Course Name	COs	CO Description	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Average mapping strength	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	Average mapping strength
Semester I																
Programming Fundamentals using C/C++: Theory & Lab (UGCMSCC01)	CO1	Discuss, memorize and understand the different concept of C/C++ programming constructs and classes for code reuse.		3						3						
	CO2	Solve problems and propose algorithms, pseudo codes and flowcharts for it.				3						3	3			
	CO3	Identify real life problems and convert it to computational problems.			3				3			3	3				3
	CO4	Apply the concepts of structural and object oriented programming such as loops, functions, structure, class, inheritance, friend functions, and virtual functions to develop programs for problem solving.			3								3			
	CO5	Analyse and Compare approaches to model efficient and standard programs.				3	3							3		
	CO6	Evaluate, design, compile, run and debug programs for software development.				3									3	3
Computer System Architecture: Theory & Lab (UGCMSCC02)	CO1	Ability to define the basic architectural organization and design of computer.	3							3						
	CO2	Ability to understand the basic structure, operation and characteristics of digital computer.		3						3	3						3
	CO3	Ability to understand the arithmetic and logic unit as well as the concept of pipelining with hierarchical memory system including cache memories and virtual memory.		3	3				3	3	3					
	CO4	Distinguish between different ways of communicating with I/O devices and standard I/O interfaces					3						3		3	
Semester II																
Theory & Lab 3)	CO1	Discuss, memorize and understand the different concept of Java programming constructs and classes for code reuse.		3						3						
	CO2	Identify real life problems and convert it to computational problems.						3					3	3		
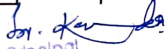
Course Name	COs	CO Description	PO 1	2	3	4	5	6	Average mapping strength	PSO 1	2	3	4	5	6	Average mapping strength
Programming in JAVA: (UGCMSCC0...)	CO3	Analyse the concepts of object oriented programming such as loops, functions, class, inheritance, packages, multi-threading and abstract class to develop programs for problem solving.			3				3		3	3				3
	CO4	Analyse and Compare approaches to model efficient and standard programs for real life application development.			3							3				
	CO5	Evaluate, design, compile, run and debug programs for software development.				3	3						3			
Discrete Structures: Theory & Tutorial (UGCMSCC04)	CO1	Ability to define and understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking.	3	3						3	3					
	CO2	Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.		3						3	3					
	CO3	Understand the basics of combinatorics, and be able to apply the methods from these subjects in problem solving		3					3		3	3				
	CO4	Understand asymptotic notation, its significance, and be able to use it to analyse asymptotic performance for some basic algorithmic examples				3						3	3			
	CO5	Ability to determine effective algebraic techniques to analyse basic discrete structures and algorithms and be able to apply them in problem solving.				3							3		3	

Semester III

Course Name	COs	CO Description	PO 1	2	3	4	5	6	Average mapping strength	PSO 1	2	3	4	5	6	Average mapping strength
:: Theory & Lab (UGCMSCC05)	CO1	Ability to define fundamental data structures and with the manner in which these data structures can best be implemented.	3							3	3					
	CO2	Ability to understand the complexity of basic operations like insert, delete, search on these data structures.		3	3					3	3					
	CO3	Ability to analyse and know the applications of algorithms for sorting, pattern matching etc				3			3			3	3			3
	CO4	Ability to choose a data structure to suitably model any data used in computer applications.				3							3			

Course Name	COs	CO Description	PO 1	2	3	4	5	6	Average mapping strength	PSO 1	2	3	4	5	6	Average mapping strength
Data Structures	CO5	Ability to assess efficiency trade-offs among different data structure implementations.					3						3	3		
	CO6	Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.						3							3	
Operating Systems: Theory & Lab (UGCMSCC06)	CO1	Understanding various functions, structures and history of operating systems and should be able to define objectives of modern operating systems and describe how operating	3							3						
	CO2	Describe the important computer system resources and the role of operating system in their management policies and algorithms.		3							3	3				
	CO3	Understanding of design issues, various process management concepts, scheduling, synchronization, and deadlocks associated with operating systems.		3							3	3				
	CO4	Understanding about multithreading, concepts of memory management including virtual memory, file system interface and implementation, disk management.			3				3	3	3					3
	CO5	Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to adapt to different operating systems.		3		3				3			3			
	CO6	Ability to categorise and identify potential threats to operating systems and will have the ability to explain the design criteria of the security features to guard against them.				3	3						3		3	
orks: Theory & Lab (UGCMSCC07)	CO1	Familiarize with contemporary issues in network technologies.	3							3						
	CO2	Know the layered model approach explained in OSI and TCP/IP network models and Identify different types of network devices and their functions within a network.	3							3						
	CO3	Understand the structure of Data Communications System and its components. Be familiarize with different network terminologies		3					3	3	3					3
	CO4	Learn and illustrate the basic routing mechanisms, IP addressing scheme and internetworking concepts			3								3	3		

