Galgotias College of Engineering and Technology, Greater Noida

Statements of Course Outcomes (COs) and Mapping with Program Outcomes (POs) : Dept. of MCA : 2022-23

BKL # K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

S. No.	Sub Code	COx	Statement of Course Outcomes (COs)	Kx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
			Statement of Course Outcomes (COs) Upon completion of topic concerned, students will be able to :	Blooms Knowledge Level	Engineering knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	Professional Ethics	Life Long LEarning	Project Management and Finance	Communications Efficacy	Societal and Environmental Concern	Individual and Team Work	Innovation and Entrepreneurship
1	KCA101	CO-1	Demonstrate the knowledge of the basic structure, components, features and generations of computers.	K1,K2	3	3	-	-	-		3					2
		CO-2	Describe the concept of computer languages, language translators and construct algorithms to solve problems using programm	K2, K3	3	3	-	-	-		3					1
		CO-3	Compare and contrast features, functioning & types of operating system and computer networks.	K4	3	3	-	-	-		3					2
		CO-4	Demonstrate architecture, functioning & services of the Internet and basics of multimedia.	K2	3	3	-	-	2		3			3	3	3
		CO-5	Illustrate the emerging trends and technologies in the field of Information Technology	K1. K2	3	3	1	-	2		3			3	3	3
			KCA101 (average)		**3**	**3**	**1**		**2**		**3**			**3**	**3**	**2**
2	KCA102	CO-1	Describe the functional components and fundamental concepts of a digital computer system including number systems.	K1,K2	3	2										
		CO-2	Construct flowchart and write algorithms for solving basic problems.	K2,K3		3	2			1						
		CO-3	Write 'C' programs that incorporate use of variables, operators and expressions along with data types.	K2,K3		3	2	2								
		CO-4	Write simple programs using the basic elements like control statements, functions, arrays and strings.	K2,K3		3	3	2								
		CO-5	Write advanced programs using the concepts of pointers, structures, unions and enumerated data types.	K2,K3		3	2	3								
			KCA102 (average)			3	3	3		1						
3	KCA103	CO-1	Describe primary features, processes and principles of management.	K1, K2		3	2	2			-	3	3	-	1	3
		CO-2	Explain functions of management in terms of planning, decision making and organizing.	K3, K4		3	2	2			2	3	3	-	2	3
		CO-3	Illustrate key factors of leadership skill in directing and controlling business resources and processes.	K5, K6		3	3	3			1	2	2	2	3	3
		CO-4	Exhibit adequate verbal and non-verbal communication skills	K1, K3		3	2	3			-	3	2	3	-	3
		CO-5	Demonstrate effective discussion, presentation and writing skills	K3, K5		3	2	3			-	3	3	3	-	3
			KCA103 (average)			3	2	3			2	3	3	3	**2**	**3**
4	KCA104	CO-1	Use mathematical and logical notation to define and formally reason about basic discrete structures such asSets, Relations and	K1,K2	2	2	2	2	-	-	-	-	-	-	-	3
		CO-2	Apply mathematical arguments using logical connectives and quantifiers to check the validity of an argumentthrough truth tab	K2,K3	2	2	2	2	-	-	-	-	-	-	-	3
		CO-3	Identify and prove properties of Algebraic Structures like Groups, Rings and Field	K3, K4	2	2	2	2	-	-	-	-	-	-	-	3
		CO-4	Formulate and solve recurrences and recursive functions.	K3, K4	2	2	2	2	-	-	-	-	-	-	-	3
		CO-5	Apply the concept of combinatorics to solve basic problems in discrete mathematics	K1, K3	2	2	2	2	-	-	-	-	-	-	-	3
