

# Course Outcomes

**R20**

## Information Technology

For

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for batches admitted from 2019-2020)



**SWARNANDHRA**  
**COLLEGE OF ENGINEERING & TECHNOLOGY**  
(AUTONOMOUS)

SEETHARAMAPURAM, NARSAPUR-534 280, W.G.DT., A.P.

<b>I SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20MA1T01: LINEAR ALGEBRA</b>				

**COURSE OUTCOMES:**

1. Develop the use of matrix algebra techniques that is needed by engineers for practical applications (K3)
2. Apply the functions of several variables which is useful in optimization (K3)
3. Acquire important tools of calculus in higher dimensions and will become familiar with double integral(K3)
4. Solve the multiple integrals and are apply for special functions.(K3)

<b>I SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20BS1T02: ENGINEERING CHEMISTRY</b>				

**COURSE OUTCOMES:**

1. Summarize the impurities present in raw water, problems associated and how to avoid them (K2)
2. List out the advantages of Polymers in daily life (K2)
3. Illustrate the theory of construction of battery and fuel cells and theories of corrosion and prevention methods. (K2)
4. Compare conventional and non-conventional energy sources and their advantages and disadvantages. (K2)
5. Interpret the usage of advanced materials in day to day life (K2)

<b>I SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20HS1T01: ENGLISH</b>				

**COURSE OUTCOMES:**

1. Identify the parts of speech, root words and apply relative writing formats to prepare notes (K3)
2. Precise the ideas coherently in day to day life. (K2)
3. Identify the importance of correct usage of grammar (K3)
4. Illustrate the ideas effectively on various topics (K2)
5. Develop the reports and essays by using appropriate sentences (K3)

<b>I SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS1T01: PROBLEM SOLVING USING C PROGRAMMING</b>				

**COURSE OUTCOMES:**

1. Develop an algorithm/flowchart to find a solution for computational problem (K3)
2. Develop C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or bitwise operators (K3)
3. Develop a C program using arrays to divide a given computational problem into a number of modules (K3)
4. Apply pointers for array processing and parameter passing (K3)
5. Develop C programs with structure or union and files for storing the data to be processed. (K3)

<b>I SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>3</b>	<b>1.5</b>
<b>20BS1L02: ENGINEERING CHEMISTRY LAB</b>				

**COURSE OUTCOMES:**

1. Identify the concentration of given solution by different methods of chemical analysis (K3)
2. Analyze the water purity by checking hardness, DO and Acidity. (K4)
3. Estimate the  $\text{Cu}^{+2}$ ,  $\text{Fe}^{+3}$ ,  $\text{Ca}^{+2}$ ,  $\text{Mg}^{+2}$  ions and Ascorbic acid present in given solution. (K4)
4. Identify the pour and cloud point of lubricants. (K3)
5. Classify the principles of conductometric and potentiometric titrations. (K2)

<b>I SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>3</b>	<b>1.5</b>
<b>20HS1L01: ENGLISH PROFICIENCY LAB</b>				

**COURSE OUTCOMES:**

1. Acquire the sounds of words for correct pronunciation. (K2)
2. Identify and learn accent of words for mastering language proficiency. (K3)
3. Distinguish the word pronunciation relating to accent and accuracy of English language. (K4)
4. Apply the words for ensuring the ability for correct pronunciation. (K3)
5. Summarize the influence of mother tongue on target language. (K2)

<b>I SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>3</b>	<b>1.5</b>
<b>20CS1L01: C PROGRAMMING LAB</b>				

**COURSE OUTCOMES:**

1. Develop basic programs in C and design flowcharts in Raptor. (K3)
2. Apply Conditional and Iterative statements to solve the real time scenarios in C. (K3)
3. Implement the concept of Arrays and Modularity and Strings. (K3)
4. Apply the Dynamic Memory Allocation functions using pointers. (K3)
5. Develop programs using structures and Files. (K3)

<b>I SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>3</b>	<b>1.5</b>
<b>20IT1L01: IT WORKSHOP</b>				

**COURSE OUTCOMES:**

1. Acquire complete knowledge of computer hardware. (K2)
2. Install basic computer engineering software. (K2)
3. Document a task through MS office. (K2)
4. Apply the usage of Google Tools and Email handling. (K3)
5. Make use of network troubleshooting. (K3)

<b>II SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20MA2T02: DIFFERENTIAL EQUATIONS AND NUMERICAL METHODS</b>				

**COURSE OUTCOMES:**

1. Solve the differential equations related to various engineering fields (K3)
2. Identify solution methods of partial differential equations that model physical processes (K3)
3. Evaluate the approximate roots of polynomial and transcendental equations by different algorithms(K3)
4. Solve integrate and ordinary differential equations by various numerical techniques.(K3)

<b>II SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20BS2T01: ENGINEERING PHYSICS</b>				

**COURSE OUTCOMES:**

1. Acquire the knowledge of basic crystal systems and determination of crystal structures. (K2)
2. Summarize the Magnetic and Dielectric Materials properties. (K2)
3. Illustrate the concept of Magnetic Induction and Super Conducting properties. (K2)
4. Interpret Pure & Doped Semiconductor materials for better utility. (K2)
5. Acquire the knowledge on Optical fibers and Optical properties of materials and their applications (K2)

<b>II SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS2T03: OBJECT ORIENTED PROGRAMMINGS WITH PYTHON</b>				

**COURSE OUTCOMES:**

1. Acquire the core programming basics and program design with functions using Python programming language. (K2)
2. Interpret the high-performance programs designed to strengthen the practical expertise. (K2)
3. Develop applications for real time problems by applying python data structure concepts. (K3)
4. Apply the concepts of packages, handling, multithreading and socket programming. (K3)
5. Analyze the importance of object-oriented programming over structured programming. (K4)

<b>II SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>2</b>	<b>1</b>	<b>-</b>	<b>3</b>
<b>20IT2T01: IT ESSENTIALS</b>				

**COURSEOUTCOMES:**

1. Acquire the basic concepts of operating systems. (K2)
2. Outline the various software engineering tools. (K2)
3. Acquire the basics of Internet. (K2)
4. Acquire the basic concepts of web basics. (K2)
5. Outline the various computer graphics concepts. (K2)

II SEMESTER	L	T	P	C
	3	-	-	3

**20EE2T01: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

1. Analyze different electrical networks using KVL, KCL and Theorems. (K4)
2. Acquire the basic concepts of single-phase system for simple AC circuit. (K2)
3. Compare the construction, working and operating characteristics of AC & DC machines. (K2)
4. Interpret the construction details, operation and characteristics of various semiconductor devices, digital and logic operations. (K2)

