	After completion of this course, students will be able to 1. Understand the concepts of Kirchoff's laws and their application various theorems to get solution of simple dc circuits. 2. Predict the steady state response of RLC circuits with AC single phase/three phase supply. 3. Infer the basics of single phase transformer 4. Describe the construction, working principle of DC machine and 3-phase Induction motor.

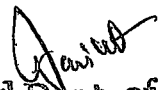
			5. Acquire the knowledge of electrical wires, cables, earthing, Electrical safety precautions to be followed in electrical installations and electric shock and its safety and energy calculations.
13.	22CSC03	Object Oriented Programming	After completion of this course, students will be able to 1. Understand the concepts of Object-Oriented features. 2. Apply OOPs concepts and different libraries to solve programming problems. 3. Understand the advanced concepts of Python. 4. Develop programs to access databases and web data. 5. Understand APIs and third-party libraries to be used with Python.
14.	22CYC02	Chemistry Lab	At the end of the course, student will be able to 1. Identify the basic chemical methods to analyse the substances quantitatively & qualitatively. 2. Estimate the amount of chemical substances by volumetric analysis. 3. Determine the rate constants of reactions from concentration of reactants/ products as a function of time. 4. Calculate the concentration and amount of various substances using instrumental techniques. 5. Develop the basic drug molecules and polymeric compounds.
15.	22MBC02	Community Engagement	After completion of this course, students will be able to 1. Gain an understanding of Rural life, Culture and Social realities. 2. Develop a sense of empathy and bonds of mutuality with Local Communities. 3. Appreciate significant contributions of Local communities to Indian Society and Economy. 4. Exhibit the knowledge of Rural Institutions and contributing to Community's Socio Economic improvements. 5. Utilise the opportunities provided by Rural Development Programmes.
16.	22CSC04	Object Oriented Programming Lab	After completion of this course, students will be able to 1. Demonstrate the features of Object-Oriented Programming. 2. Understand APIs and third-party libraries to be used with Python. 3. Use Python libraries to solve real-world problems. 4. Write scripts to solve data science/machine learning problems using NumPy and Pandas. 5. Develop applications by accessing web data and databases.
17.	22MEC37	Robotics and Drones Lab	After completion of this course, students will be able to 1. Demonstrate knowledge of the relationship between mechanical structures of robotics and their operational workspace characteristics 2. Understand mechanical components, motors, sensors and electronic circuits of robots and build robots. 3. Demonstrate knowledge of robot controllers. 4. Use Linux environment for robotic programming. 5. Write Python scripts to control robots using Python and Open CV.
18.	22EEC02	Basic Electrical Engineering Lab	After completion of this course, students will be able to 1. Comprehend the circuit analysis techniques using various circuit laws and theorems. 2. Analyse the parameters of the given coil and measurement of power and energy in AC circuits 3. Determine the turns ratio/performance parameters of single-phase transformer 4. Infer the characteristics of DC shunt motor different tests. 5. Illustrate different parts and their function of electrical components, equipment and machines.

B.E –Information Technology–Course Outcome Statements AY: 2022-23: R-20 Regulation

S.No.	Course Code	Name of the Course	Course Outcomes
2022-23 -- III Semester			
1.	20ECC34	DC Circuits, Sensors and Transducers	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand about the basics of lower power systems, DC circuits. 2. Use semiconductor devices in making circuits like rectifiers, filters, regulators, etc. 3. Design transistorized circuits of amplifiers and oscillators 4. Acquire the data from various sensors and transducers with the help of DAQ. 5. Analyze usage of sensors/transducer for the development of real-time applications.
2.	20ITC05	Digital Logic and Computer Architecture	<p>Upon completing this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand simplification of logic gates, fundamentals of combinational and sequential logic gates. 2. Design of registers, counters and representation of data using numbers. 3. Understand the architecture and functionality of central processing unit. 4. Discuss the techniques that computers use to communicate with I/O devices for data transfer. 5. Comprehend memory hierarchy, cache memory and virtual memory
3.	20ITC06	Discrete Mathematics and Applications	<p>Upon completing this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Symbolize the given sentence using propositional logic and apply the onto and one-to-one functions between the sets. 2. Understand the mathematical induction and apply the modular arithmetic for cryptography and congruence applications. 3. Apply permutations and combinations to handle different types of objects, understand Solving homogeneous and Non-homogeneous recurrence using generating functions. 4. Apply relations and graph concepts for basic problem solving. 5. Demonstrate Algebraic systems and their Properties.
4.	20ITC07	Java Programming & Enterprise Frameworks	<p>Upon completing this course, students will be able to:</p> <ol style="list-style-type: none"> 1. To understand fundamentals of object-oriented programming paradigm. 2. To apply knowledge of string handling, interfaces, packages and inner classes. 3. To implement Exception handling mechanisms and Multithreading. 4. To demonstrate knowledge on collection framework, stream classes. 5. To develop web applications using Servlets and JSP.
5.	20ITC08	Database Management Systems	<p>Upon completing this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the purpose of database systems and design any domain specific database using E-R model. 2. Design and implement a database using Relational data model, formulate Relational algebra expressions. Use SQL for efficient data retrieval. 3. Access databases from high level languages, define triggers and apply normalization. 4. Understand the concepts of database transactions, locking protocols and concurrency control 5. Efficiently organize and manage data using indexing,


