1.1.1: Curricula developed and implemented have relevance to the local, national, regional and global developmental needs

Department of CSE- (M.Tech Computer Science & Engineering)

S. NO	Course Code	Course Name	Course Objectives	Course Outcomes	Mapped POs	Mapped PSOs	Integrated with local, national, regional and global developmental needs	Linkage with Government of India's Initiatives	Justification
1	80501	Programming for Problem Solving	This course provides the fundamental concepts of computers and introduce to the students to the field of programming using C language, apply the control structures, iterations statements, arrays, functions, strings, pointers, structures, unions and files. This course also explains the concepts of searching and sorting techniques in C language.	1. Understand the basic terminology, write, compile and debug programs in computer programming. 2. Apply different types of control structures and arrays in a computer programming. 3. Develop programs that make use of concepts such as strings and pointers in C language. 4. Compare parameter passing techniques, structures and unions in computer programming. 5. Analyze file operations, searching and sorting methods.	PO1 PO2 PO3 PO4 PO5	PSO1 PSO2	Sustainability	Digital India	One of the key Programming for Problem Solving of that Program was that the problem statements will directly come from different Government Departments under GoG based on their requirements which will be used to challenge students for developing innovative digital solutions.
2	80502	Programming for Problem Solving Lab	This course provides the fundamental concepts of programming using C language, apply the control structures, iterations statements, arrays, functions, strings, pointers, structures, unions and files. This course also explains the concepts of searching and sorting techniques in C language	1. Analyze concepts in problem solving do programming in C language and write diversified solutions using C language. 2. Identify situations where computational methods and computers would be useful. 3. Understand the programming tasks using techniques learned and write pseudo-code. 4. Compare the program on a computer, edit, compile, debug, correct, recompile and run it. 5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task	PO1 PO2 PO3 PO4 PO5	PSO1 PSO2	Sustainability	Digital India	To find digital prototypes/solutions based on real life challenges while working in a team in a short stipulated time frame across Sectors.
3	80503	Data Structures	This course will deliver the knowledge in introducing the concepts of various data structures such as linked lists, stacks, queues, trees and graphs along with the applications.	1. Identify the appropriate data structures and analyze the performance of algorithms. 2. Understand and implement single, double, and circular linked-lists. 3. Implement Stacks and Queues using array and linked-list representations. 4. Develop programs by using non linear data structures such as trees and graphs. 5. Design and Implement applications of advanced data structures	PO1 PO2 PO3	PSO1 PSO2	Sustainability	Digital India	One of the key Programming for Problem Solving of that Program was that the problem statements will directly come from different Government Departments under GoG based on their requirements which will be used to challenge students for developing innovative digital solutions.
4	80504	Data Structures Lab	This course will deliver the knowledge in introducing the concepts of various data structures such as linked lists, stacks, queues, trees and graphs along with the applications.	1. Identify the appropriate recursive algorithms and analyze the performance of algorithms. 2. Understand and implement single, double, and circular linked-lists. 3. Implement linear data structures such as Stacks and Queues using array and linked-list representations. 4. Implement non linear data structures such as trees and graphs.	PO1 PO2 PO3	PSO1 PSO2	Sustainability	Digital India	To find digital prototypes/solutions based on real life challenges while working in a team in a short stipulated time frame across Sectors.

5	80B09	Probability and Statistics	This course is meant to provide a grounding in Statistics and foundational concepts that can be applied in modeling processes, decision making and would come in handy for the prospective engineers in most branches	1. The students will understand central tendency and variability for the given data. 2. Students would be able to find the Probability in certain realistic situation. 3. Students would be able to identify distribution in certain realistic situation. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables Involved in the probability models. It is quite useful for all branches of engineering. 4. The student would be able to calculate mean and proportions (large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations. 5. The student would be able to calculate mean and proportions (small sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2	Environment and Sustainability	Start Up India	The action plan of this initiative, is based on the Simplification and Handholding.
6	80505	Discrete Mathematics	This course provides the concepts of mathematical logic demonstrate predicate logic and Binary Relations among different variables, discuss different type of functions and concepts of Algebraic system and its properties. It also evaluates techniques of Combinatorics based on counting methods and analyzes the concepts of Generating functions to solve Recurrence equations	1. Apply the concepts of connectives and normal forms in real time applications. 2. Summarize predicate logic, relations and their operations. 3. Describe functions, algebraic systems, groups and Boolean algebra. 4. Illustrate practical applications of basic counting principles, permutations, combinations, and the pigeonhole methodology. 5. Analyze techniques of generating functions and recurrence relations.	PO1, PO2, PO3, PO4, PO5, PO12	PSO1, PSO2	Environment, Sustainability and Professional Ethics	Start Up India	The action plan of this initiative, is based on the Simplification and Handholding.
7	80506	Computer Organization	This course used to recognize the basic structure and operation of a digital computer, understand the instruction formats, addressing modes, I/O and interrupts, study the micro programmed control and hierarchy of memory system, operations of the arithmetic unit and concepts related to the input-output organization and analyze processor performance improvement using instruction level parallelism and operations in pipeline design.	1. Develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems. 2. Classify the impact of instruction set architecture of computer design. 3. Design memory organization and control unit operations. 4. Evaluate computer arithmetic operations of binary number system and different hardware components associated with the input-output organization. 5. Ability to conceptualize instruction level parallelism and pipeline.	PO1, PO2, PO3, PO12	PSO1, PSO2	Sustainability	Digital India	To find digital prototypes/solutions based on real life challenges while working in a team in a short stipulated time frame across Sectors.
8	80507	Operating Systems	This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.	1.Determine the role of Operating System in a computer. 2.Relate the methods for providing concurrency, communication and synchronization among concurrent tasks. 3.Illustrate the schemes used to address the issues of deadlocks. 4.Contrast different memory management techniques. 5.Examine various file management strategies and security issues.	PO1, PO2, PO3, PO12	PSO1, PSO2, PSO3	Human Values and Professional Ethics	Digital India	To find digital prototypes/solutions based on real life challenges while working in a team in a short stipulated time frame across Sectors.
9	80508	Java Programming	This course will make students able to learn and understand the concepts and features of object oriented programming and the object oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading, to explore concepts of Applets and event handling mechanism. This course makes students to gain the knowledge in programming using Layout Manager and swings.	1.Differentiate structured programming and object oriented programming and know the concepts of classes, objects, members of a class. 2.Apply object oriented programming features and concepts for solving given problems using inheritance and will know how to organize files in packages and concept of interface. 3.Capable of handling run time errors using Exceptional Handling and develop applications for concurrent processing using Thread Concept. 4.Design Applets that take user response through various peripheral devices such as mouse and keyboard by event handling mechanism. 5.Design interactive applications for use on internet.	PO2, PO3, PO5	PSO1, PSO2	Environment and Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.