			KCA104 (average)		2	2	2	2	-	-	-	-	-	-	-	**3**
5	KCA105	CO-1	Describe functional units of digital system and explain how arithmetic and logical operations are performed by computer	K2, K3	3	3	3	3	3	1	-	-	-	-	-	1
		CO-2	Describe the operations of control unit and write sequence of instructions for carrying out simple operation using various add	K2, K4	2	2	3	3	2	1	-	-	-	-	-	1
		CO-3	Design various types of memory and its organization.	K3	2	3	3	3	3	1	-	-	-	-	-	1
		CO-4	Describe the various modes in which IO devices communicate with CPU and memory	K2, K3	2	3	3	1	3	1	-	-	-	-	-	1
		CO-5	List the criteria for classification of parallel computer and describe various architectural schemes.	K1, K2	3	2	2	1	2	1	-	-	-	-	-	1
			(average)		3	3	3	2	3	1	-	-	-	-	-	1
6	KCA151	CO-1	Write, compile, debug and execute programs in a C programming		3	3	3	3	3	1	-	-	-	-	-	1
		CO-2	Write programs that incorporate use of variables, operators		2	2	3	3	2	1	-	-	-	-	-	1
		CO-3	Write programs for solving problems involving use of decision control structures and loops.		2	3	3	3	3	1	-	-	-	-	-	1
		CO-4	Write programs that involve the use of arrays, structures and user		2	3	3	1	3	1	-	-	-	-	-	1
		CO-5	Write programs using graphics and file handling operations		3	2	2	1	2	1	-	-	-	-	-	1
			KCA151 (average)		3	3	3	2	3	1	-	-	-	-	-	1

7	KCA152	CO-1	Design and verify combinational circuits (adder, code converter, decoder, multiplexer) using basic gates.	K6	3	3	-	-	-	-	-	3	3	3	-	3
		CO-2	Design and verify various flip-flops.	K3	3	2	-	-	-	-	-	3	3	3	-	3
		CO-3	Design I/O system and ALU.	K3	2	3	-	-	-	-	-	3	3	3	-	3
		CO-4	Demonstrate combinational circuit using simulator	K2	3	2	-	-	-	-	-	3	3	3	-	3
		CO-5			3	3	-	-	-	-	-	3	3	3	-	3
		KCA152 (average)			3	3	-	-	-	-	-	3	3	3	-	3
8	KCA153	CO-1	Develop the ability to work as a team member as an integral activity in the workplace.	K3	-	-	-	1	1	2	2	2	3	3	1	1
		CO-2	Increase confidence in their ability to read, comprehend, organize, and retain written information. Improve reading fluency.	K4	-	-	-	1	1	2	1	2	2	3	1	1
		CO-3	Write coherent speech outlines that demonstrate their ability to use organizational formats with a specific purpose; Deliver ef	K5, K6	-	-	-	1	1	2	1	1	3	3	2	2
		CO-4	Develop proper listening skills; articulate and enunciate words and sentences clearly and efficiently	K3	-	-	-	1	1	1	1	2	2	3	-	1
		CO-5	Show confidence and clarity in public speaking projects; be schooledin preparation and research skills for oral presentations.	K5, K6	-	-	-	1	1	1	2	2	2	3	1	2
		KCA153 (average)						1	1	1	2	2	3	1	1	2
9	KCA201	CO-1	Define various types of automata for different classes of formal languages and explain their working.	K1, K2	-	-	-									
		CO-2	State and prove key properties of formal languages and automata.	K1,K3	-	-	-									
		CO-3	Construct appropriate formal notations (such as grammars, acceptors, transducers and regular expressions) for given formal	K3,K4	-	-	-									
		CO-4	Convert among equivalent notations for formal languages	K3	-	-	-									
		CO-5	Explain the significance of the Universal Turing machine, ChurchTuring thesis and concept of Undecidability.	K2	-	-	-									
		KCA201 (average)								-	-	-	-	-	-	2
10	KCA202	CO-1	List the significance and key features of object oriented programming and modeling using UML	K4	3	1	3	2	1	-	-	-	-	-	-	2