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			hashing, and recovery techniques.
6.	20EGM01	Indian Constitution and Fundamental Principles	Upon completing this course, students will be able to: 1. Understand the making of the Indian Constitution and its features. 2. Identify the difference among Right To equality, Right To freedom and Right to Liberty. 3. Analyze the structuring of the Indian Union and differentiate the powers between Union and States. 4. Distinguish between the functioning of Lok Sabha and Rajya Sabha while appreciating the importance of Judiciary. 5. Differentiate between the functions underlying Municipalities, Panchayats and Co-operative Societies.
7.	20EGM02	Indian Traditional Knowledge	Upon completing this course, students will be able to: 1. Understand philosophy of Indian culture 2. Distinguish the Indian languages and literature 3. Learn the philosophy of ancient, medieval and modern India 4. Acquire the information about the fine arts in India 5. Know the contribution of scientists of different eras.
8.	20ITC09	Java Programming & Enterprise Frameworks Lab	Upon completing this course, students will be able to: 1. To gain the fundamental programming knowledge of OOPs. 2. To use exception handling mechanisms in application development. 3. To apply knowledge of generics and Collections Framework in application development 4. To use the stream, reader and writer classes in applications 5. To build applications using Hibernate and MVC Spring Boot 2.0
9.	20ITC10	DBMS Lab	Upon completing this course, students will be able to: 1. Design and implement database schemas by enforcing integrity constraints. 2. Use SQL for database administration, data manipulation and retrieval. 3. Develop PL/SQL programs and use cursors for the databases. 4. Design triggers for database validation. 5. Handle Exceptions in PL/SQL programs.
10.	20ITC11	IT Workshop	Upon completing this course, students will be able to: 1. Identify the basic components of a computer, gain knowledge on assembling and disassembling of a PC. 2. Implement with Virtual machine setup, Install operating systems and execute Linux commands. 3. Inspect internet connectivity issues and secure a computer from cyber threats. 4. Outline productivity tools and their usage. 5. Make use of cloud based productivity collaboration tools, typesetting system.
11.	20ITC12	Mini Project-1	Upon completing this course, students will be able to: 1. Interpret Literature with the purpose of formulating a project proposal. 2. Plan, Analyse, Design and implement a project. 3. Find the solution of identified problem with the help of modern Technology and give priority to real time scenarios. 4. Plan to work as a team and to focus on getting a working project done and submit a report within a stipulated period of time. 5. Prepare and submit the Report and deliver presentation before the departmental Committee.
12.	20ITI01	MOOCs/Training/Internship	Upon completion of this MOOCs/Training/Internship, students will be able to: 1. Learn new technologies and solve real time problems. 2. Expose to industrial environment problems and technologies. 3. Gain knowledge of contemporary technologies and industrial