10	80601	IT Workshop	• The IT Workshop is a training lab course to get training on PC Hardware, Internet & World Wide Web, and Productivity tools for documentation, Spreadsheet computations, and Presentation. • To introduce to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers, hardware and software level troubleshooting process. • To introduce connecting the PC on to the internet from home and workplace and effectively usage of the internet, Usage of web browsers, email, newsgroups and discussion forums. To get knowledge in awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks. • To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools and LaTeX	1.Apply knowledge for computer assembling and software installation. 2.Ability how to solve the trouble shooting problems. 3.Apply the tools for preparation of PPT, Documentation and budget sheet etc	PO1, PO2, PO3, PO5, PO12	PSO1	Human Values and Professional Ethics	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
11	80509	Operating Systems Lab	This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.	1. Implement various CPU scheduling algorithms, Bankers algorithms used for deadlock avoidance and prevention. 2. Develop disk scheduling algorithms and apply File organization techniques. 3. Simulate file allocation method	PO1, PO2, PO3, PO12	PSO1	Environment, Sustainability and Professional Ethics	Digital India	To find digital prototypes/solutions based on real life challenges while working in a team in a short stipulated time frame across Sectors.
12	80510	Java Programming Lab	This course will make students able to learn and understand the concepts and features of object oriented programming and the object oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading, to explore concepts of Applets and event handling mechanism. This course makes students to gain the knowledge in programming using Layout Manager and swings	1. Build simple java progras using the basic concepts of OOP 2. Create user defined packages to build real time applications 3. Develop applications on files, exceptions, threads and applets. 4. Construct GUI based applications. 5. Design Interactive applications for use on internet.	PO2, PO3, PO5	PSO1, PSO2	Environment, Sustainability and Professional Ethics	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
13	80M02	Gender Sensitization	To develop students' sensibility with regard to issues of gender in contemporary India.To provide a critical perspective on the socialization of men and women.To introduce students to information about some key biological aspects of genders.To expose the students to debates on the politics and economics of work.To help students reflect critically on gender violence.To expose students to more egalitarian interactions between men and women.	1. Develop a better understanding of important issues related to gender in contemporary India. 2. Sensitize about the basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film. 3. Attain a finer grasp of how gender discrimination works in our society and how to counter it. 4. Acquire insight into the gendered division of labour and its relation to politics and economics. 5. Develop a sense of appreciation of women in all walks of life.	PO6,PO8, PO9,PO11,PO12	PSO1, PSO2.	Environment and Sustainability	National Educational Policy	Gender Sensitization is the process by which people give moral values to each other.[1] It can be an activity that can take place in any human organisation during which people are assisted by others, who may be older, in a condition experienced to make explicit our ethics in order to assess the effectiveness of these values and associated behaviour for their own and others' long term well-being, and to reflect on and acquire other values and behaviour which they recognise as being more effective for long term well-being of self and others. There is a difference between literacy and education.
14	80511	Software Engineering	Student will be able to learn fundamental aspects of Software Engineering and analyze various process models. To identify various types of requirements and the process for Requirements Engineering. To make use of various System Models to conceptualize and construct a system. To demonstrate different testing tactics and define metrics for software measurement. To classify and mitigate the Software Risks and learn to achieve quality standards	1. Analyze the customer business requirements and choose the appropriate Process model for the given project 2. Elicit functional and non-functional requirements using rigorous engineering methodology 3. Conceptualize and achieve requirements defined for the system using Architectural styles and Design patterns 4. Design test cases and define metrics for standardization. 5. Assess, mitigate and monitor the risks and assuring quality standards	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10	PSO1, PSO2, PSO3	Environment, Sustainability and Professional Ethics	Start Up India	To promote awareness and adoption of IPRs by Startups and facilitate them in protecting and commercializing the IPRs, Startup India provides access to high quality Intellectual Property services and resources, including Project Management Tools for Startups. If you are a service company, invoicing and time tracking are two important feature requirements for your project management system

15	80512	Database Management Systems	This course enables the students to learn the basic concepts and the applications of Data Base Systems and conceptualize and depict a Data Base System using ER diagram, master in constructing queries using SQL. Using this course student can understand relational database principles, become familiar with the basic issues of transaction processing and concurrency control and Data Base storage structures and access techniques.	1. Identify and define the data models needed to design a database. 2. Write queries in SQL for database creation and maintenance. 3. Analyze functional dependencies for designing a robust database. 4. Implement transactions, concurrency control, recovery and Query optimization techniques. 5. Compare various indexing and hashing techniques.	PO1, PO2, PO3, PO6, PO10, PO12	PSO1, PSO2	Sustainability	PROJECT MANAGEMENT SYSTEM (PMIS)	This course makes to Construct a Database Schema, Manipulate data using a SQL. In PROJECT MANAGEMENT SYSTEM (PMIS) ,all the activities of team and their tasks are monitored with time and resource requirement
16	80602	Web Technologies	This course enables the students to identify the fundamental concepts for developing web application using PHP language for server side scripting, analyze how data can be transported using XML, developing a web application with Server side programming using JavaServlets & JSP and Client side scripting with JavaScript and AJAX.	1. Understand the concepts of client side scripting, validation of forms and AJAX programming 2. Identify the role of server side scripting with PHP language. 3. Create web pages using XML and explore how to parse and use XML Data with Java. 4. Design dynamic web application using Server side programming with Java Servlets and JSP. 5. Contrast on how to connect and retrieve data through a web page from database using JDBC.	PO3, PO5, PO6, PO10, PO12	PSO1, PSO2, PSO3	Environment and Sustainability	eProcurement System of NIC (GePNIC)	This course covers all the web programming paradigms. GePNIC is a generic software which can be directly used by any Government Department can be used for all kinds of procurement activities such as Goods, Works and Services.
17	80513	Formal Languages and Automata Theory	This course enable the students to define basic properties of formal languages, explain the Regular languages and grammars, inter conversion, Normalizing CFG , describe the context free grammars, minimization of CNF, GNF and PDA , designing Turing Machines and types of Turing Machines, church's hypothesis counter machines, LBA, P & NP problems and LR grammar.	1. Define the theory of automata types of automata and FA with outputs. 2. Differentiate regular languages and applying pumping lemma. 3. Classify grammars checking ambiguity able to apply pumping lemma for CFL various types of PDA. 4. Illustrate Turing machine concept and in turn the technique applied in computers. 5. Analyze P vs NP- Class problems and NP-Hard vs NP-complete problems, LBA, LR Grammar, Counter machines, Decidability of Problems.	PO1, PO2, PO3, PO4, PO5, PO12	PSO1, PSO2.	Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
18	80523	Object Oriented Analysis and Design	The student will be able to understand the Unified Modeling Language Principles and learns fundamental process pattern for object-oriented analysis and design.	1. Analyze the requirements through Use-Case View 2. Identify all structural and behavioral concepts of the entire system 3. Develop a model using UML concepts by different types of diagrams like Use case diagram, Class Diagram, Sequence Diagram etc. 4. Design event ,process and state chart diagrams for the models 5. Build an application with object oriented analysis and design concepts.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO11.	PSO1, PSO2, PSO3	Environment, Sustainability and Professional Ethics	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
19	80524	Neural Networks	To understand the neural activities and learning process	1. Learn basic neural network architecture 2. Learn basic learning algorithms 3. Understand data pre and post processing 4. Learn training, verification and validation of neural network models 5. Design Engineering applications that can learn using neural networks	PO1, PO2, PO3, PO4, PO5, PO12.	PSO1, PSO2	Sustainability	National Strategy for Artificial Intelligence-NITI Aayog	An artificial neuron network (ANN) is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc..
20	80525	Computer Graphics	This course is to enable the students to understand the fundamental concepts of display devices and output primitives, to demonstrate 2D transformations, viewing and clipping algorithms, explore different representations of 3D objects and illumination models, to understand 3D transformations and viewing, discuss surface detection and animation methods.	1. Develop simple graphics applications. 2. Apply 2D objects transformations. 3. Use the Concepts of 3D Object representations. 4. Design 3D object transformations and viewing. 5. Build Animation sequences.	PO1, PO3, PO4, PO5, PO6	PSO1, PSO2, PSO3	Environment and Sustainability	E-EntryPass / Skill India	This course is to make programming in graphics by using graphical tools. It was setup as a one of its kind, Public Private Partnership Company with the primary mandate of catalysing the skills landscape in India. E-Entrypass is a web-based computerized solution for issuance of photo entry passes to visitors to Punjab Civil Secretariat for various reasons. This include Capturing of Visitor's Details along with photograph and also giving provision for entry of multiple visitors.