II SEMESTER	L	T	P	C
	-	-	3	1.5

**20CS2L03: OBJECT ORIENTED PROGRAMMING LAB WITH PYTHON**

**COURSE OUTCOMES:**

1. Apply core programming basics and program design with functions using Python programming language. (K3)
2. Interpret the high-performance programs designed to strengthen the practical expertise. (K2)
3. Develop applications for real time problems by applying python data structure concepts. (K3)
4. Apply the concepts of packages, handling, multithreading and socket programming. (K3)
5. Identify the importance of object-oriented programming over structured programming. (K3)

II SEMESTER	L	T	P	C
	-	-	3	1.5

**20EE2L01: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

**COURSE OUTCOMES:**

1. Acquire knowledge on electrical networks by using KVL, KCL. (K2)
2. Analyze the performance characteristics and to determine efficiency of DC machines (K4)
3. Identify the characteristics of AC machines. (K3)
4. Apply the knowledge on PN junction diode, transistor and Rectifiers. (K3)

II SEMESTER	L	T	P	C
	-	-	3	1.5

**20BS2L01: ENGINEERING PHYSICS LAB**

**COURSE OUTCOMES:**

1. Apply the basic knowledge to know the frequency of a vibrator, hall coefficient. (K3)
2. Apply the knowledge to verify some of the properties of physical optics. (K3)
3. Develop skills to plot various characteristic curves and to calculate the physical properties of given materials. (K3)
4. Estimate some the properties of semiconducting materials. (K3)

<b>II SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>3</b>	<b>1.5</b>
<b>20HS2L02: ENGLISH COMMUNICATIONS LAB</b>				

**COURSE OUTCOMES:**

1. Identify the difference between impromptu and extempore.(K3)
2. Express hypothetical situations in different ways.(K2)
3. Outline the etiquettes of telephonic conversation and interviews.(K2)
4. Identify the need of the presentation skills to participate in various oral activities.(K3)
5. Apply preparatory techniques for Job interviews.(K3)

<b>III SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>20IT3T01 : DISCRETE MATHEMATICS</b>				

**COURSE OUTCOMES:**

1. Identify programming errors efficiently through enhanced logical capabilities (K3)
2. Discover a general solution of recurrence equation (K4)
3. Acquire set theory, graph of the relations which are used in data structures (K2)
4. Analyze the concepts in graph theory (K4)
5. Apply graph theory concepts in core subjects such as data structures and network theory effectively (K3)

<b>III SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>20BM3T01:MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS</b>				

**COURSE OUTCOMES:**

1. Summarize the importance of Managerial Economics and its utility in decision making (K2)
2. Identify the meaning and usefulness of the production function and cost function in analyzing the firms production activity (K3&K4)
3. Comprehend the market structure, different types of markets and pricing policies (K4)
4. Identify the different forms of business organization and analyze their merits and demerits (K3)
5. Evaluate the Investment proposal through techniques of capital budgeting and financial performance of the company through financial statements (K5)

<b>III SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>20IT3T02: COMPUTER ORGANIZATION</b>				

**COURSE OUTCOMES**

1. Acquire the knowledge on structure of computers and computer arithmetic. (K2)
2. Analyze Micro operations such as Arithmetic micro operations, Shift micro operations and Logic micro operations. (K4)
3. Outline the appropriate addressing modes and instructions for writing programs.(K2)
4. List out the Peripheral devices for efficient operation of system. (K4)
5. Acquire the knowledge on parallel and vector processing. (K2)
- 6.

<b>III SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>20CS3T01 : DATA STRUCTURES</b>				

**COURSE OUTCOMES:**

1. Develop the applications using stacks and implement various types of queues. (K3)
2. Analyze and implement operations on linked lists and demonstrate their applications. (K4)
3. Identify the operations on trees. (K3)
4. Illustration of various types of Graphs and Graph Traversals. (K2)
5. Discover the various searching and sorting techniques.(K4)

<b>III SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT3T03 : JAVA PROGRAMMING</b>				

**COURSE OUTCOMES:**

1. Identify the concepts of OOPs through Java programming. (K3)
2. Apply the inheritance and packages in Java. (K3)
3. Illustrate the concepts of Exception handling and Multithreading. (K2)
4. Discover the I/O concepts in file operations and HttpClient methods. (K4)
5. Classify the concepts and usage of Collection framework. (K2)

<b>III SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>
<b>20CS3L01: DATA STRUCTURES LAB</b>				

**COURSE OUTCOMES:**

1. Construct stack and queue using arrays and linked lists. (K3)
2. Illustrate applications of stack. (K2)
3. Construct the operations on linked lists. (K3)
4. Develop the binary search trees. (K3)
5. Illustrate the different searching and sorting algorithms. (K2)

<b>III SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>
<b>20IT3L01 : COMPUTER ORGANIZATION LAB</b>				

**COURSE OUTCOMES:**

1. Simulate the 8085 microprocessor. (K4)
2. Construct the machine language programs to perform different operations. (K3)
3. Develop Arithmetic logic units and different types of memory blocks. (K3)
4. Outline the different number systems, binary addition and subtraction, 2's complement representation and operations with this representation. (K2)

<b>III SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>
<b>20IT3L02 : JAVA PROGRAMMING LAB</b>				

**COURSE OUTCOMES:**

1. Develop solutions for a range of problems using object-oriented programming. (K3)
2. Construct Java programs that solve simple business problems. (K3)
3. Illustrate the multithreaded applications with synchronization. (K2)
4. Solve problems using java collection framework and I/O classes. (K3)



<b>III SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>1</b>	-	<b>2</b>	<b>2</b>

**20IT3S01 : DATA ANALYSIS AND VISUALIZATION LAB**

**COURSE OUTCOMES:**

1. Construct data visualization libraries in Python, including Matplotlib and Seaborn(K3)
2. Develop visualization tools, including area plots, histograms, and bar charts (K3)
3. Illustrate the specialized visualization tools, including pie charts, box plots, scatter plots and bubble plots (K2)
4. Discover the usage of visualization tools, including waffle charts, word clouds and Seaborn and regression plots (K4)
5. Develop maps and visualize geospatial data (K3)

<b>IV SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>

**20MA4T07: PROBABILITY & STATISTICS**

**COURSE OUTCOMES:**

1. Illustrate the concepts of probability and their applications (K2)
2. Apply discrete and continuous probability distributions (K3)
3. Identify the components of a classical hypotheses test (K3)
4. Examine Significance tests based on small and large sampling tests (K4)
5. Evaluate correlation methods and principle of least squares, regression lines (K5)

<b>IV SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>

**20IT4T01 :OBJECT ORIENTED SOFTWARE ENGINEERING**

**COURSE OUTCOMES:**

After the completion of this course, students will be able to

1. Outline about software development process models (K2)
2. Analyze the planning and scheduling of a software project (K4)
3. Summarize the object oriented analysis (K2)
4. Illustrate the design concepts and principles (K2)
5. Identify the testing methods and comparison of various testing techniques. (K3)