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			<p>requirements.</p> <p>4. Identify, design and develop solutions for real world problems.</p> <p>5. Communicate their ideas and learning experiences through reports and presentations.</p>
2022-23 -- IV Semester			
13.	20MTC12	Probability and Queueing Theory	<p>On successful completion of this course the students shall be able to</p> <ol style="list-style-type: none"> 1. Apply the principle of Least Squares approximating for estimating the value 2. Choose the basic probability model's for fitting the Random phenomenon. 3. Analyze the probability function using statistical averages 4. Distinguishing the data using different methods of hypothesis testing. 5. Analyze the Queue model for the probabilistic nature.
14.	20ITC13	Software Engineering	<p>Upon completing this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Identify the minimum requirements for the development of application. 2. Build a system, component, or process to meet desired needs of a customer. 3. Involve in analysis and design of UML models for various case studies. 4. Acquire thorough knowledge of standard UML notations. 5. Know the risks, formulate and implement software projects.
15.	20ITC14	Automata Theory and Compiler Design	<p>Upon completing this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Design deterministic, nondeterministic finite automata and regular expressions. 2. Construct context-free grammars for certain languages, test closure properties, decision properties of CFL's, design PDAs and TMs. 3. Identify recursively enumerable languages, undecidable problems. Understand compiler phases and build topdown, bottom-up parsers. 4. Infer syntax directed translation schemes for the CFGs and develop intermediate code for annotated parse trees. 5. Understand runtime environments, translate intermediate code into target code and apply code optimization.
16.	20ITC15	Design and Analysis of Algorithms	<p>Upon completing this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Analyze best, average and worst case complexities of algorithms and choose appropriate data structure for designing algorithm. 2. Develop solutions using Divide and Conquer, Greedy techniques. 3. Design algorithms using dynamic programming approach, apply traversal and search techniques. 4. Apply backtracking, branch and bound techniques to solve problems. 5. Identify P, NP, NP-Complete and NP-Hard classes to which an algorithm belongs and design a feasible solution.
17.	20ITE01	Digital Image Processing	<p>Upon completing this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Illuminate the fundamental concepts and applications of digital image processing techniques. 2. Demonstrate intensity transformations, spatial filtering, smoothing and sharpening in both spatial and frequency domains, image restoration concepts. 3. Demonstrate image restoration and morphological image processing methods. 4. Apply object recognition techniques by using image segmentation and image representation & description methods. 5. Illustrate the various colour models and Application of image

			compression methods.
18.	20ADE01	Data Analysis and Visualization	Upon completing this course, students will be able to: 1. Efficiently store and manipulate dense data in arrays with Numpy 2. Apply high level mathematical functions to aggregate, broadcast, index and sort multidimensional arrays. 3. Create Series and DataFrame objects to operate on datasets. 4. Perform Data cleaning, transformation, merging, aggregation on datasets. 5. Apply 2-D and 3-D plotting techniques on datasets
19.	20ITE02	Mobile Application Development with Android and Kotlin	Upon completing this course, students will be able to: 1. Understand the benefits of using Kotlin for Mobile application development 2. Understand the android project structure 3. Understand activity and fragment life cycles 4. Apply various styles, themes and material design to apps 5. Apply best practices to prepare and publish apps on Playstore
20.	20ITE03	Fundamentals of Cryptography	Upon completing this course, students will be able to: 1. Demonstrate the key security concepts, security attacks and cryptography techniques. 2. Analyze block ciphers, symmetric encryption algorithms. 3. Describe the operations of asymmetric key cryptography and key exchange. 4. Comprehend cryptographic hash functions, message authentication codes. 5. Inspect the digital signature process, key distribution, user authentication
21.	20ITE04	Data Warehousing and Data Mining	Upon completing this course, students will be able to: 1. Understand the concepts and issues of data mining, apply preprocessing techniques. 2. Build multidimensional data model and perform OLAP operations, generate association rules. 3. Evaluate various models for classification and prediction. 4. Analyze advanced classification methods and clustering techniques. 5. Understand outlier detection and real time applications of data mining.
22.	20MBC01	Engineering Economics & Accountancy	Upon completing this course, students will be able to: 1. Apply fundamental knowledge of Managerial Economics concepts and tools. 2. Analyze various aspects of Demand Analysis, Supply and Demand Forecasting. 3. Understand Production and Cost relationships to make best use of resources available. 4. Apply Accountancy Concepts and Conventions and preparation of Final Accounts. 5. Evaluate Capital and Capital Budgeting decision based on any technique
23.	20CEM01	Environmental Science	Upon completing this course, students will be able to: 1. Identify the natural resources and realise the importance of water, food, forest, mineral, energy, land resources and affects of over utilisation. 2. Understand the concept of ecosystems and realise the importance of interlinking of food chains. 3. Contribute for the conservation of bio-diversity. 4. Suggest suitable remedial measure for the problems of environmental pollution and contribute for the framing of legislation for protection of environment. 5. Follow the environmental ethics and contribute to the mitigation and management of environmental disasters.