21	80514	Software Engineering & UML Lab	To understand the software engineering methodologies involved in the phases for project development. To gain knowledge about open source tools used for implementing software engineering methods. To exercise developing productstartups implementing software engineering methods. Open source Tools: StarUML / UMLGraph / Topcased.	1. Analyze the requirements through Use-Case View 2. Identify all structural and behavioral concepts of the entire system 3. Develop a model using UML concepts by different types of diagrams like Usecase Diagram, Class Diagram, Sequence Diagram etc	PO1, PO2, PO3, PO4, PO5, PO6.	PSO1, PSO2, PSO3	Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
22	80515	Database Management Systems Lab	This course enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example company named "Roadway Travels" whose description is as follows. The student is expected to practice the designing a database system using ER diagram, developing and querying a relational database using normalization techniques in the context of example database "Roadway travels". Students are expected to use "Mysql" database.	1. Design and implement a database schema for a given problem. 2. Generate queries using SQL DML/DDL/DCL commands on a database. 3. Declare normalization techniques for development of application software to realistic problems. 4. Make use of procedures for various Data Base accessing and manipulations	PO1, PO2, PO3, PO6, PO10, PO12	PSO1, PSO2.	Environment, Sustainability and Professional Ethics	PROJECT MANAGEMENT SYSTEM (PMIS)	This course makes to Construct a Database Schema, Manipulate data using a SQL. In PROJECT MANAGEMENT SYSTEM (PMIS) ,all the activities of team and their tasks are monitored with time and resource requirement
23	80603	Web Technologies Lab	To enable the student to program web applications using the following technologies, AJAX, PHP, Tomcat Server, Servlets, JSP	1. Demonstrate use of LAMP Stack for web applications and Tomcat Server for Servlets and JSPs 2. Design simple applications with Technologies like HTML, Javascript, AJAX, PHP, 3. Utilize the concepts of Servlets and JSPsand implement dynamic websites and Connect to Database and get results 4. UseParse XML files using Java (DOM and SAX parsers)	PO3, PO5, PO6, PO8, PO10, PO12	PSO1,PSO2,PSO3	Sustainability	eProcurement System of NIC (GePNIC)	This course covers all the web programming paradigms. GePNIC is a generic software which can be directly used by any Government Department can be used for all kinds of procurement activities such as Goods, Works and Services.
24	80M01	Environmental Science	An interdisciplinary approach to complex environmental problems using basic tools of the natural and social sciences, including geo-systems, biology, chemistry, economics, political science and international processes. The ability to work effectively as a member of an interdisciplinary team on complex problem of environment	1. To enable the students to realize the importance of ecosystem, its structure, services. To make the students aware of Different natural functions of ecosystem, this helps to sustain the life on the earth. 2. To use natural resources more efficiently. 3. To make the students aware of the impacts of human actions on the environment, its effects and minimizing measures to mitigate them. 4. To educate the students regarding environmental issues and problems at local, national and international level. 5. To know more sustainable way of living	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8.	PSO1, PSO2.	Environment, Sustainability and Professional Ethics	National Environmental Policy	Environmental science is an interdisciplinary academic field that integrates physical, biological and information sciences to the study of the environment, and the solution of environmental problems. Environmental science emerged from the fields of natural history and medicine during the Enlightenment.
25	80H05	Fundamentals of Management and Entrepreneurship	Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an organization.	1. Understand the various concepts, principles and theories of management. 2. Understand the basic concepts of planning and various structures of organizations. 3. Understand the process of staffing and controlling 4. Understand the process of operations management. Also learn the concepts of materials management and marketing management at an organization. 5. Understand the various contemporary management practices. Also the project management techniques	PO2,PO4,PO5,PO7,PO9,PO10,PO11	PSO1, PSO2.	Human Values and Professional Ethics	Guidelines for Prospective Entrepreneur	Understanding basic concepts in the area of entrepreneurship, understanding the stages of the entrepreneurial process, adopting of the key steps in the elaboration of business ideas, developing personal creativity and entrepreneurial initiative.
26	80516	COMPILER DESIGN	This course outlines the major concept areas of language translation and various phases of compiler, extend the knowledge of parser by parsing LL parser and LR parser, analyze the intermediate forms and the role of symbol table, classify code optimization techniques and analyze the data flow and develop machine code generation algorithms.	1. Distinguish the various phases of compilation. 2. Explain the different types of parsing techniques. 3. List the intermediate forms of source programs and organize symbol table. 4. Make use of code optimization techniques to reduce the code. 5. Build the Object code generation algorithms.	PO1,PO2,PO8,PO12	PSO1.PSO2	Environment, Sustainability and Professional Ethics	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
27	80517	COMPUTER NETWORKS	This course provides students to understand the fundamental concepts of computer networking and communications make use of IEEE standards in the construction of LAN, build the skills of subnetting and supernetting, explain the concepts of protocols of Transport Layer, QoS and Congestion control mechanisms and demonstrate different protocols of Application Layer.	1. Understand the Layered Architecture of Computer Networks. 2. Conceptualize the protocols of Data Link Layer and can build Local area networks. 3. Apply Subnet and Supernet concepts in the construction of computer network. 4. Summarize the protocols used in Transport Layer, QoS and Congestion control mechanisms. 5. Analyze different protocols of Application Layer and various security risks	PO2,PO3,PO5,PO6,	PSO1,PSO2,PSO3	Sustainability	e-Granthalaya: A Digital Agenda for Library Automation and Networking	This course gives the fundamentals and designing of network and deployment. A Library Management Software for computerization of Government Libraries. The software provides Web based Data Entry solution to the libraries. The software generates e-Catalogs of library documents and provides various kinds of Online services to the Library members.

28	80526	ADVANCED DATABASES	To understand the distributed database management and real-time application management	1. Understand the role of a distributed database management system in an Enterprise/organization. 2. Design queries of a distributed database management system 3. Apply the principles of query optimization techniques to a database schema. 4. Understand the concept of a database transaction including concurrency control, backup and recovery, and data object locking and protocols. 5. Explain the various types of locking mechanisms used in within database management systems.	PO1,PO2,PO3,PO6,PO10,PO12	PSO1,PSO2	Environment, Sustainability and Professional Ethics	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
29	80617	Artificial Intelligence	This course enable the students to understand the basic fundamentals of Artificial Intelligence, determine various problem solving strategies, understand the logic concepts, different approaches to represent the knowledge, develop the expert systems in various phases and its applications, apply the fuzzy logic in various problem solving techniques	1. Describe the key components of the Artificial Intelligence field. 2. Identify various problem solving strategies. 3. Construct the solution for the problem using various logic and knowledge representation techniques. 4. Interpret the knowledge in various domains using expert systems. 5. Discover the solutions by using the probability theory and fuzzy logic.	PO1,PO2,PO3,PO4,	PSO1,PSO2,PSO3	Human Values and Professional Ethics	National Strategy for Artificial Intelligence-NITI Aayog	An Artificial Intelligence is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc.,
30	80527	ANIMATION TECHNIQUES	This course will enable the students to learn the fundamental concepts of animation, creating flash animation concepts, learn the 3d animation techniques, apply the motion capture software for animation and analyze various color models.	1. Understand fundamental concepts of animation. 2. Implement animation using flash concepts. 3. Outline the scripting concepts in 3D animation methods. 4. Analyze the different languages of scripting animation techniques. 5. Apply the story developing and color model in 3D animated movies.	PO1,PO2,PO3,PO4,PO5,PO12	PSO1,PSO2,PSO3	Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
31	80528	DISTRIBUTED SYSTEMS	Student will be able to learn fundamental aspects of Distributed systems and analyze basics of Architectural and Fundamental Models. To identify various types of requirements and the process for Distributed objects. To make use of various OS layers to conceptualize and construct a system, to demonstrate different file systems tactics and define Events and time ordering in distributed transactions.	1. Structuring distributed applications: using client-server and remote procedure calls. 2. Learns inter process communication and distributed objects. 3. Design Cryptographic Algorithms and security issues for distributed systems. 4. Assess distributed file systems. 5. Ordering of events: using logical and physical clocks.	PO1,PO2,PO3,PO4,PO5,PO9	PSO1,PSO2	Human Values and Professional Ethics	PROJECT MANAGEMENT SYSTEM (PMIS)	This course makes to Construct a Database Schema, Manipulate data using a SQL. In PROJECT MANAGEMENT SYSTEM (PMIS) ,all the activities of team and their tasks are monitored with time and resource requirement
32	80529	IMAGE PROCESSING	To comprehend the relation between human visual system and machine perception and processing of digital images. To provide a detailed approach towards image processing applications like enhancement, segmentation, and compression.	1. Exploration of the limitations of the computational methods on digital images. 2. Expected to implement the spatial and frequency domain image transforms on enhancement 3. Explain the different image restoration of images. 4. Elaborate understanding on image enhancement techniques. 5. Analyze and define the need for compression and evaluate the basic compression algorithms	PO1,PO2,PO3,PO4,PO5,PO7,PO10	PSO1,PSO3	Sustainability	Telangana State Wide Video Conference Facility	A study on image processing for real time applications. The Telangana State Wide Video Conference Facility is focused on minimizing the travel time and money, maximizing the governance. All the Telangana State officers can get this facility with in department and with state legislative representatives.
33	80530	SEMANTIC WEB	This course enables the students to learn and understand the fundamental technologies for enabling the envisioned semantic web, study various knowledge representation techniques, make use of development tools and methods for ontology engineering, construct application and services using semantic web technologies and analyze various collaboration networks.	1. Develop web applications using semantic techniques. 2. Relate knowledge representation methods for semantic web. 3. Explain the key aspects of ontology engineering. 4. Design web services and its applications. 5. Analyze and build a social network.	PO1,PO2,PO3,PO4,PO5,PO9	PSO1,PSO2	Environment, Sustainability and Professional Ethics	eProcurement System of NIC (GePNIC)	This course covers all the semantic web paradigms. GePNIC is a generic software which can be directly used by any Government Department can be used for all kinds of procurement activities such as Goods, Works and Services.
34	80518	COMPILER DESIGN LAB	This course outlines the major concept areas of language translation and various phases of compiler, extend the knowledge of parser by parsing LL parser and LR parser, analyze the intermediate forms and the role of symbol table, classify code optimization techniques and analyze the data flow and develop machine code generation algorithms.	1. Apply the knowledge of lex tool & yacc tool to develop a scanner & parser. 2. Develop program for solving parser problems. 3. Create program for intermediate code generation. 4. Write code to generate abstract syntax tree and to convert BNF to YACC. 5. Implement target code from the abstract syntax tree.	PO1,PO2,PO8,PO12	PSO2	Human Values and Professional Ethics	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.

