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Supporting Documents-
Department of Computer Science &
Engineering

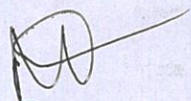
**Mapping of Courses to Employability/ Skill
Development**



I.K. Gujral Punjab Technical University, Kapurthala (Main Campus)
Department of Computer Science & Engineering

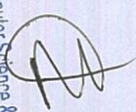
B. Tech CSE

3rd Sem


HOD
Department of Computer Science & Engineering
IKG PTU Main Campus
Kapurthala

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/analyse/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	For a given algorithm student will be able to analyze the algorithms to determine the time and computation complexity and justify the correctness.	3	3	2	3	2	3	0	0	0	0	1	3	3	3	1	0	Analyze	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Student will be able to handle operation like searching, insertion, deletion, traversing on various Data Structures and determine time and computational complexity	3	3	2	2	1	2	0	0	1	0	1	3	3	3	1	0	Analyze	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Student will be able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.	3	3	3	3	1	1	0	0	1	0	1	3	3	3	1	0	design	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Students will be able to choose appropriate Data Structure as applied to specific problem definition	3	3	3	3	2	2	0	0	3	0	3	3	3	3	1	0	Apply	Employability	
CO5	Demonstrate the reusability of Data Structures for implementing complex iterative problems	3	3	3	3	2	2	0	0	3	0	3	3	3	3	1	0	Demonstrate	Employability	

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CO No.	CO Statements (UC-BTEC-502-18: Digital Signal Processing)	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Honing Domain Knowledge	Innovation and design	Entrepreneurship Skills	Ethical values	Learning Level(understand/analyze/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Identify classes, objects, members of a class and the relationships among them needed to solve a specific problem operators	3	3	3	3	2	3	0	0	0	0	1	3	3	3	1	0	Identify	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Demonstrate the concept of constructors and destructors. And create new definitions for some of the operators	3	3	3	3	1	2	0	0	1	0	1	3	3	3	1	0	Demonstrate	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Create function templates, overload function templates	3	3	3	3	1	1	0	0	1	0	1	3	3	3	1	0	Apply	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Understand and demonstrate the concept of data encapsulation, inheritance, polymorphism with virtual functions	3	3	3	3	2	2	0	0	3	0	3	3	3	3	1	0	Understand	Employability	
CO5	Demonstrate the concept of file operations, streams in C++ and various I/O manipulators	3	3	3	3	2	2	0	0	3	0	3	3	3	3	1	0	Demonstrate	Employability	

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understanda nalyse/ deisgn etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Improve practical skills in designing and implementing basic linear data structure algorithms	3	3	3	3	2	3	0	0	0	0	1	3	3	3	1	0	Apply	Skill Development	MST's, ESE, Class/Quiz Tests
CO2	Improve practical skills in designing and implementing Non-linear data structure algorithms.	3	3	3	3	1	2	0	0	1	0	1	3	3	3	1	0	design	Skill Development	MST's, ESE, Class/Quiz Tests
CO3	Use Linear and Non-Linear data structures to solve relevant problems.	3	3	3	3	1	1	0	0	1	0	1	3	3	3	1	0	Implement	Skill Development	MST's, ESE, Class/Quiz Tests
CO4	Choose appropriate Data Structure as applied to specific problem definition.	3	3	3	3	2	2	0	0	3	0	3	3	3	3	1	0	Apply	Skill Development	
CO5	Implement Various searching algorithms and become familiar with their design methods	3	3	3	3	2	2	0	0	3	0	3	3	3	3	1	0	Implement	Skill Development	

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B. Tech CSE

4th Sem



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CO No.	CO Statements (UC-BTES-401-18: Computer Organisation and Architecture)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understand/ analyse/ design etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Understand functional block diagram of microprocessor	3	1	2	2	2	1			1	1		3	3		1		Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Apply instruction set for Writing assembly language programs	3	2	3	3	2		1		3	2	2	3	3	1	3	1	Apply	Employability	
CO3	Design a memory module and analyze its operation by interfacing with the CPU.	3	3	3	3	2				3	2	1	3	3	3	2		Design	Employability	
CO4	Classify hardwired and microprogrammed control units	3	1	2	2	3	1	1		1		1	3	3	1	1	1	Apply	Employability	
CO5	Understand the concept of pipelining and its performance metrics	3	3	3	3	3	1		1	3	2	1	3	3	2	3	1	Understand	Employability	

