UG COURSE OUTCOMES - 2021 SCHEME

3rd Semester			
Subject:	**Transform Calculus, Fourier Series and Numerical Techniques**		
Subject Code:	**21MAT31**	**NBA Code:**	**21C201**
CO1	To solve ordinary differential equations using Laplace transform.		
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory		
CO3	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations		
CO4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations		
CO5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis		

3rd Semester			
Subject:	**Data Structures and Applications**		
Subject Code:	**21CS32**	**NBA Code:**	**21C202**
CO1	Identify different data structures and their applications.		
CO2	Apply stack and queues in solving problems.		
CO3	Demonstrate applications of linked list.		
CO4	Explore the applications of trees and graphs to model and solve the real-world problem.		
CO5	Make use of Hashing techniques and resolve collisions during mapping of key value pairs		

3rd Semester			
Subject:	**Analog and Digital Electronics**		
Subject Code:	**21CS33**	**NBA Code:**	**21C203**
CO1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.		
CO2	Explain the basic principles of A/D and D/A conversion circuits and develop the same.		
CO3	Simplify digital circuits using Karnaugh Map, and Quine-McClusky Methods		
CO4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.		
CO5	Develop simple HDL programs		

3rd Semester			
Subject:	**Computer Organization and Architecture**		
Subject Code:	**21CS34**	**NBA Code:**	**21C204**
CO1	Explain the organization and architecture of computer systems with machine instructions and programs		
CO2	Analyze the input/output devices communicating with computer system		
CO3	Demonstrate the functions of different types of memory devices		
CO4	Apply different data types on simple arithmetic and logical unit		
CO5	Analyze the functions of basic processing unit, Parallel processing and pipelining		

3rd Semester			
Subject:	**Object Oriented Programming with JAVA Laboratory**		
Subject Code:	**21CSL35**	**NBA Code:**	**21C205**
CO1	Use Eclipse/NetBeans IDE to design, develop, debug Java Projects.		
CO2	Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP		
CO3	Demonstrate the ability to design and develop java programs, analyze, and interpret object oriented data and document results.		
CO4	Apply the concepts of multiprogramming, exception/event handling, abstraction to develop robust programs		
CO5	Develop user friendly applications using File I/O and GUI concepts.		

3rd Semester			
Subject:	**Social Connect and Responsibility**		
Subject Code:	**21SCR36**	**NBA Code:**	**21C206**
CO1	Develop effective communication skills to connect with the surrounding environment, communities, and cultural heritage during plantation and adoption activities.		
CO2	Foster a responsible and engaged relationship with society through the exploration of local history, heritage, and traditional crafts during the heritage walk and crafts corner activities.		
CO3	Demonstrate an understanding of organic farming practices, waste management techniques, and their impact on neighboring villages and campus environments.		
CO4	Investigate and promote water conservation practices through the documentation and analysis of current methods in surrounding villages and their implementation on campus.		
CO5	Engage in the exploration of local culinary practices, food traditions, and indigenous ingredients to appreciate and promote the cultural significance of food in the region.		

3rd Semester			
Subject:	**Constitution of India & Professional Ethics**		
Subject Code:	**21CIP37**	**NBA Code:**	**21C207**
CO1	Analyse the basic structure of Indian Constitution.		
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution		
CO3	Know about our Union Government, political structure & codes, procedures		
CO4	Understand our State Executive & Elections system of India		
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution		

3rd Semester			
Subject:	**Mastering Office**		
Subject Code:	**21CSL381**	**NBA Code:**	**21C208**
CO1	Know the basics of computers and prepare documents, spreadsheets, make small presentations with audio, video and graphs and would be acquainted with internet.		
CO2	Create, edit, save and print documents with list tables, header, footer, graphic, spellchecker, mail merge and grammar checker		
CO3	Attain the knowledge about spreadsheet with formula, macros spell checker etc.		
CO4	Demonstrate the ability to apply application software in an office environment.		
CO5	Use Google Suite for office data management tasks		

4th Semester			
Subject:	**Mathematical Foundations for Computing**		
Subject Code:	**21CS41**	**NBA Code:**	**21C209**
CO1	Apply the concepts of logic for effective computation and relating problems in the Engineering domain.		
CO2	Analyze the concepts of functions and relations to various fields of Engineering. Comprehend the concepts of Graph Theory for various applications of Computational sciences.		
CO3	Apply discrete and continuous probability distributions in analysing the probability models arising in the engineering field		
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.		
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis		

4th Semester			
Subject:	**Design and Analysis of Algorithms**		
Subject Code:	**21CS42**	**NBA Code:**	**21C210**
CO1	Apply asymptotic notational method to analyze the performance of the algorithms in terms of time complexity.		
CO2	Demonstrate divide & conquer approaches and decrease & conquer approaches to solve computational problems.		
CO3	Make use of transform & conquer and dynamic programming design approaches to solve the given real world or complex computational problems.		
CO4	Apply greedy and input enhancement methods to solve graph & string based computational problems.		
CO5	Apply and analyze backtracking, branch and bound methods and to describe P, NP and NP Complete problems.		