35	80519	COMPUTER NETWORKS LAB	This course provides students to understand the fundamental concepts of computer networking and communications make use of IEEE standards in the construction of LAN, build the skills of subnetting and supernetting, explain the concepts of protocols of Tranport Layer, QoS and Congestion control mechanisms and demonstrate different protocols of Application Layer.	1. Implement the various protocols. 2. Analyze various Congestion control mechanisms. 3. Implement encryption mechanisms using Symmetric Key and Asymmetric Key algorithms.	PO1,PO2,PO3	PSO1,PSO2	Sustainability	Digital India	Digital India is a campaign launched by the Government of India in order to ensure the Data made available to citizens electronically by improved online infrastructure and by increasing Internet connectivity or by making the country digitally empowered in the field of technology
36	80610	PYTHON PROGRAMMING LAB	This course enables the students to develop various applications using python	1. Develop simple applications using python. 2. Make use of functions in python scripts. 3. Deploy applications and packages necessary for applications.	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO12	PSO1,PSO2,PSO3	Environment, Sustainability and Professional Ethics	Start Up India	Data Science for Startups was that Python would be a better choice for Data Scientist joining the start-up. Many Start-ups are already using Python for production and also for performing analysis tasks.
37	80H04	Engineering Economics and Accountancy	EEA is a think beyond program which will make the student to examine the application of microeconomics theory as applied to the manager's responsibilities in an organization. To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making. This course should emphasize the quantitative and qualitative applications of economic principle to business analysis	1. Understand the concepts of managerial economics and their application in evaluating the demand. 2. Evaluate the production function and identifies the least cost combination to control the costs of production. 3. Understand the structures of various market types and their pricing policies. 4. Understand the types of business forms and also be able to evaluate the investments using capital budgeting techniques. 5. Understand the basic concepts of financial accounting and evaluation of company performance using ratio analysis.	PO1, PO2, PO4, PO5, PO9,PO11.	PSO1 PSO2 PSO3	Environment, Sustainability and Professional Ethics	Pay Online	This course gives the fundamentals of economics and accounting. Generic Electronic Revenue Receipt Portal a single window system to handle E-payment of any Government Receipts .Objective of the project to facilitate citizen to pay any type of Fee /Tax /loan or any other receipts via this single window portal .
38	80520	Design and Analysis of Algorithms	This course will make students to analyze asymptotic performance of algorithms, understand different methods like divide and conquer, greedy and graph theory. It also helps to develop solutions to the problems that arise with dynamic programming method by applying backtracking techniques on different applications and synthesizing branch and bound, NP problems.	1. Analyze performance of algorithms using asymptotic notations 2. Describe and analyze paradigms for designing good algorithms using Divide-and-Conquer and Greedy Techniques. 3. Synthesize dynamic-programming algorithms, and analyze them 4. Learn and apply backtracking and branch and bound techniques to solve some complex problems. 5. Apply algorithm design techniques to solve certain NP-complete problems	PO1,PO2,PO3	PSO1,PSO2,PSO3	Environment and Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
39	80613	Data Mining	This course provides the students to understand stages in building a Data Warehouse, identify the need and importance of preprocessing techniques, implement similarity and dissimilarity techniques, analyze and evaluate performance of algorithms for Association Rules, analyze Classification and Clustering algorithms.	1. Acquire knowledge in building a Data Warehouse 2. Understand the need and importance of preprocessing techniques 3. Implement Similarity and dissimilarity techniques 4. Analyze and evaluate performance of algorithms for Association Rules. 5. Deploy Classification and Clustering algorithms	PO1,PO2,PO3,PO4,PO5,PO12	PSO1,PSO2,PSO3	Environment and Sustainability	PROJECT MANAGEMENT SYSTEM (PMIS)	This course makes to Construct a Database Schema, Manipulate data using a SQL. In PROJECT MANAGEMENT SYSTEM (PMIS) ,all the activities of team and their tasks are monitored with time and resource requirement
40	80605	Android Application Development	This course aims the students to learn the essentials of mobile apps development, aids in developing simple android applications, identify the essentials of android design, file settings, study about user interface design and develop android APIs.	1. Classify different types of Platforms. 2. Appreciate the Mobility landscape. 3. Familiarize with Mobile apps development aspects. 4. Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications. 5. Perform testing, signing, packaging and distribution of mobile apps	PO1, PO2, PO3, PO4, PO5, PO7, PO9, PO12	PSO1,PSO2	Environment, Sustainability and Professional Ethics	SWATCH BHAARAT	This course describes the programming paradigms for all mobile devices. The main focus of this ' SWATCH BHAARAT App' is to involve people actively to become part of the clean India movement.
41	80614	Internet of Things	Understand the basics of Embedded System, IoT and the development model. Understand the architecture, Instruction set and work on ARM microcontroller using practical hands-on. Ability to select appropriate hardware and microcontrollers based on need of application. Understand the Internet of Things Standards, Frameworks and Techniques. Apply the tools, techniques and skills acquired towards development of Projects	1. Describe the fundamental concepts of IoT and its applications 2. Illustrate M2M concepts with protocols. 3. Develop applications using Python Scripting Language. 4. Build real world applications by applying Raspberry PI. 5. Examine web based services.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO12	PSO1,PSO2,PSO3	Environment, Sustainability and Professional Ethics	Draft Policy on Internet of Things - MeitY Policy/Smart Cities Mission	To develop IoT products specific to Indian needs in the domains of agriculture, health, water quality, natural disasters, transportation, security, automobile, supply chain management, smart cities, Automated metering and monitoring of utilities, waste management, Oil & Gas) etc.