<b>IV SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>

**20CS4T01 : OPERATING SYSTEMS**

**COURSE OUTCOMES:**

1. Summarize the Basic concepts about Operating System and its functions. (K2)
2. Outline the Process management, CPU scheduling and Deadlocks. (K2)
3. Analyze Memory management (K4)
4. Classify File systems & Disk Structures. (K2)
5. Apply the Case Study on LINUX, WINDOWS and Android OS. (K3)

<b>IV SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>20IT4T02 : THEORY OF COMPUTATION</b>				

**COURSE OUTCOMES:**

1. Construct automata, regular expression for any pattern. (K3)
2. Apply Context free grammar for any construct. (K3)
3. Summarize Turing machines for any language. (K2)
4. Apply computation solutions using Turing machines. (K3)
5. Discover whether a problem is decidable or not. (K4)

<b>IV SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>20IT4T03 : DATA BASE MANAGEMENT SYSTEMS</b>				

**COURSE OUTCOMES:**

1. Illustrate the basic concepts of database management system and design an Entity-Relationship (E-R) model and convert E-R model to relational model. (K2)
2. Construct database using Relational algebra and SQL. (K3)
3. Apply Normalization techniques to normalize the database. (K3)
4. Examine transaction management using different concurrency control protocols and recovery algorithms. (K4)
5. Illustrate different file organization and indexing methods. (K2)

<b>IV SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>20IT4L03: OPERATING SYSTEMS LAB IN LINUX</b>				

**COURSE OUTCOMES**

1. Acquire basic knowledge in Linux operating System (K3)
2. Illustrate the concepts of CPU Scheduling. (K2)
3. Discover the process management, scheduling and concurrency control mechanisms. (K4)
4. Analyze Page Replacements and deadlocks. (K4)
5. Classify various file systems and its operating systems examples (K2)

<b>IV SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>3</b>	<b>1.5</b>
<b>20IT4L01: UML LAB</b>				

**COURSE OUTCOMES**

1. Construct various UML models and diagrams (K3)
2. Develop UML model in object-oriented software. (K3)
3. Analyze and design in solving computer Based problems. (K4)
4. Develop software architecture for a project. (K3)

<b>IV SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>3</b>	<b>1.5</b>
<b>20IT4L02 : DATA BASE MANAGEMENT SYSTEMS LAB</b>				

**COURSE OUTCOMES:**

1. Illustrate the basic Structured Query Language (SQL) commands. (K2)
2. Build the Database Integrity Constraints. (K3)
3. Discover SQL Queries on set operators, sub queries, nested queries, aggregate functions, other SQL functions and views. (K4)
4. Develop applications using various features of PL/SQL like Functions, Procedures, Packages, cursors and triggers. (K3)
5. Develop Database system to handle the real world problem. (K3)

<b>IV SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>1</b>	-	<b>2</b>	<b>2</b>
<b>20IT4S01: ANDROID PROGRAMMING LAB</b>				

**COURSE OUTCOMES:**

1. Outline the Android platform, Architecture and features. (K2)
2. Design User Interface and develop activity for Android App. (K4)
3. Apply Internet, Broadcast receivers and Internet services in Android App. (K3)
4. Build Database Application and Content providers. (K3)
5. Develop multimedia, camera and Location based services in Android App. (K3)

<b>V SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS5T01:Computer Networks</b>				

**COURSE OUTCOMES:**

1. Classify network reference models such as OSI, TCP/IP. (K2)
2. Apply Data Link Layer protocols for Error detection and correction. (K4)
3. Distinguish various MAC sub layer Protocols such as ALOHA, CSMA, CSMA/CD. (K4)
4. Identify various Network layer and Transport layer protocols. (K3)
5. Illustrate various application layer protocols such as WWW and HTTP etc. (K2)

<b>V SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT5T01:Web Technologies</b>				

**COURSE OUTCOMES:**

1. Distinguish various static web pages and dynamic web pages using html and java script. (K4)
2. Apply the client side validation using Java Script. (K3)
3. Develop a well formed XML document. (K3)
4. Construct the web servers with servlets. (K3)
5. Summarize java server side programming and connection with database. (K2)

<b>V SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT5T02:Artificial Intelligence</b>				

**COURSE OUTCOMES:**

1. Outline the fundamentals of AI techniques and search techniques. (K2)
2. Identify appropriate search algorithms for any AI problem. (K3)
3. Illustrate a problem using first order and predicate logic. (K2)
4. Summarize the concepts of non-monotonic reasoning. (K2)
5. Acquire the knowledge of various AI applications. (K4)

<b>V SEMESTER – Professional Elective - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT5E01:Compiler Design</b>				

**COURSE OUTCOMES:**

1. Outline language processors and its phases. (K2)
2. Develop the concepts of scanning of tokens. (K3)
3. Illustrate the syntax analysis by using parsing techniques. (K2)
4. Distinguish memory Management techniques in runtime environment. (K4)
5. Discover optimization techniques for intermediate code forms and code generation. (K4)

<b>V SEMESTER – Professional Elective - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT5E02: Software Project Management</b>				

**COURSE OUTCOMES:**

Upon the completion of the course students will be able to:-

1. Apply the process to be followed in the software development life-cycle models. (K3)
2. Outline the concepts of project management & planning. (K2)
3. Test for project plans through managing people, communications and change (K4)
4. Examine the activities necessary to successfully complete and close the Software projects. (K4)
5. Illustrate communication, modeling and construction and deployment practices in software development. (K2)

<b>V SEMESTER – Professional Elective - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT5E03: Digital Image Processing</b>				

**COURSE OUTCOMES:**

1. List out the basic concepts of image processing and image geometry. (K1)
2. Apply various operations on image both in spatial and frequency domains to solve various real time problems by converting them between domains. (K3)
3. Distinguish different types of images, such as black & white, gray scale and color images, and can convert image from one color model to other. (K4)
4. Analyze different features of the images for the purpose of Compression, authentication and safety. (K4)
5. Summarize Morphological Image Processing, Segmentation and Color Image Processing. (K2)

<b>V SEMESTER – Professional Elective - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT5E04: Virtual Reality</b>				

**COURSE OUTCOMES:**

1. Outline various principles and concepts of Virtual Reality and its Application. (K2)
2. Apply appropriate method of Geometric Modeling. (K3)
3. Analyze various VR Hardware and Software. (K4)
4. Summarize the concepts of Augmented Reality. (K2)
5. Discover the Augmented Reality Contents and its Applications. (K4)

<b>V SEMESTER (OPEN ELECTIVE –I)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	3	-	-	3
<b>20EE5001 - NON-CONVENTIONAL ENERGY SOURCES</b>				