4th Semester			
Subject:	**Microcontroller and Embedded Systems**		
Subject Code:	**21CS43**	**NBA Code:**	**21C211**
CO1	Explain C-Compilers and optimization		
CO2	Describe the ARM microcontroller's architectural features and program module.		
CO3	Apply the knowledge gained from programming on ARM to different applications.		
CO4	Program the basic hardware components and their application selection method.		
CO5	Demonstrate the need for a real-time operating system for embedded system applications.		

4th Semester			
Subject:	**Operating Systems**		
Subject Code:	**21CS44**	**NBA Code:**	**21C212**
CO1	Identify the structure of an operating system and its scheduling mechanism.		
CO2	Demonstrate the allocation of resources for a process using scheduling algorithm.		
CO3	Identify root causes of deadlock and provide the solution for deadlock elimination.		
CO4	Explore about the storage structures and learn about the Linux Operating system.		
CO5	Analyze Storage Structures and Implement Customized Case study.		

4th Semester			
Subject:	**Biology For Engineers**		
Subject Code:	**21BE45**	**NBA Code:**	**21C213**
CO1	Elucidate the basic biological concepts via relevant industrial applications and case studies		
CO2	Evaluate the principles of design and development, for exploring novel bioengineering projects.		
CO3	Evaluate the principles of design and development, for exploring novel bioengineering projects.		
CO4	Corroborate the concepts of biomimetics for specific requirements.		
CO5	Think critically towards exploring innovative biobased solutions for socially relevant problems.		

4th Semester			
Subject:	**Universal Human Values**		
Subject Code:	**21UH49**	**NBA Code:**	**21C214**
CO1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society.		
CO2	Distinguish between the self and the body, understand the meaning of harmony in the self the co-existence of self and body.		
CO3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society.		
CO4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.		
CO5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.		

4th Semester			
Subject:	**Samskrutika Kannada**		
Subject Code:	**21KSK47**	**NBA Code:**	**21C215**
CO1	Awareness about Kannada language, literature and Kannada culture will be developed.		
CO2	Pre-modern and modern poetry, which is a major part of Kannada literature, will be symbolically learned and inspired for further reading and knowledge.		
CO3	Increases awareness and interest in literature and culture among students		
CO4	The curiosity to know about other people of the country increases by knowing the introduction of technical persons and their achievements		
CO5	To introduce cultural, folk and travel stories.		

4th Semester			
Subject:	**Balake Kannada**		
Subject Code:	**21KBK47**	**NBA Code:**	**21C215**
CO1	To understand the necessity of learning of local language for comfortable life.		
CO2	To speak, read and write Kannada language as per requirement		
CO3	To communicate (converse) in Kannada language in their daily life with kannada speakers		
CO4	To Listen and understand the Kannada language properly		
CO5	To speak in polite conservation		

4th Semester			
Subject:	**Python Programming Laboratory**		
Subject Code:	**21CSL46**	**NBA Code:**	**21C216**
CO1	Demonstrate proficiency in handling of loops and creation of functions.		
CO2	Identify the methods to create and manipulate lists, tuples and dictionaries		
CO3	Discover the commonly used operations involving regular expressions and file system.		
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.		
CO5	Determine the need for scraping websites and working with PDF, JSON and other file formats		

4th Semester			
Subject:	**Web Programming**		
Subject Code:	**21CSL481**	**NBA Code:**	**21C217**
CO1	Describe the fundamentals of web and concept of HTML.		
CO2	Use the concepts of HTML, XHTML to construct the web pages.		
CO3	Interpret CSS for dynamic documents		
CO4	Evaluate different concepts of JavaScript & Construct dynamic documents.		
CO5	Design a small project with JavaScript and XHTML		

5th Semester			
Subject:	**Automata Theory and compiler Design**		
Subject Code:	**21CS51**	**NBA Code:**	**21C301**
CO1	Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation.		
CO2	Design and develop lexical analyzers, parsers and code generators		
CO3	Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.		
CO4	Acquire fundamental understanding of the structure of a Compiler and Apply concepts automata theory and Theory of Computation to design Compilers.		
CO5	Design computations models for problems in Automata theory and adaptation of such model in the field of compilers.		

5th Semester			
Subject:	**Computer Networks**		
Subject Code:	**21CS52**	**NBA Code:**	**21C302**
CO1	Learn the basic needs of communication system.		
CO2	Interpret the communication challenges and its solution.		
CO3	Identify and organize the communication system network components		
CO4	Design communication networks for user requirements.		
CO5	To Understand the concept of Application Layer.		