42	80531	Advanced Computer Architecture	This course helps to explore on the advanced concepts and state-of-the-art developments in computer architecture: memory systems, pipelining, simultaneous multithreading, run-time optimization, array processing, parallel processing, multiprocessing, abstract analytic models, power-aware computing, embedded computing, relationship between computer design and application requirements, cost/performance tradeoffs, and many example computers of interesting and unusual features	1. Understand and apply concept and principle of cache memory and virtual memory to high -performance computer architecture. 2. Understand pipelining and its speed advantage & design pipelined logic. 3. Proficient in fault-tolerant design techniques and examine various methods of error detection and correction such as TMR and Hamming Codes. 4. Identify tradeoffs between complex instruction set computers (CISC) and reduced instruction set computers (RISC). 5. Analyze and perform tradeoffs between the cost, performance, and reliability of alternative computer architectures.	PO1, PO2, PO3, PO7, PO12	PSO1,PSO2,PSO3	Human Values and Professional Ethics	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
43	80H03	English Communication and Presentation Skills Lab	The learners need to be aware of the characteristics of technical communication in their workplaces; as a result, they are exposed to different channels of technical communication. Hence the acquired skills make the learners effective communicators using persuasive language. Besides the above said, one of the major objectives is to maintain objectivity in writing documents and to produce professional quality documents using different components of the language.	1. Give Oral Presentations Confidently. 2. Draft appropriate Resume in accordance with the context. 3. Participate and present their view and ideas logically and confidently. 4. Understand the importance of communication in various settings. 5. Utilize the technology for career advancement.	PO2, PO4, PO5, PO6, PO9, PO10, PO12	PSO2 PSO3	Environment, Sustainability and Professional Ethics	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
44	80615	Data Mining lab	This course provides the students to understand stages in building a Data Warehouse, identify the need and importance of preprocessing techniques, implement similarity and dissimilarity techniques, analyze and evaluate performance of algorithms for Association Rules, analyze Classification and Clustering algorithms.	1. Analyze the classification rules on various databases. 2. Deploy association rules for any kind of databases. 3. Develop clustering rules for applications.	PO1, PO2, PO3, PO4, PO5.	PSO1,PSO2,PSO3	Environment and Sustainability	PROJECT MANAGEMENT SYSTEM (PMIS)	This course makes to Construct a Database Schema, Manipulate data using a SQL. In PROJECT MANAGEMENT SYSTEM (PMIS) ,all the activities of team and their tasks are monitored with time and resource requirement
45	80616	Internet of Things Lab	This course provides the students to understand stages in building a IoT application development .	1. Describe the fundamental concepts of IoT and its applications 2. Illustrate M2M concepts with protocols. 3. Develop applications using Python Scripting Language. 4. Build real world applications by applying Raspberry PI. 5. Examine web based services.	PO1, PO2, PO3, PO4.	PSO1,PSO2,PSO3	Environment, Sustainability and Professional Ethics	Draft Policy on Internet of Things - MeitY Policy/Smart Cities Mission	To develop IoT products specific to Indian needs in the domains of agriculture, health, water quality, natural disasters, transportation, security, automobile, supply chain management, smart cities, Automated metering and monitoring of utilities, waste management, Oil & Gas) etc.
46	80521	Big Data Analytics	This course enables the students to learn and understand Big data, data analytics, R language, developing map reduce programs, discuss about concepts of big data, make use of Hadoop concepts for designing applications, develop applications using Hadoop I/O and analyze big data using programming tools such as Pig and Hive.	1. Develop simple applications using R language 2. Analyze file systems such as GFS and HDFS. 3. Design applications by applying Map reduce concepts. 4. Build up programs by making use of I/O. 5. Explore and inspect the big data using programming tools like Pig and Hive.	PO1 PO2 PO3 PO4 PO5 PO11 PO12	PSO2 PSO3	Sustainability	Draft Policy on Internet of Things - MeitY Policy	Data analytics is the science of analyzing raw data in order to make conclusions about that information. The Indian govt. can realise the dreams outlined in the 'Make in India' and 'Digital India' missions through sophisticated IoT technology.
47	80611	Machine Learning	This course provides the students a broad introduction to python programming, machine learning, discuss about various learning algorithms like decision tree learning, Bayesian learning, computational learning, instance based learning, combined inductive and analytical learning methods, analyze genetic algorithms and various learning set of rules.	1. Formulate machine learning problems corresponding to different applications. 2. Understand a range of machine learning algorithms like decision trees, and ANN. 3. Apply Machine Learning algorithms, Bayesian and Instance based Learning techniques. 4. Use of machine learning algorithms to solve problems using rules, and analytical learning techniques 5. Illustrate the Combining Inductive and Analytical Learning and applications of Reinforcement Learning	PO1 PO2 PO3 PO4 PO5 PO6 PO12	PSO2 PSO3	Sustainability	National Strategy for Artificial Intelligence- NITI Aayog	An Machine Learning is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc.,

#	Code	Course	Description	Course Outcomes	PO	PSO	Category	Initiative	Relevance
48	80532	Natural Language Processing	This course provides a broad introduction to NLP to determine whether the algorithm answers the goals of its designers, or if the system meets the needs of its users. And to demonstrate NLP with regular expression, Python programming, demonstrate Context Free Grammar, Probability theory to analyze various models of language, implement Naive Bayes, HMM, explore in detail about Probabilistic Context Free Grammars, Models, parsers and classifiers, grammar and techniques	1. Be able to compose key NLP elements to develop higher level processing chains and Assess Evaluate NLP based systems and apply Python programming concepts in NLP. 2. Choose appropriate solutions CFG, probability for solving typical NLP sub problems 3. Analyze NLP problems to decompose them in adequate independent components, models, and its applications. 4. Evaluate language technology component use of probabilistic context free grammars, parsers and classifiers. 5. Elaborate the interaction between Grammar, models and techniques used in NLP.	PO1 PO2 PO3 PO4	PSO1 PSO2 PSO3	Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
49	80533	Deep Learning	This course aims to present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data.	1. Examine the significant features of neural networks. 2. Explore the architecture of various neural networks. 3. Analyze the strategy for unsupervised learning. 4. Elaborate the various deep learning applications concerned with computer vision. 5. Investigate various reasoning methods using deep learning techniques.	PO1 PO2 PO3 PO4 PO5 PO6 PO12	PSO1 PSO2 PSO3	Sustainability	National Strategy for Artificial Intelligence- NITI Aayog	An Deep Learning is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc.,
50	80534	Mobile Computing	To understand the Wireless communication Environment, GSM and MANNET.	1. Learn the different wireless communication technologies, understand the protocols used in the layered architecture. 2. Define WLAN and different WLAN transmission technologies. 3. Explain different types of WLANs, learn about GSM. 4. Explain different Wireless Medium Access Control Protocols, explain Mobile Network and Transport Layer Protocols. 5. Explain different routing algorithms used in Mobile Ad hoc Networks (MANET).	PO1 PO2 PO3 PO12	PSO1 PSO2	Sustainability	Mobility Platform Services	This course describes the programming paradigms for all handheld devices and deploy mobile application on it. Mobility Platform Services is an open, comprehensive and advanced mobile application platform for smart phones and tablets, helping organizations of all sizes to efficiently customize the requirements, emulate and deploy on multiple platforms.
51	80522	Big Data Analytics Lab	This course enables the students to learn and understand Big data, data analytics, R language, developing map reduce programs.	1. Apply data analytics for a given problem using R Language. 2. Identify the need for big data analytics for a domain. 3. Use Hadoop, Map Reduce Framework	PO1 PO2 PO3 PO4 PO5 PO6 PO12	PSO1 PSO2	Sustainability	PROJECT MANAGEMENT SYSTEM (PMIS)	This course makes to Construct a Database Schema, Manipulate data using a SQL. In PROJECT MANAGEMENT SYSTEM (PMIS) ,all the activities of team and their tasks are monitored with time and resource requirement
52	80612	Machine Learning Lab	This course provides the students a broad introduction to python programming, machine learning, discuss about various learning algorithms like decision tree learning, Bayesian learning, computational learning, instance based learning, combined inductive and analytical learning methods, analyze genetic algorithms and various learning set of rules.	1. Apply Machine learning approaches for a given problem. 2. Analyze and identify the need for machine learning techniques for a particular domain. 3. Develop the real time applications and predict its outcomes using machine learning algorithms	PO1 PO2 PO3 PO4 PO5 PO6 PO12	PSO1 PSO2	Sustainability	National Strategy for Artificial Intelligence- NITI Aayog	An Machine Learning is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc.,
53	80618	Information Security	This course enables the students to understand the main concepts of Security services and Attacks, categorize various Conventional Encryption Algorithms, compare various algorithms and fundamental ideas of public-key cryptography, illustrate various E-Mail privacy techniques and infer web security and intrusion detection systems.	1. Analyze various security service mechanisms. 2. Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to various attacks. 3. Apply cryptographic techniques in real time applications 4. Formulate web security services and mechanisms. 5. Distinguish SSL, TLS and its applications.	PO1 PO2 PO3 PO4 PO8 PO9 PO10	PSO1 PSO2	Sustainability	CRIME AND CRIMINAL TRACKING NETWORK & SYSTEMS (CCTNS)	This course is intent to write Programs for Conversion of data into a secret code in digital communication. CRIME AND CRIMINAL TRACKING NETWORK & SYSTEMS (CCTNS) gives the immediate details of existing criminal oriented data.
54	80620	Cyber Security	This course makes the students to understand the basic concepts security policies, interpret security objectives, various catalog approaches, analyze cyber user, conflict, management, infrastructure issues, investigate various case studies on cyber security policies.	1. Explore various security policies and evolution of security. 2. Investigate more on various catalog approaches and cyber security objectives. 3. Analyze cyber user and conflict issues. 4. Review cyber management and infrastructure issues. 5. Examine various case studies on cyber security policies.	PO1 PO2 PO3 PO4 PO5 PO6	PSO1 PSO2	Sustainability	Aadhaar Number Validation (Verhoeff Algorithm)	This course develops unique encryption and description algorithms for real time transmissions. Aadhaar Number data is to be entered in various applications. In order to enter quality data of Aadhaar Numbers, need has been felt to validate the entered Aadhaar Number. UIDAI has recommended Verhoeff algorithm for validating the same