**COURSE OUTCOMES:**

1. Analyze solar radiation data and solar thermal systems (k4)
2. Identify the methods and analysis of wind energy generation systems (k3)
3. Explain the biomass and geothermal energy, its mechanism of production and its applications (k2)
4. Explain basic principle and working of hydro, tidal energy systems. (k2)
5. Explain basics of Chemical Energy Sources(k2)

<b>V SEMESTER (OPEN ELECTIVE –I)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	3	-	-	3
<b>20ME5001 - WASTE TO ENERGY CONVERSION</b>				

**COURSE OUTCOMES:**

1. Describe of the concept of waste to energy, classifications and principles. [K2]
2. Explain management principles for production of energy from waste. [K2]
3. Explain the best available technologies for waste to energy. [K2]
4. Describe the waste to energy options landfill gas, and energy from plastics.[K2]
5. Apply the knowledge in planning and operations of waste to energy plants [K3]

<b>V SEMESTER (OPEN ELECTIVE –I)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	3	-	-	3
<b>20CS5001 - INTERNET OF THINGS AND APPLICATIONS</b>				

**COURSE OUTCOME:**

1. Explain Arduino IDE tool and Arduino Programming concept.
2. Illustrate concept hardware configuration with Firmata protocols.
3. Explain the knowledge Arduino pin configuration.
4. Differentiate various sensors configuration and workflows.
5. Define architecture of IoT.

<b>V SEMESTER (OPEN ELECTIVE –I)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	3	-	-	3
<b>20CS5002 - DATA ENGINEERING</b>				

**COURSE OUTCOMES:**

1. Preprocessing techniques for various datasets,
2. Standard database systems concepts like tables, relations, query, NoSQL
3. Information retrieval techniques such as Relevance Ranking, Indexing etc
4. Data processing algorithms and data structures
5. Visualization techniques like Table, graph, histogram, pie-chart

<b>V SEMESTER (JOB ORIENTED ELECTIVE-I)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	3	-	-	3
<b>20IT5J01 - LINUX ADMINISTRATION</b>				

**COURSE OUTCOMES:**

1. Illustrate various Linux commands that are used to manipulate system operations at admin level. (K2)
2. Construct Shell Programming using Linux commands. (K3)
3. Develop applications to manipulate internal kernel level Linux File System. (K3)
4. Summarize the concepts of user, group and storage management. (K2)
5. Construct SSH client and server. (K3)

<b>V SEMESTER (JOB ORIENTED ELECTIVE-I)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	3	-	-	3
<b>20CS5J01 - FULL STACK WITH JAVA</b>				

**COURSE OUTCOMES:**

1. Design simple web pages using markup languages like HTML and CSS.
2. Create dynamic web pages using DHTML and java script that is easy to navigate and use.
3. Create web pages using AngularJS.
4. Build web applications using Servlet and JSP.
5. Understand various operations on Mongo Database.

<b>V SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	3	1.5
<b>20IT5L01:Network Programming Lab</b>				

**COURSE OUTCOMES:**

1. Apply the basics of Physical layer in real time applications. (K3)
2. Interpret data link layer concepts for design issues. (K2)
3. Experiment with Network layer routing protocols and IP addressing. (K3)
4. Develop the functions of Application layer and Presentation layer paradigms and Protocols. (K3)

<b>V SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	3	1.5
<b>20IT5L02:Web Technologies Lab</b>				

**COURSE OUT COMES:**

1. Distinguish static web pages and dynamic web pages using HTML, XML and JavaScript. (K4)
2. Construct and review on database connectivity. (K3)
3. Develop web applications using Servlets & JSP using oracle database connectivity. (K3)
4. Build and implement the web application projects. (K3)

V SEMESTER	L	T	P	C
	1	-	2	2

**20HS5S01 :: Skill Course-3 (ADVANCED COMMUNICATION SKILLS LAB)**

**COURSE OUTCOMES:**

1. Summarize ideas and organize information relevantly and coherently. (K2)
2. Prove in group discussions and face interviews with confidence. (K5)
3. Build resume with covering letter.(K3)
4. Plan oral presentations and public speaking. (K3)
5. Take part in social and professional communication. (K4)

V SEMESTER	L	T	P	C
	0	0	0	1.5

**20IT5I01 :: Internship-I**

**COURSE OUTCOMES:**

1. Apply existing engineering knowledge in similar or new situations(K3)
2. Identify when new engineering knowledge is required, and apply it(K3)
3. Analyze the existing and new technical knowledge for industrial application(K4)
4. Outline the impact of the internship on their learning and professional development (K2)
5. Examine the lifelong learning processes through critical reflection of internship experiences(K4)



<b>VI SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6T01:MACHINE LEARNING</b>				

**COURSE OUTCOMES:**

1. Illustrate the fundamentals of machine learning concepts. (K2)
2. Develop and apply regression and classification algorithms. (K3)
3. Build a model for decision tree learning. (K3)
4. Discover the Bayesian approach for machine learning. (K4)
5. Apply unsupervised learning models for handling unknown pattern. (K3)

<b>VI SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6T02:INTERNET OF THINGS</b>				

**COURSE OUTCOMES:**

1. Outline the concepts of IoT and apply IoT to different applications. (K2)
2. Utilization of Devices, Gateways and Data Management in IoT. (K3)
3. Analyze and evaluate protocols used in IoT. (K4)
4. Identify how IoT differs from traditional data collection systems. (K3)
5. Illustrate the role of big data, cloud computing and data analytics in a typical IoT system. (K2)

<b>VI SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6T03: CLOUD COMPUTING</b>				

**COURSE OUTCOMES:**

1. Illustrate the main concepts, key technologies, strengths and limitations of cloud computing. (K2)
2. Discover the enabling technologies that help in the development of cloud. (K4)
3. Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models. (K3)
4. Summarize the core issues of cloud computing such as resource management and security. (K2)
5. Identify the appropriate technologies, algorithms and approaches for implementation and use of cloud. (K3)

<b>VI SEMESTER – PROFESSIONAL ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6E01:DESIGN AND ANALYSIS OF ALGORITHMS</b>				

**COURSE OUTCOMES:**

1. Analyze the asymptotic runtime complexity of algorithms for real world problems developed using different algorithmic methods. (K4)
2. Identify the optimal solutions by using advanced design and analysis of algorithm techniques like Divide & conquer and greedy method. (K3)
3. Illustrate the fundamentals of Dynamic Programming methods along with its applications. (K2)
4. Apply the search space and optimization problem techniques like backtracking and branch and bound method to solve problems optimally where advanced algorithm design techniques fail to find solution. (K3)
5. Distinguish the problems and its complexity as polynomial and NP problems and can formulate some real world problems to abstract mathematical problems. (K4)

<b>VI SEMESTER – PROFESSIONAL ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6E02:AGILE TECHNOLOGY</b>				