5th Semester			
Subject:	**Database Management Systems**		
Subject Code:	**21CS53**	**NBA Code:**	**21C303**
CO1	Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS		
CO2	Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation.		
CO3	Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database		
CO4	Develop application to interact with databases, relational algebra expression		
CO5	Develop applications using tuple and domain relation expression from queries		

5th Semester			
Subject:	**Artificial Intelligence and Machine Learning**		
Subject Code:	**21CS54**	**NBA Code:**	**21C304**
CO1	Apply the knowledge of searching and reasoning techniques for different applications.		
CO2	Have a good understanding of machine learning in relation to other fields and fundamental issues and challenges of machine learning		
CO3	Apply the knowledge of classification algorithms on various dataset and compare results		
CO4	Model the neuron and Neural Network, and to analyze ANN learning and its applications		
CO5	Identifying the suitable clustering algorithm for different pattern		

5th Semester			
Subject:	**Database Management Systems Laboratory with Mini Project**		
Subject Code:	**21CSL55**	**NBA Code:**	**21C305**
CO1	Create, Update and query on the database.		
CO2	Demonstrate the working of different concepts of DBMS		
CO3	Implement, analyze and evaluate the project developed for an application		

5th Semester			
Subject:	**Research Methodology & Intellectual Property Rights**		
Subject Code:	**21RMI56**	**NBA Code:**	**21C306**
CO1	To know the meaning of engineering research.		
CO2	To know the procedure of Literature Review and Technical Reading		
CO3	To know the fundamentals of patent laws and drafting procedure.		
CO4	Understanding the copyright laws and subject matters of copyrights and designs		
CO5	Understanding the basic principles of design rights		

5th Semester			
Subject:	**Environmental Studies**		
Subject Code:	**21CIV57**	**NBA Code:**	**21C307**
CO1	Understand the principles of ecology and environmental issues that apply to air, land and water issues on a global scale		
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.		
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components		
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues		

5th Semester			
Subject:	**Angular JS and Node JS**		
Subject Code:	**21CSL581**	**NBA Code:**	**21C308**
CO1	Develop Angular JS programs using basic features		
CO2	Develop dynamic Web applications using AngularJS modules		
CO3	Make use of form validations and controls for interactive applications		
CO4	Apply the concepts of Expressions, data bindings and filters in developing Angular JS programs		
CO5	Make use of modern tools to develop Web applications		

6th Semester			
Subject:	**Software Engineering & Project Management**		
Subject Code:	**21CS61**	**NBA Code:**	**21C309**
CO1	Understand the activities involved in software engineering and analyze the role of various process models		
CO2	Explain the basics of object-oriented concepts and build a suitable class model using modelling techniques		
CO3	Describe various software testing methods and to understand the importance of agile methodology and DevOps		
CO4	Illustrate the role of project planning and quality management in software development		
CO5	Understand the importance of activity planning and different planning models		

6th Semester			
Subject:	**Fullstack Development**		
Subject Code:	**21CS62**	**NBA Code:**	**21C310**
CO1	Understand the working of MVT based full stack web development with Django.		
CO2	Designing of Models and Forms for rapid development of web pages.		
CO3	Analyze the role of Template Inheritance and Generic views for developing full stack web applications.		
CO4	Apply the Django framework libraries to render non HTML contents like CSV and PDF		
CO5	Perform jQuery based AJAX integration to Django Apps to build responsive full stack web applications,		

6th Semester			
Subject:	**Computer Graphics and Fundamentals of Image Processing**		
Subject Code:	**21CS63**	**NBA Code:**	**21C311**
CO1	Construct geometric objects using Computer Graphics principles and OpenGL APIs.		
CO2	Use OpenGL APIs and related mathematics for 2D and 3D geometric Operations on the object.		
CO3	Design GUI with necessary techniques required to animate the created objects.		
CO4	Apply OpenCV for developing Image processing applications.		
CO5	Apply Image segmentation techniques along with programming, using OpenCV, for develop simple applications.		

6th Semester			
Subject:	**Advanced java Programming**		
Subject Code:	**21CS642**	**NBA Code:**	**21C312**
CO1	Understanding the fundamental concepts of Enumerations and Annotations.		
CO2	Apply the concepts of Generic classes in java programs.		
CO3	Demonstrate the concepts of string operations in java.		
CO4	Develop web based applications using java servlets and JSP.		
CO5	Illustrate database interaction and transaction processing in java.		

6th Semester			
Subject:	**Occupational Health and Safety**		
Subject Code:	**21CV653**	**NBA Code:**	**21C313**
CO1	Identify hazards in the workplace that pose a danger or threat to their safety or health, or that of others.		
CO2	Control unsafe or unhealthy hazards and propose methods to eliminate the hazard		
CO3	Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation		
CO4	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors		
CO5	Identify the decisions required to maintain protection of the environment, workplace as well as personal health and safety		

6th Semester			
Subject:	**Computer Graphics and Image Processing Laboratory**		
Subject Code:	**21CSL66**	**NBA Code:**	**21C314**
CO1	Use openGL /OpenCV for the development of mini Projects.		
CO2	Analyze the necessity mathematics and design required to demonstrate basic geometric transformation techniques.		
CO3	Demonstrate the ability to design and develop input interactive techniques		
CO4	Apply the concepts to Develop user friendly applications using Graphics and IP concepts.		
CO5	Apply the concept of image processing operation on images using openCV		