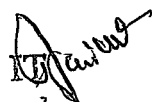
24.	20ITC16	Software Engineering Lab	Upon successful completion of this course, students will be able to: 1. Interpret user requirements using the UML notation. 2. Illustrate Dynamic models of a software system. 3. Analyze and develop class diagrams that model a software system. 4. Develop Activity and swimlane models. 5. Outline analysis and design models.
25.	20ITC17	Design and Analysis of Algorithms Lab	Upon completing this course, students will be able to: 1. Implement Divide and Conquer Algorithms. 2. Build solutions using Greedy technique. 3. Apply Dynamic programming algorithms to solve problems. 4. Implement connected and biconnected components algorithms. 5. Design solutions using Backtracking technique.
26.	20ADC03	Artificial Intelligence & Machine Learning Tools, Techniques and Applications	Upon completing this course, students will be able to: 1. Understand the importance of AI. 2. Understand concepts of Machine Learning algorithms and their limitations. 3. Develop Chatbots based on the requirements. 4. Analyse complex problems involving image processing, such as quality control, visual surveillance, multimodal human-machine interfaces, and image compression. 5. Understand the application of Reinforcement Learning.
27.	20ITC18	Mini Project – II	Upon completing this course, students will be able to: 1. Interpret Literature with the purpose of formulating a project proposal. 2. Plan, Analyse, Design and implement a project using SDLC model. 3. Find the solution of identified problem with the help of modern Technology and give priority to real time scenarios. 4. Plan to work as a team and to focus on getting a working project done and submit a report within a stipulated period of time. 5. Prepare and submit the Report and deliver presentation before the departmental Committee

B.E –Information Technology–Course Outcome Statements AY: 2022-23: R-20 Regulation

S.No.	Course Code	Name of the Course	Course Outcomes
2022-23 -- V Semester			
1.	20ITC19	Operating Systems	Upon successful completion of this course, students will be able to: 1. Demonstrate operating system services, inter process communication and multithreaded Programming. 2. Apply suitable process scheduling, deadlocks handling algorithms and solve process-synchronization. 3. Make use of advanced techniques such as paging, segmentation and virtual memory for memory management. 4. Illustrate file system interfaces and its implementation. 5. Identify the Operating System Security problems and Threats.
2.	20ITC20	Computer Networks	Upon successful completion of this course, students will be able to 1. Summarize functions of each layer in the OSI and TCP/IP reference models and demonstrate the systematic understanding


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			<p>of data communication Techniques.</p> <ol style="list-style-type: none"> 2. Solve problems related to Addressing, Routing and Interoperability among heterogeneous networks. 3. Identify issues in Internetwork Routing issues and Congestion in computer networks. 4. Appraise the functions and performance of Internet Transport Protocols TCP and UDP. 5. Analyze the operating principles of Domain Name System and Electronic Mail, WWW.
3.	20ITC21	Basic Machine Learning	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the types of machine learning and handle the challenges of machine learning. 2. Construct Decision Trees, Measure performance of classifiers. 3. Apply Regression, Logistic Regression and gradient descent to solve problems. 4. Design solutions using Bayesian classifier, SVMs and Ensemble methods. 5. Perform Dimensionality reduction and clustering of data.
4.	20ADC07	Full Stack Development	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Create web pages with good aesthetic sense of design using HTML and CSS. 2. Create real-world React web applications and related tools. 3. Become an agile practitioner with the ability to quickly complete projects. 4. Build an end-to-end application from scratch using NODE JS. 5. Understand and build logical relationships between documents using MongoDB.
5.	20ITE05	Information Retrieval Systems	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand different Information Retrieval models. 2. Apply query language to retrieve the data and evaluate performance. 3. Analyze various methods to improve the retrieval results. 4. Perform operations on text and build indices. 5. Analyze searching techniques and understand Parallel and Distributed IR models.
6.	20ITE06	Advanced Databases	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Acquire knowledge on distributed, parallel and multimedia databases. 2. Distinguish the design, query processing and transaction management activities in centralized and distributed databases. 3. Apply query optimization principles for optimizing query performance in distributed database systems. 4. Utilize distributed transaction principles for handling transactions in distributed database applications. 5. Develop databases for various applications.
7.	20ITE07	Augmented Reality and Virtual Reality	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the basic concepts of Virtual Reality and 3D Computer Graphics. 2. Apply 3D manipulation techniques in Virtual Reality. 3. Analyze Development Tools and Frameworks in Virtual Reality. 4. Develop a Virtual Reality application. 5. Evaluate Augmented Reality Systems