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Department Computer Science and Engineering

Program : B.Tech. (Computer Science and Engineering)

S(401-18) : Discrete Mathematics

CO No.	CO Statements (UC-BTEC Processing)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	To be able to express logical sentence in terms of predicates, quantifiers, and logical connectives	3	3	3	2		1	1		1				2				Understand	Employability	MST's, ESE, Class/Quiz Tests
CO2	To derive the solution for a given problem using deductive logic and prove the solution based on logical inference	3	3	3	3		1			2			1	2				Design	Employability	MST's, ESE, Class/Quiz Tests
CO3	For a given a mathematical problem, classify its algebraic structure	3	3	3	2					1				1	1			Design	Employability	MST's, ESE, Class/Quiz Tests
CO4	To evaluate Boolean functions and simplify expressions using the properties of Boolean algebra	3	3	3	3		2			2	2	1	1	1				Design	Employability	MST's, ESE, Class/Quiz Tests
CO5	To develop the given problem as graph networks and solve with techniques of graph theory.	3	3	3	3	1	2	1	1	2	2	2	2	2	2	2	1	Design	Employability	MST's, ESE, Class/Quiz Tests

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CO No.	CO Statements (U/C-BTEC-502-18: Digital Signal Processing)	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Honing Domain Knowledge	Innovation and design	Entrepreneurship Skills	Ethical values	Learning Level (understand/analyse/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Explain basic operating system concepts such as overall architecture, system calls, user mode and kernel mode.	3	2	2	1	1	2	1	2	2	1	1	2	2	2			Understand	Employability	MST's, ESE, Class/Quiz Tests
CO2	Distinguish concepts related to processes, threads, process scheduling, race conditions and critical sections.	3	3	3	3	3	2	2	1	2	2	2	3	3	3	2	1	Design	Entrepreneurship/ Skill Development	MST's, ESE, Class/Quiz Tests
CO3	Analyze and apply CPU scheduling algorithms, deadlock detection and prevention algorithms.	3	3	3	3	3	3	2	1	2	2	2	3	3	3	2	1	Design	Skill Development/ Entrepreneurship	MST's, ESE, Class/Quiz Tests
CO4	Examine and categorize various memory management techniques like caching, paging, segmentation, virtual memory, and thrashing.	3	3	3	3	3	3	1		2	2	2	3	3	2			Analyse	Entrepreneurship	MST's, ESE, Class/Quiz Tests
CO5	Design and implement file management system.	3	3	3	3	3	3	2		2	2	2	3	3	3	2		Design	Entrepreneurship	MST's, ESE, Class/Quiz Tests
CO6	Appraise high-level operating systems concepts such as file systems, disk-scheduling algorithms and various file systems.	3	3	3	3	3	3	2	1	2	2	2	3	3	3	3	1	Understand	Entrepreneurship	MST's, ESE, Class/Quiz Tests

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms	3	3	1	3									3	2			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Explain when an algorithmic design situation calls for which design paradigm (greedy/ divide and conquer/backtrack etc.	3	3	3	3									3	2			Analyse	Employability	
CO3	Explain model for a given engineering problem, using tree or graph, and write the corresponding algorithm to solve the problems	3	3	3	3	1	1							3	2			Analyse	Employability	
CO4	Demonstrate the ways to analyze approximation/randomized algorithms	3	3	3	3	2	1							3	2			Design	Employability	
CO5	Examine the necessity for NP class based problems and explain the use of heuristic techniques	3	3	3	3	2	2						2	3	2			Design	Employability	

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CO No.	CO Statements (UC-BTES-402-18: Computer Organisation and Architecture Lab)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand / analyse/ design etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Assemble personal computer	3	2	2	3	2	2	2	1	3	1	1	3	3	1	2	1	Understand	Skill development Tests	MSTs, ESE, Class/Quiz Tests
CO2	Implement the various assembly language problems for basic arithmetic and logical operations	3	3	3	3	2	1		3	2	3	3	3	3	1	1		Implement	Skill development Tests	MSTs, ESE, Class/Quiz Tests
CO3	Demonstrate the functioning of microprocessor/ microcontroller based systems with I/O interface	3	1	3	3	1	1		2	2	3	3	3	3	2	3	1	Demonstrate	Skill development Tests	MSTs, ESE, Class/Quiz Tests