**COURSE OUTCOMES:**

1. Interpret the basics of Scrum framework. (K2)
2. List out the principles of Agile methodology. (K1)
3. Analyze life time period of a sprint. (K4)
4. Identify the roles, responsibilities and principles of a ScrumMaster. (K3)
5. Categorize the scrum team structures and scrum planning principles. (K4)

<b>VI SEMESTER – PROFESSIONAL ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6E03:EMBEDDED SYSTEMS</b>				

**COURSE OUTCOMES:**

1. Interpret the fundamentals of Embedded Systems. (K2)
2. Distinguish various components used in Embedded systems. (K4)
3. Develop the Embedded Firmware. (K3)
4. Summarize the concepts of PIC, AVR controllers and Processors. (K2)
5. Build a case study on Embedded Systems. (K3)

<b>VI SEMESTER – PROFESSIONAL ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6E04 :ROBOTICS</b>				

**COURSE OUTCOMES:**

1. Identify the basic components of robots. (K3)
2. Distinguish various types of robots and robot grippers. (K4)
3. Illustrate forward and inverse kinematics of robot manipulators. (K2)
4. Analyze forces in links and joints of a robot and design intelligent robots using sensors. (K4)
5. Develop a robot to perform tasks in industrial applications. (K3)
- 6.

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CE6001:: ENVIRONMENTAL POLLUTION AND CONTROL</b>				

**COURSE OUTCOMES:**

1. Identify the air pollutant causes and control devices. (K2)
2. Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods. (K2)
3. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city. (K2)
4. know the causes for noise pollution and ISO14000 standards. (K2)
5. know Treatment and management of hazardous waste. (K2)

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CE6002 :: DISASTER MANAGEMENT</b>				

**COURSE OUTCOMES:**

1. Identify the tools of integrating disaster management principles in disaster mitigation process. (K2)
2. Discuss about different approaches needed to manage pre and post- disaster activities. (K2)
3. Prepare the process of risk management and develop a basic understanding method for the role of public in risk management. (K2)
4. Administer the role of technology in Disaster management. (K2)
5. Conclude the planning strategies for education and community preparedness programs. (K2)

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20EE6001 :: FUNDAMENTALS OF ELECTRIC VEHICLES</b>				

**COURSE OUTCOMES:**

1. Illustrate different types of electric vehicles
2. Select suitable power converters for EV applications
3. Design HEV configuration for a specific application
4. Choose an effective method for EV and HEV applications
5. Analyse a battery management system for EV and HEV

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20EC6001 ::MOBILE COMMUNICATION AND IT'S APPLICATIONS</b>				

**COURSE OUTCOMES:**

1. Design Hexagonal shaped cells and how these are implemented in real world.
2. Explain different types of antenna systems in mobile communication.
3. Analyze Handoffs and different types of handoffs and Dropped call rates and their evaluation.
4. Describe the Parameters of Mobile multipath channels, Types of small scale fading.

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20ME6001 :: BASICS OF 3D PRINTING</b>				

**COURSEOUTCOMES:**

1. To impart the fundamentals of Additive Manufacturing Technologies for engineering applications[K2]
2. Select and use correct CAD for mats in the manufacture of a3D printed part. [K2]
3. Explain the operating principles, capabilities, and limitations of liquid, solid and laser based additive manufacturing system. [K2]
4. Enumerate the design process for additive manufacturing including tools used for design and some features required for design. [K2]
5. Describe the important process parameters for bio-manufacturing and determine the suitable additive technique for bio-manufacturing, aerospace and manufacturing engineering. [K2]

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20ME6O02 :: FARM MACHINERY</b>				

**COURSE OUTCOMES:**

1. Explain various types of machinery in farming. [K2]
2. Illustrate types of farm operation for craft cultivation with scientific understanding. [K2]
3. Explain various types of earth moving equipment. [K2]
4. Summarize various seeding methods and sprayer types. [K2]
5. Explain transplanting methods and fertilizer equipment. [K2]

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS6O01:: FUNDAMENTALS OF SOFTWARE ENGINEERING</b>				

**COURSE OUTCOMES:**

1. Identify, formulate the various software engineering concepts
2. Different software development process models.
3. Analyze and specify software requirements with various stakeholders of a software development project
4. Apply systematic procedure for software design and deployment.
5. Compare and contrast the various testing methods and art of debugging

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS6O02 :: FUNDAMENTALS OF COMPUTER NETWORKS</b>				

**COURSE OUTCOMES**

1. Differentiate network reference models such as OSI, TCP/IP.
2. Classify various Data Link Layer protocols such as sliding window.
3. Distinguish various MAC sublayer protocols such as ALOHA, CSMA, CSMA/CD.
4. Differentiate Network layer protocols IPv4 and IPv6.
5. Distinguish various Transport layer protocols and its applications.

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20MA6O01 :: OPERATION RESEARCH</b>				

**COURSE OUTCOMES:**

1. Formulate the resource management problem and identify appropriate methods to solve them. [K3]
2. Apply transportation model to optimize the industrial resources. [K3]
3. Solve sequencing problems using operation research techniques. [K3]
4. Apply the replacement model to increase the efficiency of the system. [K3]
5. Apply the inventory and queuing model to increase the efficiency of the system. [K4]

<b>VI SEMESTER : OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6001 :: INTRODUCTION TO CLOUD COMPUTING</b>				

**COURSE OUTCOMES:**

1. Illustrate the main concepts, key technologies, strengths and limitations of cloud computing. (K2)
2. Discover the enabling technologies that help in the development of cloud. (K4)
3. Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models. (K3)
4. Summarize the core issues of cloud computing such as resource management and security. (K2)
5. Identify the appropriate technologies, algorithms and approaches for implementation and use of cloud. (K3)

<b>VI SEMESTER: OPEN ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6O02 :: E-COMMERCE</b>				

**COURSE OUTCOMES:**

1. Identify the fundamentals E-commerce framework. (K3)
2. Outline the basics of Consumer Oriented Electronic models. (K2)
3. Distinguish different electronic payment systems and their issues. (K4)
4. Illustrate Inter-organizational and intra-organizational electronic commerce. (K2)
5. Summarize the consumer search, resource discovery and key multimedia concepts. (K2)

<b>VI SEMESTER:JOB ORIENTED ELECTIVE -II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS6J01 :: AWS CLOUD PRACTITIONER</b>				

**COURSE OUTCOMES:**

1. Outline the AWS cloud and identify the Global Infrastructure components of AWS. (K2)
2. Examine when to use Amazon EC2, AWS Lambda and AWS Elastic Beanstalk. (K4)
3. Classify Storage Services and when to use AWS Database services. (K4)
4. Illustrate Networking and Content Delivery Services. (K2)
5. Summarize the Cloud economics and security. (K2)

<b>VI SEMESTER:JOB ORIENTED ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS6J02 :: SOFTWARE TESTING TOOLS</b>				