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8.	20ITE08	Cyber Security	Upon successful completion of this course, students will be able to: 1. Describe legal frameworks to handle cybercrimes. 2. Identify the functioning of different kinds of malware used in cybercrimes. 3. Examine the legal perspectives of cybercrimes in Indian and international context. 4. Describe the need of Digital Forensics and the importance of digital evidence in prosecution 5. Interpret the commercial activities in the event of significant information security incidents in the Organization.
9.	20ITE09	Software Project Management	Upon successful completion of this course, students will be able to: 1. Understand Project Management principles while developing software. 2. Obtain adequate knowledge about software process models and software effort estimation techniques. 3. Estimate the risks involved in various project activities. 4. Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles. 5. Learn staff selection process and the issues related to people management
10.	20ITC22	Networks and Security Lab	Upon successful completion of this course, students will be able to: 1. Identify Errors using CRC, Implement routing algorithms and congestion control algorithms. 2. Demonstrate client-server communication using TCP, UDP protocols. 3. Experiment with rootkits to detect malware, wire shark to capture the packets and interfaces. 4. Make use of tools, techniques to protect the system from attacks. 5. Acquire thorough knowledge on tcpdump, dumpcap and nmap.
11.	20ITC23	Basic Machine Learning Lab	Upon successful completion of the course the students will be able to: 1. Perform dimensionality reduction of a dataset. 2. Build decision trees for classification. 3. Design solutions using SVM, KNN, Regression algorithms. 4. Perform clustering of data. 5. Use principle Component Analysis for feature Extraction.
12.	20ADC09	Minor Project-I (Full Stack Development Lab)	Upon completion of this course, students will be able to: 1. Understand Engineer's responsibilities and ethics 2. Use state of the art Tools and technologies 3. Provide innovative solutions to solve real world problems 4. Acquire knowledge in technical reports writing and presentation 5. Apply technical knowledge to real world industrial/rural situations
13.	20ITI02	Industrial / Rural Internship-II	Upon successful completion of this course, students will be able to: 1. Interpret Literature with the purpose of formulating a project proposal. 2. Plan, analyze, Design and implement a project. 3. Find the solution of identified problem with the help of modern Technology and give priority to real time scenarios. 4. Plan to work as a team and to focus on getting a working project done and submit a report within a stipulated period of time.

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			5. Prepare and submit the Report and deliver a presentation before the departmental Committee.
S.No.	Course Code	Name of the Course	Course Outcomes
2022-23 -- VI Semester			
14.	20ADC14	Big Data Analytics	Upon completing this course, students will be able to: 1. Understand the processing large datasets in Hadoop framework and Apply MapReduce architecture to solve real world problems. 2. Develop scripts using Pig over large datasets and query using Hive. 3. Understand the fundamentals of Spark and the Scala programming. 4. Expertise in using Resilient Distributed Datasets (RDD) for creating applications in Spark and query using SparkSQL. 5. Understand NoSQL databases and Develop data models using MongoDB
15.	20ITC24	Embedded Systems and IoT	Upon successful completion of this course, students will be able to: 1. Demonstrate Embedded Systems using 8051 Microcontroller. 2. Interpret the various IoT enabling technologies, Levels. 3. Apply IoT design methodology to build a model using devices like Raspberry Pi3. 4. Develop Domain specific Applications and able to differentiate between M2M and IoT. 5. Infer on Industrial IoT through Real case studies.
16.	20ADC10	Deep Learning	Upon successful completion of this course, students will be able to: 1. Explain the basic principles of neural networks and deep learning. 2. Implement simple neural network algorithms. 3. Compare modeling aspects of various neural network architecture. 4. Evaluate Convolutional Neural Network models on real data sets. 5. Analyze and optimize Recurrent Neural Network models for various applications.
17.	20ITC25	Cloud Computing	Upon successful completion of this course, students will be able to: 1. Understand the basic ideas of Cloud Computing and its services. 2. Analyze the architecture, deployment models and infrastructure models of Cloud Computing. 3. Realize distributed storage and performance for implementing virtualization. 4. Analyze cloud computing security, federation, presence, identity, and privacy. 5. Use IaaS / PaaS service offered by cloud service providers
18.	20ADE03	Natural Language Processing	Upon successful completion of this course, students will be able to: 1. Justify the various steps necessary for processing natural language 2. Suggest appropriate semantic modeling and sequence labeling techniques for a particular application. 3. Apply appropriate neural network based models for a contextual application

