

# G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY

## (Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade |  
Accredited by NBA (CIV, CSE, ECE & EEE) | Affiliated to JNTUA)  
Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

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### DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING -ARTIFICIAL INTELLIGENCE

The following are the Course Outcomes of all the courses for the Academic Year 2020-21 from I-  
B.Tech to IV B.Tech

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#### R20 REGULATION

#### I B.TECH I SEM

Course Name: **MATHEMATICS-1**

#	COURSE OUTCOMES
CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical Applications.
CO2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.
CO3	Utilize mean value theorems to real life problems.
CO4	Familiarize with functions of several variables which is useful in optimization.
CO5	Familiarize with functions of several variables which is useful in optimization.
CO6	Analyze 3- dimensional coordinate systems and utilization of special functions.

Course Name: **APPLIED PHYSICS**

#	COURSE OUTCOMES
CO1	Interpret the properties of light waves and its interaction of energy with the matter
CO2	Explain the principles of physics in dielectrics and magnetic materials
CO3	Apply electromagnetic wave propagation in different guided media
CO4	Calculate conductivity of semiconductors
CO5	Interpret the difference between normal conductor and super conductor
CO6	Elucidate the applications of nano materials

Course Name: PYTHON PROGRAMMING

#	COURSE OUTCOMES
CO1	Comprehend the fundamental concepts of computer hardware and problem solving abilities.
CO2	Knowledge on the basic concepts of algorithms, flow charts and python programming.
CO3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.
CO4	Interpret the importance of functions in programming
CO5	Analyze and modularize the problem and its solution by using function
CO6	Ability to relate the concepts of strings, files and pre-processors to the real world Applications.

Course Name: – COMMUNICATIVE ENGLISH

#	COURSE OUTCOMES
CO1	Remember the concepts which the student has learnt previously and identifying their connection
CO2	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO3	Apply grammatical structures to formulate sentences and correct word forms
CO4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO5	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO6	Create a coherent paragraph interpreting a figure/graph/chart/table

Course Name: -ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING

#	COURSE OUTCOMES
CO1	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing
CO2	Apply orthographic projection concepts to draw projections of points, lines, planes and solids.
CO3	Apply development concepts to draw development of surfaces of simple solids.
CO4	Apply isometric projection concepts to draw isometric projections of right regular solids

CO5	Apply orthographic projection concepts to convert isometric view to orthographic views.
CO6	Make use of AutoCAD Software to draw 2D diagrams of various objects

Course Name: **COMMUNICATIVE ENGLISH LABORATORY**

#	COURSE OUTCOMES
CO1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO2	Apply communication skills through various language learning activities
CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO6	Improve upon speaking skills over telephone, role plays and public speaking

Course Name: **APPLIED PHYSICS LABORATORY**

#	COURSE OUTCOMES
CO1	Operate optical instruments like Travelling microscope and spectrometer
CO2	Understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
CO3	Interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
CO4	Plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
CO5	Evaluate the acceptance angle of an optical fiber and numerical aperture
CO6	Determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor

Course Name: **PYTHON PROGRAMMING LABORATORY**

#	COURSE OUTCOMES
CO1	Design solutions to mathematical problems & Organize the data for solving the Problem.
CO2	Understand and implement modular approach using python
CO3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc.
CO4	Understands about files and its applications.
CO5	Develop real-world applications, files and exception handling provided by python
CO6	Select appropriate programming construct for solving the p

## I B.TECH II SEM

Course Name: **PROBABILITY AND STATISTICS**

#	COURSE OUTCOMES
CO1	Adopt correlation methods and principle of least squares, regression analysis.
CO2	Apply discrete and continuous probability distributions.
CO3	Classify the concepts of data science and its importance.
CO4	Interpret the association of characteristics and through correlation and regression tools.
CO5	Design the components of a classical hypothesis test.
CO6	Infer the statistical inferential methods based on small and large sampling tests.

Course Name: **CHEMISTRY**

#	COURSE OUTCOMES
CO1	To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box
CO2	To differentiate between pH metry, Potentiometric and conductometric titrations.
CO3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.