**COURSE OUTCOMES:**

1. Develop Manual testing techniques and software test levels (K3)
2. Construct Java Program for Selenium and Test frame works (K3)
3. Construct Apache JMeter and apply JMeter Test Plan (K3)
4. Build the Running Multiple Scripts with JMeter and Different Types of JMeter Test Plans (K3)
5. Analyze JIRA and Test Management In JIRA (Using Zephyr Plug-in) (K4)

<b>VI SEMESTER : JOB ORIENTED ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6J01 :: FULL STACK DEVELOPMENT</b>				

**COURSE OUTCOMES:**

1. Outline the basic concepts of Web Page and Markup Languages. (K2)
2. Develop web Applications using Scripting languages and Frameworks. (K3)
3. Construct and Run the Applications using PHP. (K3)
4. Examine First Controller Working with and Displaying in AngularJS and Nested Forms with ng-form. (K4)
5. Illustrate working with the Files in React JS and Constructing Elements with Data. (K3)

<b>VI SEMESTER : JOB ORIENTED ELECTIVE - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT6J02 :: BLOCK CHAIN TECHNOLOGY</b>				

**COURSE OUTCOMES:**

1. Discover the secure and efficient transactions with crypto-currencies (K4)
2. Experiment with cryptocurrency trading and crypto exchanges (K3)
3. Analyze the bitcoin usage and applications (K4)
4. Develop private block chain environment and develop a smart contract on Ethereum (K3)
5. Build the hyper ledger architecture and the consensus mechanism applied in the hyperledger (K3)

<b>VI SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>
<b>20CS6L01:MACHINE LEARNING LAB</b>				

**COURSE OUTCOMES:**

1. Apply Data summarization and visualization. (K3)
2. Develop and implement the Linear Regression Analysis (K3)
3. Develop and implement the Logistic Regression Analysis. (K3)
4. Apply the Classification using Support Vector Machine. (K3)

<b>VI SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>1</b>	<b>2</b>	<b>1.5</b>
<b>20IT6L02 :INTERNET OF THINGS LAB</b>				

**COURSE OUTCOMES:**

1. Analyze temperature and humidity using various sensors (K4)
2. Apply IR sensor/push button to on/off LED (K3)
3. Build a Bluetooth module with Arduino and Use the same (K3)
4. Construct Actuating elements with Arduino and control the same (K3)

<b>VI SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>
<b>20IT6L03 : CLOUD COMPUTING LAB</b>				

**COURSE OUTCOMES:**

1. Identify various virtualization tools such as Virtual Box, VMware workstation. (K3)
2. Design and deploy a web application in a PaaS environment. (K6)
3. Build a cloud environment to implement new schedulers. (K3)
4. Outline the use of generic cloud environment that can be used as a private cloud. (K2)
5. Illustrate the large data sets in a parallel environment (K2)

<b>VI SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>1</b>	-	<b>2</b>	<b>2</b>
<b>20IT6S01: Skill Course-4 :: ARTIFICIAL INTELLIGENCE LAB</b>				

**COURSE OUTCOMES:**

1. Outline the concept of Artificial intelligence. (K2)
2. Apply various search algorithms of artificial intelligence. (K3)
3. Examine the knowledge representation and reasoning techniques. (K4)
4. Apply different types of machine learning and models. (K3)

<b>VI SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>1</b>	-	-	-
<b>20BM6M01:PROFESSIONAL ETHICS AND INTELLECTUAL PROPERTY RIGHTS</b>				

**COURSE OUTCOMES:**

1. Identify the professional roles played by an engineer and illustrate the process of Social experimentation (K3)
2. Determine Engineer's responsibilities and rights towards the society (K5)
3. Analyze various aspects of Intellectual Property Rights and recognize the process of protecting the copyrights (K4)
4. Outline the registration process of Patents and trademarks and also demonstrate the concept of trade secrets and cybercrimes (K2)



<b>VII SEMESTER -PROFESSIONAL ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7E01 : BIO-INFORMATICS</b>				

**COURSE OUTCOMES:**

1. Outline the fundamentals of XML, DTD for Bioinformatics. (K2)
2. Apply the concepts for file handling mechanisms. (K3)
3. Summarize the database management system for Bioinformatics. (K2)
4. Analyze the different Sequence Alignment Algorithms. (K3)
5. Examine the Phylogenetic analysis for Bioinformatics. (K4)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7E02 : DEVOPS</b>				

**COURSE OUTCOMES:**

1. Outline the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility (K2)
2. Develop DevOps & DevSecOps methodologies and their key concepts (K3)
3. Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models (K2)
4. Build the complete private infrastructure using version control systems and CI/CD tools (K3)
5. Discover DevOps maturity model. (K4)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7E03 : DEEP LEARNING</b>				

**COURSE OUTCOMES:**

1. List out the basic concepts of fundamental learning techniques and layers. (K1)
2. Analyze the Neural Network training, various random models. (K4)
3. Classify different types of deep learning network models. (K4)
4. Distinguish the Probabilistic Neural Networks and Sequence model neural networks. (K4)
5. Illustrate tools on Deep Learning techniques. (K2)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS7E01 : CRYPTOGRAPHY &amp; NETWORK SECURITY</b>				

**COURSE OUTCOMES:**

1. List out the different security threats and counter measures and foundation course of cryptography mathematics. (K1)
2. Classify the basic principles of symmetric key algorithms and operations of some symmetric key algorithms and asymmetric key cryptography (K2)
3. Illustrate the basic principles of Public key algorithms and Working operations of some Asymmetric key algorithms such as RSA, ECC and some more (K2)
4. Design applications of hash algorithms, digital signatures and key management techniques (K6)
5. Determine the knowledge of Application layer, Transport layer and Network layer security Protocols such as PGP, S/MIME, SSL, TSL, and IPsec. (K5)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7E04 : DISTRIBUTED SYSTEMS</b>				

**COURSE OUTCOMES:**

1. Outline the concept of distributed systems and various distributed models. (K2)
2. Develop the knowledge on inter-process communication mechanisms used in distributed systems and Compare RPC and RMI. (K3)
3. Examine Global states and replication. (K4)
4. Label distributed file systems and name services. (K1)
5. Examine distributed transactions and concurrency control. (K4)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7E05 : BIG DATA ANALYTICS</b>				

**COURSE OUTCOMES:**

1. List out the basic concepts of Big Data and Big Data Analytics (K1)
2. Analyze the HDFS architecture (K4)
3. Develop the Map Reduce application (K3)
4. Identify the various Hadoop Ecosystem technologies (K3)
5. Outline the Advanced Analytical methods for classification, clustering and Text Analysis (K2)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS7E05 : QUANTUM COMPUTING</b>				

**COURSE OUTCOMES:**

1. Identify the quantum computing techniques (K3)
2. Identify the mathematics using on quantum computing (K3)
3. Develop quantum logic gate circuits (K3)
4. Analyze quantum algorithm (K4)
5. Examine the programs using various toolkits (K4)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20AM7E03 : NOSQL DATABASES</b>				