		CO-2	Construct basic structural, behavioral and architectural models using object oriented software engineering approach.	K6	3	1	3	2	-	-	-	-	-	-	-	2
		CO-3	Integrate object oriented modeling techniques for analysis and design of a system.	K4, K5	3	1	3	2	1	-	-	-	-	-	-	2
		CO-4	Use the basic features of data abstraction and encapsulation in C++ programs.	K4	3	1	3	2	1	-	-	-	-	-	-	2
		CO-5	Use the advanced features such as Inheritance, polymorphism and virtual function in C++ programs.	K3, K4	3	2	3	2	2	-	-	-	-	-	-	2
		KCA202 (average)			3	1	3	2	1	-	-	-	-	-	-	2
11	KCA203	CO-1	Explain main components, services, types and structure of Operating Systems.	K2	3	3	2	3	2			2		3		2
		CO-2	Apply the various algorithms and techniques to handle the various concurrency control issues	K3	3	2	3	3	2			1		2		3
		CO-3	Compare and apply various CPU scheduling algorithms for process execution	K2	3	3	2	3	3			3		3		2
		CO-4	Identify occurrence of deadlock and describe ways to handle it	K3	2	2	2	2	2			2		2		2
		CO-5	Explain and apply various memory, I/O and disk management techniques	K5	2	2	3	2	3			3		1		2
		KCA203			3	2	2	3	2			2		2		**2**
12	KCA204	CO-1	Describe the features of a database system and its application and compare various types of data models.	K2	3	3	2	3	2			2		3		2
		CO-2	Construct an ER Model for a given problem and transform it into a relation database schema	K5,K6	3	2	3	3	2			1		2		3
		CO-3	Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus	K5,K6	3	3	2	3	3			3		3		2
		CO-4	Explain the need of normalization and normalize a given relation to the desired normalform	K2,K3	2	2	2	2	2			2		2		2
		CO-5	Explain different approaches of transaction processing and concurrency control.	K2	2	2	3	2	3			3		1		2
		KCA204 (average)			**3**	**2**	**2**	**3**	**2**			**2**		**2**		**2**
13	KCA205	CO-1	Explain the concept of data structure, abstract data types, algorithms, analysis of algorithms and basic data organization schen	K2	3	1	3	2	1							2
		CO-2	Describe the applications of stacks and queues and implement various operations on them using arrays and linked lists.	K3	3	1	3	2	1							2
		CO-3	Describe the properties of graphs and trees and implement various operations such as searching and traversal on them.	K3	3	1	3	2	1							2
		CO-4	Compare incremental and divide-and-conquer approaches of designing algorithms for problems such as sorting and searching	K4	3	1	3	2	1							2
		CO-5	Apply and analyze various design approaches such as Divide-and-Conquer, greedy and dynamic for problem solving .	K4	3	1	3	2	1							2
		KCA205 (average)			3	1	3	2	1							2
14	KCA251	CO-1	Use the Concept of Data Abstraction and Encapsulation in C++ programs.	K3	3	3	3	-	-	-	-	-	-	-	-	2
		CO-2	Design and Develop C++ program using the concept such as polymorphism, virtual function, exception handling and template	K3	3	3	3	3	-	-	-	-	-	-	-	2
		CO-3	Apply object oriented techniques to analyze, design and develop a complete solution for a given problem.	K3	3	3	3	-	-	-	-	-	-	-	-	2
		KCA251			**3**	**3**	**3**	**3**								**2**
15	KCA252	CO-1	Use the Concept of Data Abstraction and Encapsulation in C++ programs	k6	3	3	2	1	2	2	2	1	3	3	1	3
		CO-2	Write SQL commands to query a database.	k3	3	3	3	3	3	2	1	2	3	3	3	2
		CO-3	Write PL/SQL programs for implementing stored procedures, stored functions, cursors, trigger and packages.	k6	3	3	3	3	3	1	1	1	3	3	2	2