Course Name	COs	CO Description	PO 1	2	3	4	5	6	Average mapping strength	PSO 1	2	3	4	5	6	Average mapping strength
Computer Netw	CO5	Able to analyse the IP and TCP Internet protocols.				3							3			
	CO6	Ability to understand and determine the major design issues of WAN, LAN and wireless networks, its network configuration and maintenance along with the fundamentals of network security.					3	3						3	3	
Semester IV																
Design and Analysis of Algorithms: Theory & Lab (UGCMSCC08)	CO1	Ability to define how to analyse algorithms and estimate their worst-case and average-case behaviour.	3						3	3						3
	CO2	Ability to understand good principles of algorithm design.		3						3	3					
	CO3	Ability to analyse and be accustomed to the description of algorithms in both functional and procedural styles.				3							3			
	CO4	Ability to apply their theoretical knowledge in practice and design algorithms for problem solving.						3						3		
Software Engineering: Theory & Lab (UGCMSCC09)	CO1	Ability to define and understand the analysis and design of complex software systems.	3	3					3	3	3					2.888889
	CO2	Ability to apply software engineering principles and techniques.			3						3	3				
	CO3	To manage time, processes and resources effectively by prioritising competing demands to achieve personal and team goals Identify and analyses the common threats in each domain.				3							3	3		
	CO4	Ability to work as an effective member or leader of software engineering teams.					3				2			3		
	CO5	Ability to develop efficient, reliable, robust and cost-effective software solutions.						3							3	
ems: Theory & Lab 0)	CO1	Ability to define the database systems and database management systems software, formulate, using SQL, solutions to a broad range of query and data update problems	3							3						
	CO2	Ability to understand the basics of transaction processing and concurrency control and understand the database storage structures and access techniques.		3						3	3					

Course Name	COs	CO Description	PO 1	2	3	4	5	6	Average mapping strength	PSO 1	2	3	4	5	6	Average mapping strength
Database Management System (UGCMSCC1)	CO3	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.			3				3			3				3
	CO4	Compare, contrast and analyse the various emerging technologies for database systems.				3						3	3			
	CO5	Analyse strengths and weaknesses of the applications of database technologies to various subject areas.				3							3			
	CO6	Ability to model data in applications using conceptual modelling tools such as ER Diagrams and design data base schemas based on the model.						3							3	
Semester V																
Internet Technologies: Theory & Lab (UGCMSCC11)	CO1	Ability to define the terms related to the Internet and how the Internet is changing the world	3							3						
	CO2	To understand how computers are connected to the Internet and demonstrate the ability to use the World Wide Web		3						3	3					
	CO3	Demonstrate the ability to make use of electronic mail and other internet based services.				3			3			3				3
	CO4	Compare and analyse the design principles of Web pages and how they are created.				3							3			
	CO5	To develop an ability to create basic Web pages with HTML				3									3	
y of Computation: Theory & Tutorial (UGCMSCC12)	CO1	To understand a formal connection between algorithmic problem solving and the theory of languages.		3						3						
	CO2	Ability to identify the practical view towards the applications of these ideas in the engineering part as well.		3					3		3					3
	CO3	Become proficient in key topics of theory of computation, and to have the opportunity to explore the current topics in this area.				3						3				