CO4	Understand the principles of different analytical instruments and explain their applications.
CO5	Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM
CO6	Explain of different types of colloids, their preparations, properties and applications

Course Name: **DATA STRUCTURES USING C**

#	COURSE OUTCOMES
CO1	Learn to choose appropriate data structure as applied to specified problem definition
CO2	Design and analyse linear and non-linear data structures
CO3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.
CO4	Demonstrate advantages and disadvantages of specific algorithms and data Structures.
CO5	Develop programs for efficient data organisation with reduce time complexity
CO6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

Course Name: **FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE**

#	COURSE OUTCOMES
CO1	An ability to analyze a problem, identify and define the computing requirements appropriate to its solution.
CO2	An ability to design, implement and evaluate a system / computer based system process, component or program to meet desired needs.
CO3	An ability to identify, formulate and solve engineering problems using the concepts of Artificial Intelligence.
CO4	Design and conduct experiments as well as analyze and interpret data using Machine Learning Algorithms
CO5	An ability to use current techniques and skills necessary for computing and engineering practice
CO6	Get familiarized with the tools mandatory for handling problem solving techniques

Course Name: **ENGINEERING WORKSHOP**

#	COURSE OUTCOMES
CO1	Apply wood working skills to make products.
CO2	Perform metal cutting operations in the fitting section to make models.
CO3	Perform simple welding operations to join to metal p
CO4	Apply sheet metal working skills to make required models
CO5	Evaluate the performance analysis of various pumps and turbines.
CO6	Perform general maintenance works on own at house/ work place.

Course Name: **CHEMISTRY LABORATORY**

#	COURSE OUTCOMES
CO1	Understand the determine the cell constant and conductance of solutions
CO2	Prepare advanced polymer materials.
CO3	Measure the strength of an acid present in secondary batteries
CO4	Understand and apply the pH metric titrations.
CO5	Verify Lambert-Beer's law
CO6	Potentiometry - determination of redox potentials and EMFs

Course Name: – **DATA STRUCTURES LABORATORY**

#	COURSE OUTCOMES
CO1	Learn to choose appropriate data structure as applied to specified problem Definition.
CO2	Design and analyse linear and non-linear data structures.
CO3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.
CO4	Demonstrate advantages and disadvantages of specific algorithms and data Structures
CO5	Develop programs for efficient data organisation with reduce time complexity.
CO6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.



Course Name: **BASIC ARTIFICIAL INTELLIGENCE LABORATORY**

#	COURSE OUTCOMES
CO1	Execute statistical problems to produce appropriate solutions
CO2	Categorize the problem for selection of an appropriate algorithms.
CO3	Compare computational complexity of AI problems for better efficiency
CO4	Demonstrate various AI algorithms based on empirical and theoretical proofs for performance statistics
CO5	An ability to use current techniques and skills necessary for computing and engineering practice
CO6	Get familiarized with the tools mandatory for handling problem solving techniques

Course Name: **ENVIRONMENTAL SCIENCE**

#	COURSE OUTCOMES
CO1	Solve environmental problems through higher level of personal involvement and interest
CO2	Apply ecological morals to keep up amicable connection among nature and human beings.
CO3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
CO4	Apply environmental laws for the protection of environment and wildlife.
CO5	Influence society in proper utilization of goods and services.

## II B.TECH I SEM

Course Name: **MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

#	COURSE OUTCOMES
CO1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
CO2	Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
CO3	Classify the market structure to decide the fixation of suitable price
CO4	Apply capital budgeting techniques to select best investment opportunity
CO5	Analyze and prepare financial statements to assess financial health of Business.