		KCA252			3	3	3	2	3	2	1	1	3	3	2	3
16	KCA253	CO-1	Write and execute programs to implement various searching and sorting algorithms.	K3	2	2	2	2	2	-	-	-	-	-	-	3
		CO-2	Write and execute programs to implement various operations on two-dimensional arrays.	K3	3	3	3	3	2	-	-	-	-	-	-	3
		CO-3	Implement various operations of Stacks and Queues using both arrays and linked lists data structures.	K3	3	3	3	3	2	-	-	-	-	-	-	3
		CO-4	Implement graph algorithm to solve the problem of minimum spanning tree	K3	3	3	3	3	2	-	-	-	-	-	-	3
		KCA253		AVG	3	2.8	2.8	2.8	2	-	-	-	-	-	-	3
17	KCA301	CO-1	Define the meaning of intelligence and study various intelligent agents. K1	K1	3	3	2	3	2			2		3		2
		CO-2	Understand, analyze and apply AI searching algorithms in different problem domains	K2,K3,K4	3	2	3	3	2			1		2		3
		CO-3	Study and analyze various models for knowledge representation.	K1,K3	3	3	2	3	3			3		3		2
		CO-4	Understand the basic concepts of machine learning to analyze and implement widely used learning methods and algorithms.	K2,K4,K6	2	2	2	2	2			2		2		2
		CO-5	Understand the concept of pattern recognition and evaluate various classification and clustering techniques	K2,K5	2	2	3	2	3			3		1		2
		KCA301			**3**	**2**	**2**	**3**	**2**			**2**		**2**		**2**

18	KCA302	CO-1	Explain various software characteristics and analyze different software Development Models.	K1,K2	3	3	2										2
		CO-2	Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development m	K1,K2	3	3	2										2
		CO-3	Compare and contrast various methods for software design.	K2,K3	3	3	2										2
		CO-4	Formulate testing strategy for software systems, employ techniques such as unit testing, Test driven development and functior	K3	3	3	2										2
		CO-5	Manage software development process independently as well as in teams and make use of various software management tools	K5	3	2	2										3
		KCA302			3	3	2										2
19	KCA303	CO-1	Describe communication models TCP/IP, ISO-OSI model, network topologies along with communicating devices and connec	K1,K2	3	3	2	3	2			2		3		2
		CO-2	Apply knowledge of error detection, correction and learn concepts of flow control along with error control.	K2	3	2	3	3	2			1		2		3
		CO-3	Classify various IP addressing techniques, subnetting along with network routing protocols and algorithms.	K4	3	3	2	3	3			3		3		2
		CO-4	Understand various transport layer protocols and their design considerations along with congestion control to maintain Qualit	K3	2	2	2	2	2			2		2		2
		CO-5	Understand applications-layer protocols and elementary standards of cryptography and network security.	K2, K3	2	2	3	2	3			3		1		2
		KCA303 (Computer Network)		**AVG.**	**3**	**2**	**2**	**3**	**2**			**2**		**2**		**2**
20	KCA012	CO-1	Demonstrate knowledge of Data Warehouse and its components	K1,K2	3	3	3	-	-	-	-	-	-	-	-	2
		CO-2	Discuss the process of Warehouse Planning and Implementation.	K2	3	3	3	3	-	-	-	-	-	-	-	2
		CO-3	Discuss and implement various supervised and Non supervised learning algorithms on data.	K4	3	3	3	-	-	-	-	-	-	-	-	2
		CO-4	Explain the various process of Data Mining and decide best according to type of data.	K3	3	3	3	3	3	-	-	-	-	-	-	2
		CO-5	Explain process of knowledge discovery in database (KDD). Design Data Mining model.	K2, K3	3	2	3	-	-	-	-	-	-	-	-	3
		Elective -1 KCA012 (DWDM)			3	3	3	1	1	-	-	-	-	-	-	2