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CO No.	CO Statements (UC-BTEC-502-18: Digital Signal Processing)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understand/analyse/design etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Understand and implement basic services and functionalities of the operating system;	3	3	3	3	3	2	2	3	3	2	3	3	3	3	2		Understand	Employability	MSTs, ESE, Practical Assignments Tests
CO2	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority;	3	3	3	3	3	3	3	1	3	3	3	3	3	3	3	1	Analyse	Entrepreneurship/ Skill development	MSTs, ESE, Practical Assignments Tests
CO3	Implement commands for files and directories;	3	3	3	3	3	2	2	2	2	2	2	2	3	3	2		Design	Entrepreneurship/ Skill development	MSTs, ESE, Practical Assignments Tests
CO4	Understand and implement the concepts of shell programming;	3	2	3	2	3	3	3		2	3	2	3	3	3	2		Understand & Design	Entrepreneurship/ Skill development	MSTs, ESE, Practical Assignments Tests
CO5	Simulate file allocation and organization techniques;	3	3	3	3	3	2	2		3	2	2	2	2	2	2		Understand & Design	Entrepreneurship/ Skill development	MSTs, ESE, Practical Assignments Tests
CO6	Understand the concepts of deadlock in operating systems and implement them in multiprogramming system.	3	3	3	3	3	3	3	1	3	3	3	3	3	3	3	1	Design	Entrepreneurship/ Skill development	MSTs, ESE, Practical Assignments Tests

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Department Computer Science and Engineering
Program : B.Tech. (Computer Science and Engineering)
BTCS : (DAA,Lab)

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ deisgn etc)	Focus on Skill Development/Em ployability	Assessment Tools to Measure Attainment of CO
CO1	Design and implement complex problems with different techniques	3	3	3	3	3	2			2				3	3			design	Skill Development/Em ployability	MST's, ESE, Class/Quiz Tests
CO2	Understand comparative performance of strategies and hence choose appropriate, to apply to specific problem definition;	3	3	3	3	3	2			2				3	3			understand	Skill Development/Em ployability	
CO3	Implement Various tree and graph based algorithms and become familiar with their design methods;	3	3	3	2	3	1							3	1	2		Apply	Skill Development/Em ployability	
CO4	Design and Implement heuristics for real world problems.	3	3	3	3	3	2							3	3	2		Design	Skill Development/Em ployability	

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B. Tech CSE

5th Sem

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B. Tech C

5th Sem

CO No.	CO Statements (UC-BTCS-501-18: Database Management System)	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Honing Domain Knowledge	Innovation and design	Entrepreneurship Skills	Ethical values	Learning Level (understand/ analyse/ deisgn etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	write relational algebra expressions for a query and optimize the Developed expressions	1	3	3	2	0	0	0	0	3	3	2	2	3	2	1	0	understand	employability	MSTs, ESE, Class/Quiz Tests
CO2	design the databses using ER method and normalization.	1	3	3	2	2	1	1	1	3	3	2	2	3	3	3	1	Analyse	entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO3	construct the SQL queries for Open source and Commercial DBMS-MYSQL, ORACLE, and DB2.	1	2	2	2	2	1	1	1	2	2	2	2	3	2	3	1	design	entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO4	determine the transaction atomicity, consistency, isolation, and durability	1	2	1	1	1	0	0	0	3	3	2	2	3	1	1	0	understand	employability	MSTs, ESE, Class/Quiz Tests
CO5	Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling	1	2	2	2	1	1	1	1	3	3	2	2	3	2	2	1	design	employability	MSTs, ESE, Class/Quiz Tests


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CO No.	CO Statements (UC-BTEC-502-18: Digital Signal Processing)	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Honing Domain Knowledge	Innovation and design	Entrepreneurship Skills	Ethical values	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Write a formal notation for strings, languages and machines.	3	2	2	1	1				1			2	1	1			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Design finite automata to accept a set of strings of a language.	3	3	3	2	1	1	1		1		1	2	2	2			Design	Employability	MSTs, ESE, Class/Quiz Tests
CO3	For a given language determine whether the given language is regular or not.	3	3	3	3	2	2	1	1	2	1	2	2	3	3	2	1	Analyse	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO4	Design context free grammars to generate strings of context free language.	3	2	3	2	1		1		2		2	1	2	2	2		Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO5	Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars	3	3	3	3	2	1	2	1	2	1	1	3	3	3	2	1	Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO6	Write the hierarchy of formal languages, grammars and machines.	2	1	1	1		1	1			1	1	1	1				Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO7	Distinguish between computability and non-computability and Decidability and undecidability.	2	1	1	1		1	1		1		1	1	2	1			Understand	Employability	MSTs, ESE, Class/Quiz Tests