Course Name: **DATABASE MANAGEMENT SYSTEMS**

#	COURSE OUTCOMES
CO1	Apply suitable data model for given application
CO2	Construct optimized SQL queries to solve real time problems
CO3	Apply suitable normal form to eliminate data redundancy
CO4	Use suitable transaction model to avoid Deadlock
CO5	Choose appropriate index structure to improve performance

Course Name: **DESIGN AND ANALYSIS OF ALGORITHMS**

#	COURSE OUTCOMES
CO1	Analyze the efficiency of algorithm for a given problem.
CO2	Formulate the time order analysis for given algorithm
CO3	Identify the mathematical techniques required to prove the time complexity of an algorithm.
CO4	Design appropriate algorithm to solve real world problems.
CO5	Develop an application with the designed algorithms

Course Name: **DIGITAL ELECTRONICS**

#	COURSE OUTCOMES
CO1	Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions.
CO2	Make use of k-map and tabulation methods to minimize Boolean functions and to implement with logic gates.
CO3	Analyse basic components used in digital systems such as adder and subtractor, decoder, encoder, multiplexer, flip-flops, registers and counters
CO4	Distinguish combinational and sequential logic in terms of their functions.
CO5	Design various PLDs such as ROMs, PALs, PLAs and PROMs

Course Name: **NUMERICAL METHODS**

#	COURSE OUTCOMES
CO1	Apply numerical methods to solve algebraic and transcendental equations.
CO2	Derive interpolating polynomials using interpolation formulae.
CO3	Apply curve fitting techniques for data representations and computation in engineering analysis
CO4	Apply Ordinary Differential Equations to solve Engineering Problems.
CO5	Solve differential and integral equations numerically

Course Name: **DATABASE MANAGEMENT SYSTEMS LABORATORY**

#	COURSE OUTCOMES
CO1	Design Database tables for the given problem
CO2	Use appropriate querying processing technique to access the data
CO3	Apply suitable normal form to eliminate data redundancy
CO4	Develop PL/SQL routines for reusability of code
CO5	Apply appropriate triggering concepts for automation and performance

Course Name: **DIGITAL ELECTRONIC LABORATORY**

#	COURSE OUTCOMES
CO1	Design digital logic circuits using software
CO2	Verify the logical operations of the digital logic gates in the laboratory.
CO3	Analyze the functionality of Combinational and Sequential Circuits using LogiSIM.
CO4	Design and analyze the code converters using LogiSIM
CO5	Design and analyze the counters using Log

Course Name: – **DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY**

#	COURSE OUTCOMES
CO1	Apply basic programming techniques in solving given problem.
CO2	Design an algorithm for a given application program.
CO3	Utilize wrapper classes as per the demand of problem.
CO4	Apply the appropriate algorithmic technique for efficient problem solving
CO5	Execute collection classes for dynamic programming

Course Name: – **ANDROID APPLICATION DEVELOPMENT**

#	COURSE OUTCOMES
CO1	Understand the different types of mobile devices.
CO2	Learn how to apply Android Operating System on mobile.
CO3	They can understand the systems mobile application distribution.
CO4	Implementation of mobile design principles.
CO5	Implementation of prompt prototyping techniques to design and develop mobile interfaces

Course Name: **ENVIRONMENTAL SCIENCE**

#	COURSE OUTCOMES
CO1	Solve environmental problems through higher level of personal involvement and interest
CO2	Apply ecological morals to keep up amicable connection among nature and human beings.
CO3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
CO4	Apply environmental laws for the protection of environment and wildlife.
CO5	Influence society in proper utilization of goods and services.

## II B.TECH II SEM

Course Name: **DATA SCIENCE**

#	COURSE OUTCOMES
CO1	Understand the fundamental concepts of data science
CO2	Evaluate the data analysis techniques for applications handling large data
CO3	Demonstrate the various machine learning algorithms used in data science process
CO4	Understand the ethical practices of data science
CO5	Visualize and present the inference using various tools

Course Name: **OBJECT ORIENTED PROGRAMMING USING JAVA**

#	COURSE OUTCOMES
CO1	Apply object oriented concepts for solving general purpose probl
CO2	Use inheritance, user defined packages and interfaces for code reusability
CO3	Apply exception handling and multithreading for robust and efficient application development
CO4	Implement collection frameworks to store and retrieve data efficiently
CO5	Build GUI applications using swings for user interface design