			<p>4. Analyse existing encoder-decoder models and information extraction techniques.</p> <p>5. Identify the significance of word net and analyze the applications of Natural Language Processing such as Question Answering and chatbots.</p>
19.	20ITE10	Data Compression	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the Mathematical Preliminaries involved in compression techniques. 2. Analyze Hoffman and Arithmetic coding for Lossless image compression, Text compression, and Audio Compression 3. Apply LZ77, LZ78 dictionary-based compression techniques. 4. Identify appropriate Lossless and Lossy algorithms for compression of given digital information. 5. Evaluate scalar and vector quantization techniques
20.	20ADE06	Microservices with Spring Boot	<p>Upon completing this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Acquire the basic concepts of the Spring Framework 2. Interact with databases using Spring's support for JDBC and JPA. 3. Build spring boot applications using Dependency Injection concept 4. Apply Transaction Management concepts of spring in Enterprise Application Development and develop the Spring-MVC based Applications to solve the real-world problems. 5. Use Spring Unit testing framework and configure security on Spring MVC Applications
21.	20ITE11	Ethical Hacking	<p>Upon successful completion of this course, a student will be able to:</p> <ol style="list-style-type: none"> 1. Identify the vulnerabilities/threats/attacks. 2. Describe penetration & security testing. 3. Interpret safe penetration techniques on the World Wide Web. 4. Design a computer against a variety of security attacks using various tools. 5. Become a professional ethical hacker.
22.	20ITE12	Agile Methodologies	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Compare Agile model with traditional models and explain the principles of agile model. 2. Perform iterative agile software processes. 3. Analyze the impact of agile knowledge management in the software development process. 4. Realize the importance of interacting with business stakeholders in determining the requirements for agile software system. 5. Develop techniques and tools for improving team collaboration and agile software quality
23.	20EGM03	Universal Human Values II: Understanding Harmony	<p>Upon successful completion of the course the students will be able to:</p> <ol style="list-style-type: none"> 1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature) 2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. 3. They would have better critical ability. 4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). 5. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real

			life, at least a beginning would be made in this direction.
24.	20ADC15	Big Data Analytics Lab	Upon completing this course, students will be able to: 1. Explain Hadoop working environment and develop applications using MapReduce framework. 2. Develop scripts using Pig to solve real world problems and query the datasets using Hive. 3. Develop applications in Spark environment using RDDs. 4. Query real time data using SparkSQL. 5. Query large datasets using NoSQL.
25.	20ITC26	Embedded Systems and IoT Lab	Upon completing this course, students will be able to: 1. Develop Embedded System using 8051 in Embedded 'c' 2. Implement Python scripts that run on Raspberry Pi/Arduino. 3. Build IoT Applications using sensors. 4. Demonstrate Read and write cloud data using Thing speak. 5. Interpret the Case studies in different domains.
26.	20ITC27	Minor Project-II (Deep Learning Lab)	Upon completing this course, students will be able to: 1. Define a project proposal by interpreting real time scenarios and the Literature. 2. Plan, analyse, Design and implement a project. 3. Develop solution of the identified problem with the help of modern technologies 4. Work as a team and develop a collaborative learning environment. 5. Prepare and submit the Report and deliver a presentation before the departmental Committee.
27.	20EGCO3	Employability Skills	Upon successful completion the students will be able to: 1. Become effective communicators, participate in group discussions with confidence and be able to make presentations in a professional context. 2. Write resumes, prepare and face interviews confidently. 3. Be assertive and set short term and long term goals, learn to manage time effectively and deal with stress. 4. Make the transition smoothly from campus to work, use media with etiquette and understand the academic ethics. 5. Enrich their vocabulary, frame accurate sentences and comprehend passages confidently.