55	80535	Cloud Computing	This course provides the students to gain knowledge in the cloud computing environment, security architecture and development of cloud services. Students will also examine the collaboration of real time cloud services and analyze the case studies from various cloud development tools.	1. Understand the cloud enabling technologies and the Cloud service models. 2. Choose the levels of virtualization and tools for resource provisioning. 3. Compare the cloud platform architectures of virtualized data centers and Inter-cloud Resource Management. 4. Analyze the principles of Security and Trust management to protect confidentiality of data in the Cloud. 5. Propose the standards of Parallel and Distributed Programming Paradigms for improving user Access to Cloud Computing.	PO1 PO2 PO4 PO5 PO12	PSO1 PSO2 PSO3	Sustainability	Meghraj cloud initiative by Indian government	This course is on Study on demand services and applications in the remote computing. The focus of Meghraj cloud initiative is to accelerate delivery of e-services in the country while optimizing ICT spending of the Government. This will ensure optimum utilization of the infrastructure and speed up the development and deployment of eGov applications.
56	80536	Software Process & Project Management	Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project. Compare and differentiate organization structures and project structures. Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.	1. Apply software framework, process, and models in development. 2. Implements the Life cycle process and models in production stages and improve software by economics and management. 3. Planning and scheduling the process with cost estimation and Analyze work flow in process at major milestones by periodic assessment 4. Use of projects in organizations in line of business with process automations and project control with quality metrics. 5. Analyze next generation software with case study applications	PO1 PO2 PO3 PO4 PO5 PO9 PO10 PO11 PO12	PSO1 PSO2 PSO3	Sustainability	Start Up India	To promote awareness and adoption of Software Process by Startups and facilitate them in protecting and commercializing the Software Process, Startup India provides access to high quality Intellectual Property services and resources, including Project Management Tools for Startups. If you are a service company, invoicing and time tracking are two important feature requirements for your project management system
57	85101	Advanced Data Structures	This course provides the students to learn and understand the theoretical and practical solutions for the fundamental design, analysis, and implementation of basic data structures like Stacks, Queues, Heaps, Searching, Sorting, Trees and Graphs, Significance of algorithms in the computer field, various aspects of algorithm development.	1. Understand the fundamental concepts related to basic data structures. 2. Design and Analyze the implementation of linear data structures. 3. Apply the concept related to different searching and sorting techniques. 4. Learn and implement the concept of non linear data structures. 5. Acquire knowledge regarding search trees and applications.	PO1 PO3 PO4 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
58	85102	Machine Learning	This course provides the students to learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IOT nodes, design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances, explore supervised and unsupervised learning paradigms of machine learning and to investigate Deep learning technique and various feature extraction strategies.	1. Identify the way of extracting features that can be used for a particular machine learning approach in various IOT 2. Explore unsupervised learning techniques 3. Compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach. 4. Analyze various machine learning approaches and paradigm mathematically. 5. Investigate various learning approaches.	PO1 PO3	PSO1 PSO2	Sustainability	National Strategy for Artificial Intelligence-NITI Aayog	An Machine Learning is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc.,
59	85113	Data Science	This course will make the students to provide with the knowledge and expertise to become a proficient data scientist, demonstrate an understanding of statistics and machine learning concepts that are vital for data science, produce Python code to statistically analyze a dataset and critically evaluate data visualizations based on their design and use for communicating stories from data	1. Understand the fundamentals of data science. 2. Explain how data is collected, managed and stored for data science. 3. Analyze the data by applying various techniques. 4. Explore data visualization techniques. 5. Investigate several applications in data science.	PO1 PO4	PSO1 PSO2	Sustainability	Office of the Registrar General & Census Commissioner, India	This course is mainly to Record, store, and analyze data in remote server. The Office of the Registrar General & Census Commissioner holds the details of entire India's population, geographical, political and governance.
60	85114	Introduction to Intelligent Systems	The aim of the course is to introduce to the field of Artificial Intelligence (AI) with emphasis on its use to solve real world problems for which solutions are difficult to express using the traditional algorithmic approach. It explores the essential theory behind methodologies for developing systems that demonstrate intelligent behaviour including dealing with uncertainty, learning from experience and following problem solving strategies found in nature.	1. Demonstrate knowledge of the fundamental principles of intelligent systems. 2. Understand the algorithms and its applications 3. Analyze and compare the relative merits of a variety of AI problem solving techniques. and indexes. 4. Explore various knowledge representation techniques. 5. Learn and apply the evolutionary and learning algorithms.	PO1 PO3	PSO1 PSO2 PSO3	Sustainability	National Strategy for Artificial Intelligence-NITI Aayog	An Intelligent Systems is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc.,

No	Code	Course Name	Objective	Course Outcomes	PO	PSO			Description
61	85115	Advanced Data Mining	This course aims the students to develop the abilities of critical analysis to data mining systems and applications, to implement practical and theoretical understanding of the technologies for data mining and to understand the strengths and limitations of various data mining models.	1. Understand the fundamentals in data mining. 2. Explore various classification techniques. 3. Implement clustering techniques and to apply it on various datasets. 4. Investigate several web and text mining techniques. 5. Describe temporal and spatial data mining process.	PO1 PO3 PO6	PSO1 PSO2 PSO3	Sustainability	AGRIMARKET	This course use to apply pre-processing statistical methods for any given raw data. It also Extract knowledge and implementation of data mining techniques, web mining and spatial-temporal mining. In AGRIMARKET, all types of vegetables are procured in different parts of states that has to be maintain. The analysis of seasonal availability with cost to producers also recorded for analysis.
62	85116	Cyber Forensics	The objective of this course is to make the students to study about the security issues in network layer and transport layer, be exposed to security issues of the application layer, learn computer forensics, be familiar with forensics tools and to acquire knowledge in analyzing and validating forensics data.	1. Discuss the security issues network layer and transport layer 2. Apply security principles in the application layer. 3. Explain computer forensics. 4. Use forensics tools 5. Analyze and validate forensics data	PO1 PO3 PO4 PO6	PSO1 PSO2 PSO3	Sustainability	Cyber Security Policy	Cyber Forensics is the philosophic study of ethics pertaining to computers, encompassing user behavior and what computers are programmed to do, and how this affects individuals and society. The study of Cyber Ethics provides a framework for making ethical decisions that professionals are likely to encounter in the workplace.
63	85117	Software Architecture and Design Patterns	This course makes the students to learn the different types of Software Architectures and analyze various architectures such as Comprehensive and Quantitative approaches to implement the different types of Design patterns such as Creational, Structural and Behavioral patterns.	1. Analyze the Computer architecture and different processor architectures 2. Explore and analyze the architectures 3. Illustrate organization and operation of current generation parallel computer systems, including multiprocessor and multi-core systems 4. Understand patterns descriptions and solving problems and use of creational and structural patterns. 5. Apply design patterns, behavioral patterns and World Wide Web to case studies.	PO1 PO3	PSO1 PSO2	Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
64	85118	Mobile Cloud	This course enables the students to learn the basic fundamentals in mobile cloud, architecture, classification and associated cooperation approaches, study the utilization of resources in mobile clouds, study about the maintenance, simulate and develop mobile cloud applications.	1. Understand the fundamentals of Mobile cloud. 2. Analyze classification and associated cooperation approaches. 3. Investigate several technologies and implement the way of sharing resources. 4. Explore the formation of mobile cloud and know about its maintenance. 5. Develop Mobile applications.	PO1 PO4 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	Meghraj cloud initiative by Indian government	This course is on Study on demand services and applications in the remote computing. The focus of Meghraj cloud initiative is to accelerate delivery of e-services in the country while optimizing ICT spending of the Government. This will ensure optimum utilization of the infrastructure and speed up the development and deployment of eGov applications.
65	80H18	Research Methodology and IPR	The objective of the course is to make students familiar with the basics of research methodology and various types of Intellectual Properties, IPR legislations and policies.	1. Comprehend the concepts of research methodology and its concepts. 2. Realize the concepts of literature review and developing a research proposal. 3. Understand the basic concepts of Intellectual property rights. 4. Understand the types of patents and their procedures. 5. Recognize the recent developments in IPR administration.	PO1 PO2 PO5 PO6	PSO1 PSO2	Sustainability	National IPR Policy,	IPR and standards in Research. Intellectual Property (IP) is a term referring to a number of distinct types of creations of the mind for which temporary property rights are recognized by the law. Common types of IPR include copyrights, trademarks, patents, industrial design, and domain names rights.
66	85103	Advanced Data Structures Lab	This objective of the course is to provide the students to implement the applications using Linear Data Structures, Non-linear Data Structures, Searching and Sorting techniques, and deploy the shortest path algorithms.	1. Design and analyze the implementation of linear data structures and applications. 2. Apply the concepts related to different searching techniques. 3. Implement the sorting techniques. 4. Learn and implement the concept of non linear data structures and applications. 5. Study and deploy the shortest path algorithms	PO1 PO3 PO4 PO6	PSO1 PSO2	Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
67	85104	Machine Learning using Python Lab	This objective of the course is to provide the students to implement the various supervised and unsupervised learning techniques along with the clustering and classification methods.	1. Study of various statistical methods. 2. Deploy classification techniques for a real time data set. 3. Implement clustering algorithms for any data set. 4. Explore the dimensionality reduction procedures. 5. Examine the anomaly detection methods.	PO1 PO3 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	National Strategy for Artificial Intelligence-NITI Aayog	An Machine Learning is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc.,