Course Name:- **DISCRETE MATHEMATICS**

#	COURSE OUTCOMES
CO1	Apply the logic statements and connectives to solve real time problems
CO2	Classify algebraic structure and relations for a given mathematical problem

CO3	Analyze the basic results in combinatorics and binomial theorem for accuracy
CO4	Apply various recurrence relations to find solutions for numeric sequences
CO5	Apply graph theory techniques to solve network problems

Course Name: **OPERATING SYSTEMS**

#	COURSE OUTCOMES
CO1	Apply the basic principles of Operating Systems in system programming
CO2	Apply the process synchronization concepts in multiprogramming environment .
CO3	Solve the memory management problems with paging and segmentation techniques .
CO4	Design algorithmic strategies to handle deadlock problems.
CO5	Implement the concepts of secured file system for confidentiality and authentication.

Course Name: **SOFTWARE ENGINEERING**

#	COURSE OUTCOMES
CO1	Understand the various phases of software development life cycles and software Requirements.
CO2	Possess necessary skills to elicit the requirements of a software system and to create well written software documentation involving appropriate system model.
CO3	Design, implement and evaluate a computer based system, process, component or program to meet desired needs within realistic constraints specific to the field



CO4	Construct software projects by integrating components with appropriate user interface
CO5	Apply various testing strategies to verify, validate and to release error free software

:Course Name:**DATA SCIENCE LABORATORY**

#	COURSE OUTCOMES
CO1	Apply Abstraction to create models based on the real world.
CO2	Understand several techniques from previously established paradigms, including modularity, encapsulation and Polymorphism.
CO3	Apply greater flexibility and maintainability in programming
CO4	Improve the knowledge on Objects and class.
CO5	Execute statistical analysis with professional statistical software.

Course Name:**OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY.**

#	COURSE OUTCOMES
CO1	Design solutions for the problems of general purpose applications using object oriented concepts.
CO2	Generate reusable codes using inheritance, user defined packages and interface
CO3	Write robust and efficient code using exception handling and multithreading concepts
CO4	Implement collection frameworks and file handling techniques to store and retrieve data
CO5	Design user interface using swings

Course Name: **OPERATING SYSTEMS LABORATORY**

#	COURSE OUTCOMES
CO1	Apply appropriate CPU scheduling algorithm for the given problem.
CO2	Perform resource management for optimal utility of CPU
CO3	Implement algorithms handling deadlock problem
CO4	Implement the concepts of secured file system for confidentiality and authentication.
CO5	Apply threading concepts to handle concurrency.

Course Name: **UNIX & SHELL PROGRAMMING**

#	COURSE OUTCOMES
CO1	Understand the basic unix/linux commands
CO2	Learn importance of shell scripting
CO3	Apply shell programming to various files
CO4	Improve individual / teamwork skills, communication & report writing skills with ethical values
CO5	Control the sequence of the program and give logical outputs.

### III B.TECH I SEM

Course Name: **Artificial Intelligence**

#	COURSE OUTCOMES
CO1	Evaluate Artificial Intelligence (AI) methods and describe their foundations.
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception.
CO3	Analyze and illustrate how search algorithms play vital role in problem-solving
CO4	Demonstrate knowledge of Agents and learning in online search.
CO5	Illustrate the construction of learning and expert system.

Course Name: **Theory of Computation and Compiler Design**

#	COURSE OUTCOMES
CO1	Compare and analyze different computational models.
CO2	Apply regular expressions to computer languages.
CO3	Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.
CO4	Design parsers using top-down as well as bottom-up paradigms

Course Name: **Machine Learning**

#	COURSE OUTCOMES
CO1	Identify machine learning techniques suitable for a given problem.
CO2	Solve the problems using various machine learning techniques.
CO3	Design application using machine learning techniques
CO4	Able to apply Regression methods for a given problem.
CO5	Design of clustering techniques for a given problem.