**COURSE OUTCOMES:**

1. List out the Aggregate Data Models (K1)
2. Compare Master-Slave Replication, Peer-to-Peer Replication (K4)
3. Interpret the Structure of Data, Scaling, Suitable Use Cases (K2)
4. Illustrate Complex Transactions Spanning Different Operations (K2)
5. Identify Routing, Dispatch and Location-Based Services (K3)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7E06 : COMPUTER VISION</b>				

**COURSE OUTCOMES:**

1. List out the fundamental image processing techniques required for computer vision. (K1)
2. Evaluate the shape analysis and Implement boundary tracking techniques. (K5)
3. Apply Hough Transform for line, circle and ellipse detections. (K3)
4. Illustrate 3D vision techniques and Implement motion related techniques. (K2)
5. Develop applications using computer vision techniques. (K3)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7E07 :ADVANCED COMPUTER NETWORKS</b>				

**COURSE OUTCOMES:**

1. Identify the basic computer network technology and the different types of routing algorithms.(K3)
2. Compare IPV4 & IPV6 address, address space and types of addressing (K5)
3. Distinguish transport layer protocols TCP, UDP & SCTP and also process to process delivery. (K4)
4. Summarize the DNS, Architecture of World Wide Web, E-mail and different multimedia streaming protocols. (K2)
5. Distinguish functioning and services of Wireless Sensor and Wireless Mesh networks (K4)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7E08: CYBER SECURITY</b>				

**COURSE OUTCOMES:**

1. Outline the basic knowledge on Cybercrime. (K2)
2. Analyze the concepts of Cyber offenses. (K4)
3. Build the Cybercrime Mobile and Wireless Devices. (K3)
4. Develop the Tools and Methods Used in Cybercrime. (K3)
5. Apply the Cybercrimes and Cyber security scenarios. (K3)

<b>VII SEMESTER – PROFESSIONAL ELECTIVE - V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS7E08: EDGE COMPUTING</b>				

**COURSE OUTCOMES:**

1. List out the various edge computing hardware architectures and edge platforms. (K1)
2. Compare IoT Vs Machine-to-Machine Vs SCADA. (K4)
3. Develop RaspberryPi, Program (K3)
4. Summarize MQTT architecture details, state transitions, packet structure, datatypes, communication formats. (K2)
5. Apply edge computing with RaspberryPi. (K3)

**OPEN ELECTIVE-III (R20)**

<b>VII SEMESTER : OPEN ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CE7O01 :: SOLID WASTE MANAGEMENT</b>				

**COURSE OUTCOMES:**

1. Recall classification of solid waste generated.
2. Know the collection systems of solid waste of a town.
3. Analyze the importance of transfer and transport of solid waste.
4. Apply the knowledge in processing of solid waste.
5. Design treatment of municipal solid waste and landfill.

<b>VII SEMESTER : OPEN ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CE7O02 :: BUILDING PLANNING AND DRAWING</b>				

**COURSE OUTCOMES:**

1. Understand the building bye-laws, plan various buildings as per the building by-laws.
2. Plan the individual rooms with reference to functional and furniture requirements.
3. prepare different sign conventions and bonds
4. Learn the skills of drawing building elements like doors and windows.
5. Develop the skills of Drawing Plans, Sections and Elevations of different buildings.

<b>VII SEMESTER : OPEN ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20EE7001 :: ENERGY AUDITING, CONSERVATION AND MANAGEMENT</b>				

**COURSE OUTCOMES:**

1. Understand the principles of energy audit
2. Explain the role of Energy Manager and Energy Management program.
3. Design a energy efficient motors and good lighting system
4. Evaluate the methods to improve the power factor
5. Estimate the computational techniques with regard to economic aspects.

<b>VII SEMESTER : OPEN ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20EC7001 :: INTRODUCTION TO GLOBAL POSITIONING SYSTEMS</b>				

**COURSE OUTCOMES:**

1. Describe global navigation satellite systems (K1)
2. Understand GNSS Satellite signal characteristics (K2)
3. Develop GNSS Receiver (K3)
4. Analyze the impact of various error sources on the precision of positioning. (K4)

<b>VII SEMESTER : OPEN ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20ME7001 :: BIO-MECHANICAL ENGINEERING</b>				

**COURSE OUTCOMES:**

1. Explain about fundamentals of Bio mechanics. [K2]
2. Describe the mechanics of musculoskeletal system. [K2]
3. Relate the concept of kinetics with human motion. [K3]
4. Explain mechanical analysis of human motion. [K3]
5. Analyze human movements. [K4]

<b>VII SEMESTER : OPEN ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS7001 :: FULL-STACK DEVELOPMENT</b>				

**COURSE OUTCOMES:**

1. Develop simple web pages using markup languages like HTML and CSS. (K3)
2. Construct dynamic web pages using DHTML and java script that is easy to navigate and use. (K3)
3. Develop web pages using AngularJS. (K3)
4. Build web applications using Servlet and JSP. (K3)
5. Analyze the various operations on Mongo Database. (K4)

<b>VII SEMESTER – JOB ORIENTED ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7J01 : Mobile Application Development</b>				

**COURSE OUTCOMES:**

1. Analyze and configure Android application development tools. (K4)
2. Develop user Interfaces for the Android platform. (K3)
3. Illustrate state information across important operating system events. (K2)
4. Apply Java programming concepts to Android application development. (K3)
5. Analyze the advanced topic in mobile application development. (K4)

<b>VII SEMESTER – JOB ORIENTED ELECTIVE - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7J02 : Natural Language Processing</b>				

**COURSE OUTCOMES:**

1. Rephrase given text with basic Language features (K2)
2. Build an innovative application using NLP components (K3)
3. Apply a rule based system to tackle morphology/syntax of a language (K3)
4. Develop a tag set to be used for statistical processing for real-time applications (K3)
5. Compare and contrast the use of different statistical approaches for different types of NLP applications. (K2)

**OPEN ELECTIVE-IV (R20)**

<b>VII SEMESTER : OPEN ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CE7003 :: INTRODUCTION TO WATERSHED MANAGEMENT</b>				

**COURSE OUTCOMES:**

1. Analyze watershed characteristics to take appropriate management action.
2. Quantify soil erosion and design control measures.
3. Apply land grading techniques for proper land management.
4. Suggest suitable harvesting techniques for better watershed management.
5. Apply appropriate models for watershed management.