B.E –Information Technology–Course Outcome Statements: R-18 Regulation

S.No	Subject	Name of the subject	Outcomes
2022-23, B.E. VII Semester			
1.	18IT C27	Big Data Analytics	Upon completion of this course, students will be able to: 1. Understand and analyze the processing of large datasets in Hadoop framework. 2. Apply MapReduce architecture to solve real world problems. 3. Understand NoSQL databases and create data models using MongoDB. 4. Develop scripts using Pig over large datasets and query using Hive. 5. Understand the fundamentals of the Scala programming and exercise Resilient Distributed Datasets (RDDs) for creating applications in Spark.
2.	18IT C28	Embedded Systems	Upon completion of this course, students will be able to: 1. Make use of the architecture, instruction set of 8085 and

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			<p>write Assembly language programs.</p> <ol style="list-style-type: none"> 2. Examine the interface with peripheral devices like Keyboard and Display devices. 3. Inference the embedded systems and its applications using 8051 Microcontroller. 4. Interpret the design issues of Microcontroller based embedded systems. 5. Identify and test Embedded systems using Hardware tools like Multi meter, Logic Analyzer and Software tools like Emulator, Simulator etc.
3.	18IT C29	Internet of Things	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Outline the terminology, protocols, Communication models and Communication APIs of IoT. 2. Define the various IoT enabling technologies, Levels, Domain specific Applications and differentiation between M2M and IoT. 3. Make use the basics of Python Programming for developing IoT applications. 4. Infer the steps involved in IoT platform design methodology and interpret physical devices like Raspberry Pi3. 5. Analyze Data with Physical servers and develop web applications using Django frame work.
4.	18IT C30	Distributed Systems	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the various concepts, types and architectures of distributed systems. 2. Illustrate the processes and various communication techniques for distributed systems. 3. Demonstrate various naming and synchronization mechanism in distributed systems. 4. Analyse consistency, replication and fault tolerance in distributed systems. 5. Evaluate various distributed object-based systems with applications.
5.	18IT E17	Cloud Computing	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain different types of cloud computing concepts and the techniques. 2. Determine the issues related to scaling, capacity planning and load balancing. 3. Estimate the security and compliance issues in clouds. 4. Analyse the Portability and Interoperability issues of cloud virtualization. 5. Evaluate the importance of SOA and database technology.
6.	18IT E18	Quantum Computing	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the origin of quantum computing and basic concepts. 2. Apply Mathematical knowledge on Quantum computing applications. 3. Demonstrate the working of a Quantum Computing, its architecture, program model and quantum logic gates. 4. Build cryptographic techniques in quantum algorithms. 5. Evaluate quantum algorithm and program it on major toolkits.

7.	18IT E19	Natural Language Processing	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Comprehend the concept of natural language processing, its challenges and applications. 2. Formulate different natural language processing tasks using Python programming and Natural Language Toolkit (NLTK) open source library. 3. Articulate information from unstructured text, either to guess the topic or identify named entities. 4. Analyze linguistic structure in text, including parsing and semantic analysis. 5. Compare popular linguistic databases, including WordNet and treebank.
8.	18IT E20	Block Chain Technology	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the concepts of Block chain technology and describe how the Block chain systems work. 2. Explain the working of bit coin crypto currency. 3. Develop and deploy block chain application for on premise and cloud-based architecture. 4. Incorporate ideas from various domains and implement them using block chain technology in different perspectives. 5. Devise smart contract using Hyperledger Fabric and Ethereum frameworks.
9.	18IT C31	Big Data Analytics Lab	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand Hadoop working environment and develop applications using MapReduce framework. 2. Develop scripts using Pig to solve real world problems and query the datasets using Hive. 3. Write NoSQL queries to large datasets. 4. Develop applications in Spark environment using RDDs. 5. Analyze and visualize applications in R language by integrating Hadoop.
10.	18IT C32	Embedded Systems and IoT Lab	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Construct the basic Assembly Language programming using instruction set of 8085 & 8051. 2. Demonstrate and Interface embedded systems applications using 8051. 3. Develop python scripts that run on Raspberry Pi3. 4. Experiment with LEDs, Sensors using Raspberry Pi3. 5. Modify and Compose IoT systems using Raspberry Pi3.
11.	18IT C33	Distributed Systems Lab	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Design a chat server to simulate multi-client server environment. 2. Develop file transfer using FTP. 3. Develop middleware using RMI. 4. Demonstrate the functionality of a distributed environment using 2-Phase Commit Protocol. 5. Demonstrate Distributed File System using NFS.
12.	18IT C34	Project Part - 1	