Course Name: **Artificial Intelligence Lab**

#	COURSE OUTCOMES
CO1	Implement search algorithms
CO2	Solve Artificial intelligence problems
CO3	Design chat bot and virtual assistant
CO4	Identify problems where artificial techniques are applicable
CO5	Apply selected basic AI techniques;judge applicability of more advanced techniques

Course Name: **Machine Learning Lab**

#	COURSE OUTCOMES
CO1	Understand the Mathematical and statistical perspectives of machine learning algorithms through python programming
CO2	Appreciate the importance of visualization in the data analytics solution.
CO3	Derive insights using Machine learning algorithms
CO4	Understand a wide variety of learning algorithms
CO5	Understand how to evaluate models generated from data

Course Name: **Web Application Development**

#	COURSE OUTCOMES
CO1	Programming skills in Html5, CSS3, Bootstrap 4
CO2	Developing skills of Web Applications user interactions using JavaScript (i.e. ES6+)
CO3	Web application Development Database with React and React Native.
CO4	Analyze a web page and identify its elements and attributes
CO5	Develop web pages using HTML

Course Name: **GENDER SENSITIZATION**

#	COURSE OUTCOMES
CO1	Develop a better understanding of important issues related to gender in contemporary India
CO2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender

CO3	Acquire insight into the gendered division of labour and its relation to politics and economics
CO4	Equip to work and live together as equals
CO5	Develop a sense of appreciation of women in all walks of life

Course Name: **Big Data Technologies** (Professional Elective Course– I)

#	COURSE OUTCOMES
CO1	Outline the importance of Big Data Analytics
CO2	Obtain knowledge about working of Hadoop File System.
CO3	Analyze Big Data using different tools.
CO4	Apply Hadoop map Reduce programming for handling Big Data
CO5	Understand and demonstrate advanced knowledge of statistical data.

Course Name: **Data Communication**  
(Professional Elective Course– I)

#	COURSE OUTCOMES
CO1	Identify the software and hardware components of a Computer network
CO2	Design software for a Computer network
CO3	Develop new routing, and congestion control algorithms
CO4	Assess critically the existing routing protocols
CO5	Explain the functionality of each layer of a computer network

Course Name: **-Data Visualization Techniques**  
(Professional Elective Course– I)

#	COURSE OUTCOMES
CO1	Effectively present the data
CO2	Draw insights from the data
CO3	Use Tableau

CO4	Find and select appropriate data that can be used in order to create a visualization
CO5	Identify research question ,choose appropriate types and formats of data.

Course Name: **Image Processing**  
**(Professional Elective Course– I)**

#	COURSE OUTCOMES
CO1	Understand the format of different type of images
CO2	Apply the functionality of python for image processing
CO3	Understand opencv image processing
CO4	Understand the need for image transforms different types of images
CO5	Develop a image processing application.

### III B.TECH II SEM

Course Name: **Deep Learning**

#	COURSE OUTCOMES
CO1	Demonstrate the mathematical foundation of neural network
CO2	Understand the architecture of a deep neural network
CO3	Build a Convolutional neural network
CO4	Build and train RNN and LSTMs
CO5	Understand the main fundamental that drive Deep Learning.

Course Name: **Cryptography and Network Security**

#	COURSE OUTCOMES
CO1	Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
CO2	Ability to identify information system requirements for both of them such as client and server. ☒
CO3	Ability to understand the current legal issues towards information security.
CO4	Analyze and design classical techniques and block ciphers.
CO5	Understand and analyze data encryption standard.

Course Name: **Natural Language Processing**

#	COURSE OUTCOMES
CO1	Understand the logic behind Natural languages
CO2	Understand the significance of syntax and semantics of natural languages
CO3	Process the Natural languages
CO4	Verify the syntax and semantics of languages
CO5	Design new natural languages

Course Name: **Cryptography and network security Lab**

#	COURSE OUTCOMES
CO1	Identify basic security attacks and services
CO2	Use symmetric and asymmetric key algorithms for cryptography
CO3	Make use of Authentication functions
CO4	Analyze and design hash and MAC algorithms, and digital signatures.
CO5	Know about Intruders and Intruder Detection mechanisms, Types of Malicious software,