<b>VII SEMESTER : OPEN ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20EE7002 :: INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLER</b>				

**COURSE OUTCOMES:**

1. Illustrate I/O modules of PLC systems and ladder diagrams
2. Demonstrate various types registers and programming instructions. □
3. Examine various types of PLC functions and its applications
4. Assess different data handling functions and its applications.
5. Describe the analog operations and PID modules

<b>VII SEMESTER : OPEN ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20EC7O02 :: REMOTE SENSING</b>				

**COURSE OUTCOMES:**

1. Understand the subject of satellite communication and remote sensing with the core knowledge of space and satellite, communication and the international space laws.
2. Comprehend different remote sensing signaling techniques, capable of interpreting signature of satellite communication from bodies like soil, vegetation and ocean.
3. Analyze various components used in satellite communication and remote sensing applications.
4. Acquire and keep abreast of designing satellite remote sensing system and also analyze the sensor data for drawing inference and conclusions.

<b>VII SEMESTER : OPEN ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20ME7O02 :: GREEN ENGINEERING SYSTEM</b>				

**COURSE OUTCOMES:**

1. Recognize the energy scenario and explain solar radiation conversion and collection phenomena. [K3]
2. Illustrate solar energy storage methods and applications and also explain the principles of wind energy, classification, conversion and applications [K4]
3. Explain the principle, classification, conversion and applications of Bio mass, geothermal energy and ocean energy. [K3]
4. Describe the importance of energy efficient systems and interpret working of a few mechanical and electrical efficient systems. [K2]
5. Identify the need of energy efficient processes and analyze their significance in view of their importance in the current scenario and their potential future applications. [K4]

<b>VII SEMESTER : OPEN ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CS7O02 :: SOFTWARE TESTING TECHNIQUES</b>				

**COURSE OUTCOMES:**

1. List out the basic concepts of software testing and its essentials. (K2)
2. Identify the various bugs and correcting them after knowing the consequences of the bug. (K3)
3. Develop program's control flow as a structural model is the corner stone of testing. (K3)
4. Apply functional testing using control flow and transaction flow graphs. (K3)
5. Summarize the concepts of Graph Matrices and Application (K2)

<b>VII SEMESTER : OPEN ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7O01 :: INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT</b>				

**COURSE OUTCOMES:**

1. Apply the process to be followed in the software development life-cycle models(K3).
2. Apply the concepts of project management & planning(K3)
3. Analyze the project plans through managing people, communications and change(K4)
4. Evaluate the activities necessary to successfully complete and close the Software projects(K5)
5. Illustrate communication, modeling, and construction & deployment practices in software development(K2)

<b>VII SEMESTER : OPEN ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20CE7003 :: INTRODUCTION TO WATERSHED MANAGEMENT</b>				

**COURSE OUTCOMES:**

1. Analyze watershed characteristics to take appropriate management action.
2. Quantify soil erosion and design control measures.
3. Apply land grading techniques for proper land management.
4. Suggest suitable harvesting techniques for better watershed management.
5. Apply appropriate models for watershed management.

<b>VII SEMESTER – JOB ORIENTED ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7J03 : Amazon Web Services(AWS)</b>				

**COURSE OUTCOMES:**

1. Identify the core AWS services.(K3)
2. Analyze the key AWS security concepts(K4)
3. Apply the strategies for migrating from on-premises to AWS(K3)
4. Summarize the storage concepts of AWS(K2)
5. Develop building serverless applications with AWS(K3).

**COURSE OUTCOMES:**

<b>VII SEMESTER – JOB ORIENTED ELECTIVE - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>20IT7J04 : R Programming</b>				

1. Apply the basic fundamental concepts to solve the real world problem using R programming language.(K3)
2. Design and implement the solution using scalar, vectors, matrices and statistical problems in R program. (K6)
3. Distinguish and implement the program using data frames (K4)
4. Examine various factors, tables and to solve statistical problems.(K4)
5. Analyze Minimize and maximize functions, simulation and visualization using R(K4)

<b>B. TECH VII SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**20HS7T01-UNIVERSAL HUMAN VALUES-II –UNDERSTANDING HARMONY****COURSE OUTCOMES:**

1. Outline need, basic guidelines, content and process of value education; explore the meaning of happiness and prosperity (K2)
2. Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.(K4)
3. Analyze the value of harmonious relationship based on trust and respect in life and profession(K4)
4. Examine the role of a human being in ensuring harmony in society and nature.(K4)
5. Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.(K3)



VII SEMESTER	L	T	P	C
	1	-	2	2

**20IT7S01 : Skill Course-5 :: R-Programming Lab**

**COURSE OUTCOMES**

1. Build R Programming Environment.(K3)
2. Outline the use of R – Data types. (K2)
3. List out and use of R – Data Structures. (K4)
4. Develop programming logic using R – Packages. (K3)
5. Analyze data sets using R – programming capabilities (K4)

VII SEMESTER	L	T	P	C
	0	0	0	3

**20IT7I02 :: Internship-II**

**COURSE OUTCOMES**

1. Apply existing engineering knowledge in similar or new situations(K3)
2. Identify when new engineering knowledge is required, and apply it(K3)
3. Analyze the existing and new technical knowledge for industrial application(K4)
4. Outline the impact of the internship on their learning and professional development (K2)
5. Examine the lifelong learning processes through critical reflection of internship experiences(K4)

<b>IV SEMESTER (Minor Course)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>20IT4N01 : DATA STRUCTURES</b>				

**COURSE OUTCOMES:**

1. Design applications using stacks and implement various types of queues. (K6)
2. Analyze and implement operations on linked lists and demonstrate their applications. (K4)
3. Summarize the operations on trees. (K2)
4. Outline the various types of Graphs and Graph Traversals. (K2)
5. Illustrate various searching and sorting techniques. (K2)

<b>V SEMESTER (Minor Course)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>20IT5N01 : SOFTWARE ENGINEERING</b>				

**COURSE OUTCOMES:**

1. Identify formulate and solve software engineering problems (K3)
2. Analyze and specify software requirements with various stakeholders of a software development project and different software development process models. (K4)
3. Apply systematic procedure for software design and deployment. (K3)
4. Compare and contrast the various testing methods (K4)
5. Identify the key activities in managing a software project. (K3)

<b>VI SEMESTER (Minor Course)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>20IT6N01 : INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING</b>				

**COURSE OUTCOMES:**

1. Illustrate the history and foundations of Artificial Intelligence (K2)
2. Apply the basic principles of AI in problem solving (K3)
3. Summarize the appropriate representation of Knowledge (K2)
4. Examine the Perspectives and Issues in Machine Learning (K4)
5. Identify issues in Decision Tree Learning (K3)

<b>VII SEMESTER (Minor Course)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>20IT7N01 : WEB TECHNOLOGIES</b>				

**COURSE OUTCOMES**

1. Distinguish various static web pages and dynamic web pages using html and java script. (K4)
2. Apply the client side validation using Java Script. (K3)
3. Develop a well formed XML document. (K3)
4. Construct the web servers with servlets. (K3)
5. Build a java server side programming and connection with database. (K2)