21	KCA021	CO-1	Apply the knowledge of HTML and CSS to develop web application and	K1,K2	3	3	2	3	2			2		3		2
		CO-2	analyze the insights of internet programming to implement complete	K2	3	2	3	3	2			1		2		3
		CO-3	Understand, analyze and build dynamic web applications using servlet and JSP.	K4	3	3	2	3	3			3		3		2
		CO-4	Develop Spring-based Java applications using Java configuration, XML configuration, annotation-based configuration, bea	K3	2	2	2	2	2			2		2		2
		CO-5	Develop web application using Spring Boot and RESTful Web Services	K2, K3	2	2	3	2	3			3		1		2
		KCA021 (web Tecnoology)		**AVG.**	**3**	**2**	**2**	**3**	**2**			**2**		**2**		**2**
22	KCA022	CO-1	Demonstrate knowledge of Big Data Analytics concepts and its applications in business	K1,K2	3	1	3	2	1	-	-	-	-	-	-	2
		CO-2	Demonstrate functions and components of Map Reduce Framework and HDFS.	K1,K2		1	3	2	-	-	-	-	-	-	-	2
		CO-3	Develop queries in NoSQL environment	K6	3	1	3	2	1	-	-	-	-	-	-	2
		CO-4	Explain process of developing Map Reduce based distributed processing applications.	K2,K5	3	1	3	2	1	-	-	-	-	-	-	2
		CO-5	Explain process of developing applications using HBASE, Hive, Pig etc	K2, K5	3	2	3	2	2	-	-	-	-	-	-	2
		KCA022			3	1	3	2	1							**2**
23	KCA351	CO-1	Study and understand AI tools such as Python / MATLAB.	K1,K2	3	3	-	-	-	-	-	3	3	3	-	3
		CO-2	Apply AI tools to analyze and solve common AI problems	K3,K4	3	3	-	-	-	-	-	3	3	3	-	3
		CO-3	Implement and compare various AI searching algorithms.	K6	3	3	-	-	-	-	-	3	3	3	-	3
		CO-4	Implement and compare various AI searching algorithms	K6	3	3	-	-	-	-	-	3	3	3	-	3
		CO-5	Implement various classification and clustering techniques	K6	3	3	-	-	-	-	-	3	3	3	-	3
		KCA351			3	3	-	-	-	-	-	3	3	3	-	3
24	KCA352	CO-1	Identify ambiguities, inconsistencies and incompleteness from a requirements specification and state functional and non-funct	K2, K4	3	3	-	-	-	-	-	3	3	3	-	3
		CO-2	Identify different actors and use cases from a given problem statement and draw use case diagram to associate use cases with	K3, K5	3	3	-	-	-	-	-	3	3	3	-	3
		CO-3	Draw a class diagram after identifying classes and association among them.	K4, K5	3	3	-	-	-	-	-	3	3	3	-	3
		CO-4	Graphically represent various UML diagrams and associations among them and identify the logical sequence of activities und	K4, K5	3	3	-	-	-	-	-	3	3	3	-	3
		CO-5	Able to use modern engineering tools for specification, design, implementation and testing.	K3, K4	3	3	-	-	-	-	-	3	3	3	-	3
		KCA352			3	3	-	-	-	-	-	3	3	3	-	3
25	KCA353	CO-1	Able to develop a design solution, test and validate the conformance of the developed prototype against the original	K2. K3	2	3	2	1	2	2	2	1	3	3	1	3
		CO-2	Work as a responsible member and possibly a leader of a team in developing software solutions	K2, K3	3	3	3	3	3	2	1	2	3	3	3	2
		CO-3	Self learn new tools, algorithms, and/or techniques that contribute to the software solution of the project	K1, K2, K3	3	3	3	3	3	1	1	1	3	3	2	2
		KCA353			**3**	**3**	**3**	**2**	**3**	**2**	**1**	**1**	**3**	**3**	**2**	**3**
26	KCA032	CO-1	Recognize the need of soft computing and study basic concepts and techniques of soft computing.	K1, K2	3	3	2	2	2	-	2	-	-	-	2	3
		CO-2	Understand the basic concepts of artificial neural network to analyze widely used neural networks	K2, K4	3	3	2	2	2	-	2	-	-	-	2	2