Course Name: **Deep Learning Lab**

#	COURSE OUTCOMES
CO1	Identify the Deep learning algorithms which are more appropriate for various types of learning tasks in various domains
CO2	Implementing Deep learning algorithms and solve real-world problems.
CO3	enable design of an artificial neural network for classification
CO4	design and deploy simple TensorFlow-based deep learning solutions to classification problems
CO5	analyze the given dataset for designing a neural network based solution

Course Name: **Natural Language Processing Lab**

#	COURSE OUTCOMES
CO1	Understand approaches to syntax and semantics in NLP.
CO2	Analyse grammar formalism and context free grammars
CO3	Apply the statistical estimation and statistical alignment models
CO4	Apply Rule based Techniques, Statistical Machine translation (SMT), word alignment, phrase-based translation
CO5	Have the skills (experience) of solving specific NLP tasks, which may involve programming in Python, as well as running experiments on textual data.



Course Name: **Professional English Communication Skills**

#	COURSE OUTCOMES
CO1	Use techniques at different levels to convince the employers.
CO2	Use technology to convince the audience with skills.
CO3	Learn and be competent in heterogeneous groups.
CO4	Communicate effectively using the ICT tools

Course Name: **Indian Constitution and multiculturalism**

#	COURSE OUTCOMES
CO1	1. Differentiate between structure and functions of state secretariat
CO2	Understand historical background of the constitution making and its importance for building a democratic India
CO3	Understand the functioning of three wings of the government ie. executive, legislative and judiciary.
CO4	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

Course Name: **Computer Vision**

**Professional Elective Course– II**

#	COURSE OUTCOMES
CO1	Identify basic concepts, terminology, theories, models and methods in the field of computer vision.
CO2	Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition.
CO3	Develop the practical skills necessary to build computer vision applications.
CO4	Exposure to object and scene recognition and categorization from images.
CO5	Identify and interpret appropriate sources of information relating to computer vision.

Course Name: **Software Testing**

Open Elective Course– II

#	COURSE OUTCOMES
CO1	Able to identify the various bugs and correcting them after knowing the consequences of the bug.
CO2	Know the basic concepts of software testing and its essentials.
CO3	Use of program's control flow as a structural model is the corner stone of testing.
CO4	Performing functional testing using control flow and transaction flow graphs.
CO5	Understand and describe the basic concepts of functional (black box) software testing.

Course Name: **Virtual Reality and Augmented Reality**

Open Elective Course - III

#	COURSE OUTCOMES
CO1	Apply VR/MR/AR in various fields in industry.
CO2	Design Data visualization tools
CO3	Design audio and video interaction paradigms
CO4	Apply technical and creative approaches to make successful applications and experiences.
CO5	Explain how the humans interact with computers

Course Name: **Predictive Analytics**

#	COURSE OUTCOMES
CO1	Visualize and explore data to better understand relationships among variables
CO2	Understand how ensemble models improve predictions
CO3	Organize the predictive modelling task and data flow
CO4	Apply predictive models to generate predictions for new data
CO5	Choose and implement appropriate performance measures for predictive models

## IV B.TECH I SEM

Course Name: – **INTELLIGENT INFORMATION RETRIEVAL SYSTEMS**

#	COURSE OUTCOMES
CO1	Recognize the Boolean Model, Vector Space Model, and Probabilistic Model.
CO2	Understand retrieval utilities.
CO3	Understand different formatting tags
CO4	Understand cross-language information retrieval.

Course Name: **REINFORCEMENT LEARNING**

#	COURSE OUTCOMES
CO1	Understand basics of RL.
CO2	Understand RL Framework and Markov Decision Process.
CO3	analyzing through the use of Dynamic Programming and Monte Carlo.
CO4	Understand TD (0) algorithm, TD ( $\lambda$ ) algorithm
CO5	Identify the model based from the model free methods.

Course Name: **INTRODUCTION TO CYBER SECURITY**

#	COURSE OUTCOMES
CO1	Analyze cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
CO2	Interpret and forensically investigate security incidents
CO3	Apply policies and procedures to manage Privacy
CO4	Design and develop secure software modules
CO5	Analyze and evaluate the cyber security needs of an organisation.