Course Name	COs	CO Description	PO 1	2	3	4	5	6	Average mapping strength	PSO 1	2	3	4	5	6	Average mapping strength
Theor...	CO4	Evaluate and develop by applying the theoretical knowledge into a mathematical (abstract) view towards algorithmic design and in general computation itself.					3							3		
		Semester VI														
Artificial Intelligence: Theory & Lab (UGCMSCC13)	CO1	Ability to explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.		3					3		3					3
	CO2	Explain the limitations of current Artificial Intelligence techniques.		3							3					
	CO3	Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.				3						3	3			
	CO4	Categorize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, etc)				3							3			
	CO5	Evaluate and implement basic AI algorithms (e.g., standard search or constraint propagation algorithms).					3						3			
	CO6	Design and perform an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.						3						3		
Computer Graphics: Theory & Lab (UGCMSCC14)	CO1	Ability to recall the concepts and relevant mathematics of computer graphics.	3							3						
	CO2	Ability to describe the importance of viewing and projections and define the fundamentals of animation and Virtual reality technologies		3					3	3	3					3
	CO3	Ability to apply various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.				3						3	3			
	CO4	Ability to design basic graphics application programs that display graphic images to given specifications.				3								3	3	
		Discipline Specific Elective Courses														

Course Name	COs	CO Description	PO						Average mapping strength	PSO						Average mapping strength
			1	2	3	4	5	6		1	2	3	4	5	6	
Microprocessor: Theory & Lab (UGCMSDSE01)	CO1	Ability to define the basic architecture, operation and applications of Microprocessor.	3						3	3						3
	CO2	Ability to understand interrupts as well as their usage in different hardware approaches.		3						3						
	CO3	Ability to analyse the basic architecture of upgraded microprocessor and their advantages over older versions.				3						3	3			
	CO4	Ability to evaluate different ways of communicating with internal and external I/O devices.					3						3			
Numerical Methods: Theory & Lab (UGCMSDSE02)	CO1	Understand the underlying mathematical formulations across various numerical analysis rules and methods.		3					3		3					3
	CO2	Categorize between Bisection method, Secant method, Regula−Falsi method, Newton−Raphson method and different approaches of respective methods.				3						3	3			
	CO3	Ability to choose appropriate algorithm for solving different problems.				3							3			
	CO4	Design and adapt existing approaches to suit applications.						3							3	
	CO5	Design and implementation of Computer Algebra Systems for real world applications.						3							3	
oud Computing: Theory & Lab (UGCMSDSE02)	CO1	Understanding of deploying applications over commercial cloud computing infrastructures.		3					3		3	3				3
	CO2	Compare the advantages and disadvantages of various cloud computing platforms				3							3			
	CO3	Analyse the trade-offs between deploying applications in the cloud and over the local infrastructure				3							3			
	CO4	Analyse the performance, scalability, availability of the underlying cloud technologies and software and also identify security and privacy issues in cloud computing				3							3			
	CO5	Explain recent research results in cloud computing and identify their pros and cons.					3							3	3	

Course Name	COs	CO Description	PO						Average mapping strength	PSO						Average mapping strength
			1	2	3	4	5	6		1	2	3	4	5	6	
CI	CO6	Design programs for applications in the cloud to solve real-world problem using cloud computing through group collaboration.						3						3		
Machine Learning: Theory & Lab (UGCMSDSE03)	CO1	Understand the underlying mathematical relationships across various machine learning algorithms.		3					3		3					3
	CO2	Categorize between supervised, unsupervised machine learning approaches				3						3	3			
	CO3	Ability to choose appropriate machine learning algorithm for solving a problem					3							3		
	CO4	Design and adapt existing machine learning algorithms to suit applications						3							3	
	CO5	Design and implement machine learning algorithms to real world applications						3							3	
Data Mining: Theory & Lab (UGCMSDSE04)	CO1	Understand the techniques of clustering, classification, association finding, feature selection and visualisation on real world data.	3	3					3		3					3
	CO2	Apply data mining concepts on real world data for analysis and development.		3								3				
	CO3	Ability to assess whether a real world problem has a data mining solution.					3							3		
	CO4	Ability to design a data mining process for an application, including data preparation, modelling and evaluation for research and development.						3							3	
Dissertation or Project work (UGCMSDSE05)	CO1	Understand project characteristics and various stages of a project		3					2.83		3					3
	CO2	Understand the conceptual clarity about project organization and feasibility analyses.		3							3					
	CO3	Apply sound technical knowledge of their selected project topic in real life application development.				2						3				
	CO4	Analyse the learning and understand techniques for project planning, scheduling and execution control					3						3			
	CO5	Explain recent research oriented development of their selected project topic						3						3		