		CO-3	Apply fuzzy logic to handle uncertainty in various real-world problems	K3	3	3	3	2	3	-	2	-	-	-	3	3
		CO-4	Study various paradigms of evolutionary computing and evaluate genetic algorithm in solving optimization problems	K1, K5	3	3	3	3	2	-	2	-	-	-	3	2
		CO-5	Apply hybrid techniques in applications of soft computing	K3	3	3	3	3	3	-	2	-	-	-	3	3
		KCA032			**3**	**3**	**3**	**2**	**2**		**2**				**3**	**3**
27	KCA035	CO-1	Understand basic concepts of Software Quality along with its documents and process	K2	3	3	2	3	2			2		3		2
		CO-2	Apply knowledge of Software Quality in various types of software	K3	3	2	3	3	2			1		2		3
		CO-3	Compare the various reliability models for different scenarios	K4	3	3	2	3	3			3		3		2
		CO-4	Illustrate the software Quality Planning and Assurance	K2	2	2	2	2	2			2		2		2
		CO-5	Make use of various testing techniques in software implementation	K3	2	2	3	2	3			3		1		2
		KCA035			3	2	2	3	2			2		2		2

28	KCA043	CO-1	Demonstrate basic concepts, principles and challenges in IoT.	K1,K2	2	2												
		CO-2	Illustrate functioning of hardware devices and sensors used for IoT.	K2	2	2	1	2	2		2	2			2	
		CO-3	Analyze network communication aspects and protocols used in IoT.	K4	3	2	2	3	3			2			3	
		CO-4	Apply IoT for developing real life applications using Ardunio programming.	K3	3	3	3	3	2			2			3	3
		CO-5	To develop IoT infrastructure for popular applications	K2, K3	2		2		2		2				2	2
		KCA043 Internet of Things (IoT)		**AVG.**	**2**	**2**	**2**	**3**	**2**		**2**	**2**			**3**	**3**
29	KCA045	CO-1	Understand theoretical and practical aspects of distributed database systems.	K2	2								3	3		
		CO-2	Study and identify various issues related to the development of distributed database system	K3	2	2			2		2		3			
		CO-3	Understand the design aspects of object-oriented database system and related development K4	K4	2		2	2	2				3			
		C0-4	Equip students with principles and knowledge of distributed reliability.	K3	2								3	3		
		CO-5	Equip students with principles and knowledge of parallel and object-oriented databases.	K5	2		2	2	2				3			
		KCA045			2	2	2	2	2		2		3	3		
30	KCA051	CO-1	Study and aware fundamentals of mobile computing.	K1, K2	2	3										
		CO-2	Study and analyze wireless networking protocols, applications and environment.	K1, K4	3	2	1	2	3		3	2			2	
		CO-3	Understand various data management issues in mobile computing.	K2	3	2	2	2	3			2			3	
		CO-4	Analyze different type of security issues in mobile computing environment.	K4	3	3	3	3	2			2			3	3
		CO-5	Study, analyze, and evaluate various routing protocols used in mobile computing.	K1, K4, K5	2		2		2		2				2	2
		KCA051			**3**	**3**	**2**	**2**	**3**		**3**	**2**			**3**	**3**
31	KCA054	CO-1	To understand the need for machine learning for various problem solving	K1 , K2	3	3	3	-	-	-	-	-	-	-	-	2
		CO-2	To understand a wide variety of learning algorithms and how to evaluate models generated from data	K1 , K3	3	3	3	3	-	-	-	-	-	-	-	2
		CO-3	To understand the latest trends in machine learning	K2 , K3	3	3	3	-	-	-	-	-	-	-	-	2
		CO-4	To design appropriate machine learning algorithms and apply the algorithms to a real-world problem	K4 , K6	3	3	3	3	3	-	-	-	-	-	-	2
		CO-5	To optimize the models learned and report on the expected accuracy that can be achieved by applying the models	K4, K5	3	2	3	-	-	-	-	-	-	-	-	3
		KCA054			3	3	3	1	1	-	-	-	-	-	-	2
					3	3	3	2	3	2	1	1	3	3	2	3