Course Name: –**OBJECT ORIENTED ANALYSIS AND DESIGN**

#	COURSE OUTCOMES
CO1	Recognize the concepts and principles of object-oriented programming concepts.
CO2	Understand the purposes, major components and key mechanisms of Class and Object Diagram.
CO3	Describe the basic resource management responsibilities of Interaction Diagram.
CO4	Construct State-chart Diagram for the given application
CO5	applying the techniques for Component and Deployment Diagrams.

Course Name: – **FUNDAMENTALS OF DATA ANALYTICS**

#	COURSE OUTCOMES
CO1	Identify skills and attributes required for the understanding and application of data analytics in Industry
CO2	Describe the methods involved in data analytics, their scope and limitations.
CO3	Design a data analytics project in a business environment.
CO4	Apply data analytics methods for descriptive and predictive analytics tasks in a business environment
CO5	Apply computer theory , languages and algorithms as well as statistical methods.

Course Name: **RECOMMENDER SYSTEMS**

#	COURSE OUTCOMES
CO1	To understand basic techniques and problems in the field of recommender systems
CO2	Evaluate Types of recommender systems: non-personalized, content based, collaborative filtering.

CO3	Apply algorithms and techniques to develop Recommender Systems that are widely used in the Internet industry.
CO4	To develop state-of-the-art recommender systems
CO5	Conduct experimental evaluations on implemented algorithms

Course Name: **AUTONOMOUS SYSTEMS**

#	COURSE OUTCOMES
CO1	Understanding of the general theory of Bayesian Estimation.
CO2	Understanding of the theory and application of the Kalman Filter (KF and EKF) for solving diverse.
CO3	Understanding of methods such as GA, Fuzzy Logic
CO4	Develop software for applying the theory and actually solving complex problem.
CO5	Get experience in using state of the art sensors, used in Field Robotics and Autonomous Systems

Course Name: **CLOUD COMPUTING**

#	COURSE OUTCOMES
CO1	Ability to create cloud computing environment
CO2	Ability to design applications for Cloud environment
CO3	Design and develop backup strategies for cloud database don features.
CO4	Use and Examine different cloud computing services.

Course Name: **FUNDAMENTALS OF DATA CENTERS**

#	COURSE OUTCOMES
CO1	Explain the basic concepts of data center and its components.
CO2	Describe data center designs.
CO3	Compare different types of server farms
CO4	Discuss data center construct and back-up/recovery technologies.
CO5	The functional requirements of the data center facilities.

Course Name: **BLOCK CHAIN TECHNOLOGY AND APPLICATIONS**

#	COURSE OUTCOMES
CO1	Understand and explore the process of Block chain technology
CO2	Analyze the working of Smart Contracts
CO3	Perform basic operations in hyper ledges and block chain networks.
CO4	Identify the risks involved in building Block chain applications.

Course Name: **AI FOR IMAGE ANALYSIS**

#	COURSE OUTCOMES
CO1	Understand the format of different type of images
CO2	Apply the functionality of python for image processing
CO3	Relate machine learning and image processing

CO4	understand classical and deep learning object classification techniques and apply them to modern AI technologies.
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Course Name: **FULL STACK SOFTWARE DEVELOPMENT**

#	COURSE OUTCOMES
CO1	Develop a fully functioning website and deploy on a web server
CO2	Gain Knowledge about the front end and back end Tools
CO3	Find and use code packages based on their documentation to produce working results in a project
CO4	Create web pages that function using external data
CO5	Implementation of web application employing efficient database access

Course Name: **COMPUTER VISION LABORATORY**

#	COURSE OUTCOMES
CO1	Develop Image processing techniques like Erosion and Dilation of an Image
CO2	Apply Operations in Spatial Domain like Smoothing and Sharpening
CO3	Implement Operations in frequency Domain.
CO4	Convert one color space to other color spaces
CO5	Implement OpenCV library efficiently