68	80A04	English for Research Paper Writing	The objective of the course is to provide the knowledge on structuring paragraphs, paraphrasing and preparation of research documents related to abstract, literature review, methods and results.	1. Structure the sentences and paragraphs. 2. Elaborate the various sections of research papers. 3. Explore the check list in research documents. 4. Apply the key skills to coin the title, abstract, introduction and literature review. 5. Inspect the skills required for preparing experimental results and discussions.	PO2 PO3	PSO1 PSO2 PSO3	Sustainability	National Educational Policy	Publishing your research in an international journal is key to your success in academia. This guide is based on a study of over 1000 manuscripts and reviewers' reports revealing why papers written by non-native researchers are often rejected due to problems with English usage and poor structure and content.
69	85105	Web Services	This course enables the students to learn, understand the basic concepts of web services, implementation model, study the architecture and its standards, illustrate the concepts of XML documents, SOAP for registering and discovering services and discuss SOA services and its security.	1. Understand the fundamental theoretical concept related to web services such as Client server, CORBA, JAVA RMI, Microsoft DCOM, MOM and Service oriented architectures. 2. Develop a web application architectures characteristics and applying WSDL concept to develop a web application. 3. Design and develop a web application using SOAP protocol, XML and Inter communication protocols. 4. Apply the concepts for UDDI registries, addressing and notifications. 5. Analyze a secure web application using network security mechanisms like, .NET, J2EE and Richer schema languages.	PO3 PO4 PO5	PSO1 PSO2	Sustainability	eProcurement System of NIC (GePNIC)	This course covers all the web programming paradigms. GePNIC is a generic software which can be directly used by any Government Department can be used for all kinds of procurement activities such as Goods, Works and Services.
70	85106	Soft Computing	This course makes the students to learn soft computing concepts and techniques, foster their abilities in designing appropriate technique for a given scenario, implement soft computing based solutions for real-world problems, give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms and to provide student a hand-on experience on MATLAB to implement various strategies.	1. Identify and describe soft computing techniques and their roles in building intelligent machines 2. Implement fuzzy logic and reasoning to handle uncertainty and solve various engineering problems. 3. Employ genetic algorithms to combinatorial optimization problems. 4. Evaluate and compare solutions by various soft computing approaches for a given problem. 5. Investigate recent trends in deep learning.	PO1 PO2 PO3 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	National Strategy for Artificial Intelligence-NITI Aayog	An Softcomputing) is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc.,
71	85107	Advanced Databases	This course enables the students to learn the modeling and design of databases, acquire knowledge on parallel and distributed databases and its applications, Study the usage and applications of Object Oriented database, and understand the principles of intelligent databases, usage of advanced data models, learn emerging databases such as XML, Cloud and Big Data and acquire inquisitive attitude towards research topics in databases.	1. Select the appropriate high performance database like parallel and distributed database. 2. Aware of representing the model and real world data using object oriented database. 3. Design a semantic based database to meaningful data access 4. Embed the rule set in the database to implement intelligent databases 5. Represent the data using XML database for better interoperability and to solve the issues related to the data storage and retrieval	PO1 PO3 PO5 PO6	PSO1 PSO2	Sustainability	PROJECT MANAGEMENT SYSTEM (PMIS)	This course makes to Construct a Database Schema, Manipulate data using a SQL. In PROJECT MANAGEMENT SYSTEM (PMIS) ,all the activities of team and their tasks are monitored with time and resource requirement
72	85119	Big Data Analytics	This course provides the students to understand big data for business intelligence, learn business case studies for big data analytics, understand nosql big data management and to perform map-reduce analytics using Hadoop and related Tools.	1. Develop simple applications using concepts like stack, queues and classes. 2. Analyze file systems such as GFS and HDFS. 3. Design applications by applying Map reduce concepts. 4. Build up programs by making use of I/O. 5. Explore and inspect the big data using programming tools like Pig and Hive.	PO1 PO3 PO4 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	Start Up India	Startups get the big data power with power BI Data tells stories and companies of all sizes, right from startups to large enterprises, have realized the power of data. Data within itself is of no value unless it is analyzed to derive actionable insights
73	85120	Software Process and Project Management	This course provides the students to understand the importance of process models, learn about project management, phases in software process, make them to know about the different organization structures and study about several project management tools.	1. Describe and determine the purpose and importance of project management 2. Analyze the project management methods. 3. Design checkpoints and planning process. 4. Compare and differentiate organization structures and project structures. 5. Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.	PO1 PO2 PO3 PO4 PO5 PO6	PSO1 PSO2	Sustainability	Telangana State eProcurement Portal	A study on how to work in software requirement specification and estimation. The Telangana State eProcurement Project is a core eGovernance initiative and the platform of the Telangana State Government and is being used by all Government Departments, Public Sector Undertakings, Urban Local Bodies and Universities in the State. The project is very efficient in procurement processes, transparent and also it delivers demonstrable benefits like cost savings to the User Departments, significant reduction of tender process time.

74	85121	Network Programming	This course makes the students to learn and understand the concepts of Linux and C programming, to study the Shell programming, file concepts and directory management in network programming for inter process communication using pipes, FIFOs, signals, semaphores, message queues and explain socket programming to design the client/server environment, to examine network Programming for performing TCP, and UDP connections.	1. Learn the basic set of commands and utilities in Linux/UNIX systems. 2. Originate file and directories in UNIX programming. 3. Devise the signals, Inter process communication systems. 4. Make use of socket to implement client/server environment. 5. Explore the Network Programming and RMI in detail.	PO1 PO3 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	e-Granthalaya: A Digital Agenda for Library Automation and Networking	This course gives the fundamentals and designing of network and deployment. A Library Management Software for computerization of Government Libraries. The software provides Web based Data Entry solution to the libraries. The software generates e-Catalogs of library documents and provides various kinds of Online services to the Library members.
75	85122	Software Quality Assurance and Testing	This course provides the students to learn, describe and determine the purpose, importance of Software Quality Assurance (SQA) Framework and its Standards, state the metrics, measurements and methodology in quality assurance, study the Standards, metrics, methodologies, establishing policies, SDLC process, techniques and software testing tools like automated testing tools, Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, J Meter testing, assessing, project management in Client / Server and web applications by providing security	1. Define state-of-the-art, and apply their findings to framework for software testing and quality assurance. 2. Analyze different approaches to software testing and quality assurance, metrics measurement, and select optimal solutions for different situations and projects. 3. Demonstrate software testing & quality assurance and apply that knowledge in SDLC, functional, structural testing, other testing methods their future research & its practice. 4. Evaluate different testing tools and techniques 5. Justify the testing process and its applications in quality assurance for client/server, web applications with security.	PO1 PO3 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	Start Up India	To promote awareness and adoption of Software Quality by Startups and facilitate them in protecting and commercializing the Softwares, Startup India provides access to high quality Intellectual Property services and resources, including Project Management Tools for Startups. If you are a service company, invoicing and time tracking are two important feature requirements for your project management system
76	85123	Computer Vision	This course makes the students to understand both the theoretical and practical aspects of computing with images, study the foundation of image formation, measurement, and analysis, recognize the geometric relationships between 2D images and the 3D world and know the principles of state-of-the-art deep neural networks.	1. Understand the concepts in Image Analysis. 2. Explore the processing techniques in Image. 3. Investigate several techniques in segmentation and filtering. 4. Comprehend and apply feature extraction techniques. 5. Developed the practical skills necessary to build computer vision applications	PO1 PO3 PO5 PO6	PSO1 PSO2	Sustainability	Telangana State Wide Video Conference Facility	A study on Computer Vision for real time applications. The Telangana State Wide Video Conference Facility is focused on minimizing the travel time and money, maximizing the governance. All the Telangana State officers can get this facility with in department and with state legislative representatives.
77	85124	Storage Area Networks	This course makes to study and understand storage area networks, fundamentals of data creation, storage, architecture, components, data protection, storage methods, information availability, and monitoring and management of data centers. Further, policies, backup recovery techniques, storage virtualization, security management are discussed in detail using case studies and concern applications.	1. Identify and describe the functions to build data center networking for switch network. 2. Describe different components of a storage infrastructure, types of RAID implementations and data protection. 3. Evolution of Network storage and storage methods for application environments. 4. Demonstrate Information Availability, Monitoring & Managing Datacenter and list solutions for failures and recovery 5. Apply the Secure storage virtualization and case studies and applications.	PO1 PO2 PO3 PO5 PO6	PSO1 PSO2	Sustainability	Start Up India	Startups get the Storage Area Networks power with power BIg Data tells stories and companies of all sizes, right from startups to large enterprises, have realized the power of data. Data within itself is of no value unless it is analyzed to derive actionable insights
78	85108	Web Services Lab	This objective of the course is to provide the students to implement WSDL Services, web based applications with request and response operations and applications using database connectivity.	1. Design and implement web services for single and multiuser applications. 2. Develop the responsive services using HTTP. 3. Implement the web based services for customer operations. 4. Deploy the web services with the database connectivity. 5. Apply the web based concepts in real time applications.	PO3 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	eProcurement System of NIC (GePNIC)	This course covers all the web programming paradigms. GePNIC is a generic software which can be directly used by any Government Department can be used for all kinds of procurement activities such as Goods, Works and Services.
79	85109	Soft Computing Lab	This objective of the course is to provide the students to study and analyze the fuzzy logic concepts, back propagation algorithms, with the analysis of CPN,GA and crisp logics. Further, explore the implementation of Hebb's rule, delta rule and classification.	1. Understand the in-depth concepts of various network models. 2. Explore and analyze evolutionary algorithms. 3. Implement applications using neural networks. 4. Apply the Hebb's rule and Delta rule. 5. Implement and explore classification algorithms.	PO1 PO2 PO3 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	National Strategy for Artificial Intelligence- NITI Aayog	An artificial neuron network (ANN) is a computational model based on the structure and functions of biological neural networks. NITI Aayog is an initiative on block chain usage and E-governance based on artificial intelligence, machine learning etc..