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2022-23 VIII Semester			
13.	18ME O04	Entrepreneurship	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the concept and essence of entrepreneurship. 2. Identify business opportunities and nature of enterprise. 3. Analyze the feasibility of new business plan. 4. Apply project management techniques like PERT and CPM for effective planning and execution of projects. 5. Use behavioral, leadership and time management aspects in entrepreneurial journey
14.	18ME O05	Human Rights and Legislature Procedures	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Recall the human rights in the global and national context. 2. Understand the overall view on working of Indian constitution. 3. Analyze the societal problems in the context of human rights. 4. Evaluate implementation of right to development and right to information. 5. Application of human rights for human safety and clean environment.
15.	18CE O02	Disaster Mitigation Management	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Identify and understand the fundamental terminologies in disaster management. 2. Distinguish between the Hydro-meteorological disasters and apply the concepts of structural and non-structural mitigation measures. 3. Categorize different Geographical Disasters and apply the knowledge in utilizing the early warning systems. 4. Analyze various mechanisms and consequences of human induced disasters. 5. Develop an awareness of disaster management phases and formulating effective disaster management plans, ability to understand various participatory roles of stakeholders- Central and State Government bodies at different levels.
16.	18EG O01	Technical Writing Skills	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the channels of communication and define nature and aspects of Technical communication 2. Compare and contrast technical communication to that of general communication while constructing error free sentences applying features of technical writing. 3. Analyze data, draw inferences to write Journal articles and conference papers and to compose business letters. 4. Evaluate data to draft technical reports and technical proposals. 5. Design a technical presentation by understanding the nuances of presentation skills and also transfer data from verbal to graphic and vice versa.
17.	18ME O01	Robotics	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the basic components, specifications and applications of the Robots. 2. Understand transformations, direct and inverse kinematics of robots.

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			<ol style="list-style-type: none"> 3. Calculate forces in links and joints of a robot and find the singularities, Jacobian and trajectory planning of a robot for various tasks. 4. Classify drives, sensors and grippers for various applications. 5. Program a robot to predict motions for a given task with machine vision and sensors.
18.	18ME O07	Intellectual Property Rights	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the evolution of IP, working of organization's at global level to protect and promote IP. 2. Familiarize with the patent filing process at national and international level. 3. Draw the logical conclusion of research, innovation and patent filing. 4. Compare different kinds of IP and their patenting system. 5. Understand the techno-legal-business angle of IP, infringement and enforcement mechanisms for protection.
19.	18ME O10	Introduction to Operations Research	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the concepts of linear programming problem. 2. Solve the given transportation problem. 3. Develop optimum pair of operations and resources by using assignment technique. 4. Analyze project management techniques like CPM and PERT to plan and execute projects successfully. 5. Apply sequencing concepts for industry applications.
20.	18PY O01	History of Science and Technology	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Demonstrate the process of beginning of science and civilization, knowledge acquisition and philosophical approach of science and its advancements in the Stone Ages and Antiquity period. 2. Illustrate the advancements in science and technology in the medieval period across Asia and Arab countries and decline and revival of science in Europe. 3. Explain the scientific approach and its advances of the Europeans and how the role of engineer during the industrial revolution and the major advancements. 4. Make use of the advancements in the field of science and technology by adopting new philosophies of 19th and first half of 20th century in finding ethical solutions to the societal problems. 5. Interpret the changes in specializations of science and the technology and build the relation between information and society from second half of 20th century onwards.
21.	18IT C35	Technical Seminar	<p>Upon completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Collect, Organize, Analyze and Consolidate information about emerging technologies from the literature. 2. Exhibit effective communication skills, stage courage, and confidence.

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			<ol style="list-style-type: none">3. Demonstrate intrapersonal skills.4. Explain new innovations/inventions in the relevant field.5. Prepare and experience in writing the Seminar Report in a prescribed format.
22.	18IT C36	Project Part - 2	



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