Course Name	COs	CO Description	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Average mapping strength	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	Average mapping strength
	CO6	Ability to work in a team for well-planned design and development of futuristic applications.						3						3	3	
Computer Fundamentals: Theory & Lab& Lab (UGCMSGE01)	CO1	Understand the basics of computer hardware and how software interacts with computer hardware and the concepts of addressing modes.	3						3	3	3					2.75
	CO2	Apply logic gates and Boolean expression using Boolean algebra.		3								2				
	CO3	Analyse and design combinational and sequential circuit.				3							3			
Introduction to Database System: Theory & Lab (UGCMSGE02)	CO1	Ability to define the database systems and database management systems software, formulate, using SQL, solutions to a broad range of query and data update problems	3							3						
	CO2	Ability to understand the basics of transaction processing		3						3	3					
	CO3	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.			3				3			3				3
	CO4	Compare, contrast and analyse the various emerging technologies for database systems.				3						3	3			
	CO5	Analyse strengths and weaknesses of the applications of database technologies to various subject areas.				3							3			
	CO6	Ability to model data in applications using conceptual modelling tools such as ER Diagrams and design data base schemas based on the model.						3							3	
als using C/C++: Theory MSGE03)	CO1	Discuss, memorize and understand the different concept of C/C++ programming constructs and classes for code reuse.		3						3						
	CO2	Solve problems and propose algorithms, pseudo codes and flowcharts for it.				3						3	3			
	CO3	Identify real life problems and convert it to computational problems.			3						3	3				

Course Name	COs	CO Description	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Average mapping strength	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	Average mapping strength
Programming Fundamentals & Lab (UGC...	CO4	Apply the concepts of structural and object oriented programming such as loops, functions, structure, class, inheritance, friend functions, and virtual functions to develop programs for problem solving.			3				3			3				3
	CO5	Analyse and Compare approaches to model efficient and standard programs.				3	3						3			
	CO6	Evaluate, design, compile, run and debug programs for software development.				3								3	3	
Programming In Python: Theory & Lab (UGCMSGE04)	CO1	Define algorithms and to draw flowcharts for program writing.	3							3						
	CO2	Ability to show the installation and running of the Python interpreter	3								3					
	CO3	Understand the Numbers, Math functions, Strings, List, Tuples, Dictionaries and operators in Python		3					3		3					2.833333
	CO4	Understand and summarize different File handling operations and packages		3							3					
	CO5	Apply different decision making statements and loops, different functions and modules			3								2			
	CO6	Design programs using Python for problem solving					3						3			
English Communication (UGCMSAECC01)	CO1	Recall English Phonetic Symbols and demonstrate their use with emphasis on various scientific terms.		3						3						
	CO2	Utilize various processes of communication		3							3					
	CO3	Compare and analyze dialogue, group discussion, presentation, interview techniques					3		3		2					2.8
	CO4	Judge different techniques of reading and writing skills.					3	3				3				
	CO5	Develop the skill to create original write up in the form of report, proposal, paragraph, review etc.				3	3							3		
Environmental Science MSAECC02	CO1	Define and demonstrate the concept, components and function of natural resources and ecosystems.	3							3						
	CO2	Define, illustrate and analyse the cause, effects and control measures of various environmental pollutants.			2				2.6	3						2.6
	CO3	Demonstrate the basic idea about the disasters and its management.		3							3					

Course Name	COs	CO Description	PO 1	2	3	4	5	6	Average mapping strength	PSO 1	2	3	4	5	6	Average mapping strength
Environ (UGC	CO4	Illustrate and apply the knowledge about the social, environmental issues and environmental legislation.				3							2			
	CO5	Define, demonstrate and evaluate the impact of human population on the Environment						2						2		
Value Education and Indian Culture (UGCMSAECC02)	CO1	Define, demonstrate and apply the daily routine, self-evaluation & Integral Personality Development	3						2.86	3						2.86
	CO2	Demonstrate, and apply the Power of thoughts & the Science of Peace			3						3	3				
	CO3	Demonstrate the relation between Values and enlightened citizenship			3									2		
	CO4	Discuss the awareness about the Indian Practice and Culture				3							3			
	CO5	Demonstrate and practice the Four Yogas						2			3					
	CO6	Explain and analyse the idea about Modern India: her hopes, challenges and Swami Vivekananda				3		3					3			
		Grand Average							2.97							2.95