80	80A05	Value Education	Course Objectives: The course deals about value of education and self- development, Imbibe good values in students and know about the importance of character.	1. Understand self-development and moral values 2. Explore the importance of character and cultivation of values 3. Apply the personality development methods 4. Analyze the association and cooperation principles 5. Elaborate the principles of religions and good health science.	PO5 PO6	PSO1 PSO2	Sustainability	National Educational Policy	Value education is the process by which people give moral values to each other.[1] It can be an activity that can take place in any human organisation during which people are assisted by others, who may be older, in a condition experienced to make explicit our ethics in order to assess the effectiveness of these values and associated behaviour for their own and others' long term well-being, and to reflect on and acquire other values and behaviour which they recognise as being more effective for long term well-being of self and others. There is a difference between literacy and education.
81	85125	Parallel and Distributed Algorithms	This course provides the students to learn and understand the basic of parallel and distributed algorithms, message passing, Partitioning, Divide and Conquer strategies. The use of Pipelined Computations Synchronization and Programming with shared memory. Apply these algorithms in Distributed shared memory systems and programming to solve problems in distributed, internet, and various other applications.	1. Understand the basic concepts related to parallel and distributed computing, use of parallel computers for enhance performance with cluster computing. 2. Illustrate message passing parallel algorithms of Portioning and Divide and Conquer strategies. 3. Design and develop applications with use of pipelined computations and pipeline programs 4. Use of Synchronization and Programming with shared memory in parallel programming languages like Open MP. 5. Explore various parallel algorithms and programming concepts for solving the problems to achieve constant distributed shared memory.	PO1 PO3 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	Digital India	Digital India is a campaign launched by the Government of India in order to ensure the Data made available to citizens electronically by improved online infrastructure and by using Parallel and Distributed Algorithms or by making the country digitally empowered in the field of technology
82	85126	Wireless Sensor Networks	This course makes to understand and gain a broad coverage of challenges and latest concepts results related to the design and management of wireless sensor networks, design models, network architectures, node discovery and localization, analyze deployment strategies, node coverage, routing protocols , the systems with power management, protocols with medium access arbitration, fault-tolerance, network security and applications	1. Understand the wireless sensor networks for various applications and design models. 2. Explore coverage of Networking, planning, node deployment and localization control. 3. Devise appropriate data dissemination protocols and model links cost. 4. Determine suitable medium access protocols and radio energy consumption models. 5. Implement quality of service, fault-tolerance, security and other dependability requirements in wireless sensor networks	PO1 PO2 PO3 PO5 PO6	PSO1 PSO2	Sustainability	Digital India	Digital India is a campaign launched by the Government of India in order to ensure the Data made available to citizens electronically by improved online infrastructure and by increasing Wireless Sensor Networks connectivity or by making the country digitally empowered in the field of technology
83	85127	Information Retrieval Techniques	This course enables the students to gain knowledge in different Information Retrieval (IR), fundamental concepts, Retrieval and Information Search techniques in various application areas, apply IR and Classification methods, Machine Learning techniques, SVM, Clustering and Classification methods. These principles are used to locate relevant information large collections of data, to analyze performance of retrieval systems when dealing with unmanaged data sources, and implement retrieval systems for web search tasks.	1. Understand the Information retrieval techniques. 2. Explore and Analyze Information search techniques like Vector Space Model, and Probabilistic Model, system evaluation methods. 3. Identify and Apply Classification Methods and classification techniques used various applications 4. Describe and apply Machine learning retrieval methods like SVM and clustering techniques. 5. Illustrate web search technique in Information Retrieval system used in web search, crawling and indexes.	PO1 PO2 PO3 PO4 PO5 PO6	PSO1 PSO2	Sustainability	Mobile Based Fertilizer Management System (mFMS)	The study of storing, accessing and retrieval of information in remote environment. The objective of the Mobile based Fertilizer Management System (mFMS) is to monitor using IT based Technology Solution, the movement and sales of the different fertilizers from fertilizer manufacturer/ importers to fertilizer wholesalers and from wholesalers to retailers across the country. The system acts as a tool for Government Bodies to track and ensure the timely distribution of fertilizers to the farmer community
84	85128	Business Analytics	This course provides the students to learn and understand the role of business analytics within an organization, Analyze data using statistical and data mining techniques Also to gain an understanding of how managers use business analytics to formulate and solve, business problems.	1. Understand the knowledge and need for data analytics. 2. Demonstrate the ability of think critically in making decisions based on data and deep analytics. 3. Explore the technical skills in predicative and prescriptive modeling to support business decision-making. 4. Acquire the ability to translate data into clear, actionable insights. 5. Analyze the problems and use various decision strategies.	PO1 PO2 PO4 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	Start Up India	Startups get the big data power with power bussiness tells stories and companies of all sizes, right from startups to large enterprises, have realized the power of data. Data within itself is of no value unless it is analyzed to derive actionable insights

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85	80B20	Advanced Optimization Techniques	To understand extremely important topics under the broad umbrella of optimization, this is synonymous with efficiency which is the underlying prime rationale for all scientific and technological advances and progress.	1. Find feasible solution to LPP by various methods. 2. Minimize the cost and time by using Travelling salesmen Problem. 3. Understand various methods Dynamic programming. 4. Understand the various concepts on Non-Linear programming. 5. Understand the various concepts of Search methods.	PO1 PO4	PSO1 PSO2 PSO3	Sustainability	Skill India	Industries need skilled manpower youth needs employment and business. It impacts basic computer usage and maintenance skills to introduce productivity tools in day to day activities.
86	85129	Introduction to Block chain Technology	The blockchain technology course allows the students to explore the driving force behind the cryptocurrency Bitcoin. Along with the Decentralization, Cryptography, Bitcoins with its alternative coins, Smart contracts and outside of currencies.	1. Understand the types, benefits and limitation of blockchain. 2. Explore the blockchain decentralization and cryptography concepts. 3. Enumerate the Bitcoin features and its alternative options. 4. Describe and deploy the smart contracts 5. Summarize the blockchain features outside of currencies.	PO1 PO2 PO3 PO4 PO5 PO6	PSO1 PSO2 PSO3	Sustainability	Digital India	Digital India is a campaign launched by the Government of India in order to ensure the Data made available to citizens electronically by improved online infrastructure and by using Block chain Technology or by making the country digitally empowered in the field of technology