CO No.	CO Statements (UC-BTEC-502-18 (Software Engineering))	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Students should be able to identify the need for engineering approach to software development and various processes of requirements analysis for software engineering problems.	3	2	2	2	1	2	2	2	2	3	3	3	3	2		2	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Analyze various software engineering models and apply methods for design and development of software projects.	3	3	3	2	3	3	2	1	3	2	3	3	3	2	3	1	Analyse	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO3	Work with various techniques, metrics and strategies for testing software projects.	3	3	3	2	3	2	1	1	2	2	2	3	3	3	2	1	Create	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO4	Identify and apply the principles, processes and main knowledge areas for Software Project Management	3	3	3	3	3	3	2	1	3	1	1	3	3	3	3	1	Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO5	Proficiently apply standards, CASE tools and techniques for engineering software projects	3	3	3	3	3	3	3		2	2	2	3	3	3	3		Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests

CO No.	CO Statements: BTCS 504 -18UC (Computer Network)	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Honing Domain Knowledge	Innovation and design	Entrepreneurship Skills	Ethical values	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Explain the functions of the different layer of the OSI Protocol	3	3	3	2	3	3	3	2	2	3	1	3	3	2	2	2	2	2	MSTs, ESE, Class/Quiz Tests
CO2	Describe the function of each block of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)	3	2	3	2	3	3	3	2	3	3	2	3	3	3	1	1	2	2	MSTs, ESE, Class/Quiz Tests
CO3	Develop the network programming for a given problem related TCP/IP protocol	3	3	3	3	3	3	3	2	3	3	1	3	3	2	2	1	3	3	MSTs, ESE, Class/Quiz Tests
CO4	Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.	3	3	3	3	3	3	3	3	3	3	1	3	3	3	2	2	2	3	MSTs, ESE, Class/Quiz Tests

Department Computer Science and Engineering
 Program : B.Tech. (Computer Science and Engineering)
 BTCS 512-18 : (Web and Open Source Technologies Lab)

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	develop web based application using suitable client side and server side web technologies	3	2	2	3	3	3	2	2	3	2	3	3	3	3	3	2	3	3	MSTs, ESE, Class/Quiz Tests
CO2	develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management	3	3	3	3	2	1	1	1	3	2	3	3	3	3	3	2	3	3	MSTs, ESE, Class/Quiz Tests

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CO No.	CO Statements (Programming in Python Lab)	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Honing Domain Knowledge	Innovation and design	Entrepreneurship Skills	Ethical values	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Write, Test and Debug Python Programs	3	3	3	3	3	3	2	1	1	2	2	1	2	1	2		Test and Evaluate	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Implement Conditionals and Loops for Python Programs	3	3	2	3	2	3	2	2	1	1	1	3	2	2	2		Implement	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Use functions and represent Compound data using Lists, Tuples and Dictionaries	3	2	2	3	2	3	2	1	2	1	2	2	3	1	2	1	Apply	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Read and write data from & to files in Python and develop Application using Pygame	3	3	3	3	3	3	1	2	1	2	1	2	2	2	2		Design	Employability	MSTs, ESE, Class/Quiz Tests

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Department Computer Science and Engineering
 Program : B.Tech. (Computer Science and Engineering)
 BTCS : Mobile Application Development

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Describe those aspects of mobile programming that make it unique from programming for other platforms	3	3	3	3	3				2				3	3			design	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Critique mobile applications on their design pros and cons	3	3	3	3	3	2			2				3	3			understand	Entrepreneurship	
CO3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,	3	3	3	2	3	1			2				3	1	2		Apply	Employability	
CO4	Program mobile applications for the Android operating system that use basic and advanced phone features,	3	3	3	3	3	2			2				3	3	2		Design	Employability	
CO5	Deploy applications to the Android marketplace for distribution	3	3	3	3	3	2			2				3	3	2		Design	Employability	

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Department
Program
BTCS (type code)

Computer Science and Engineering
: B.Tech. (Computer Science and Engineering)
Mobile Application Development Lab

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Demonstrate the android features and create, develop using android	3	3	3	3	3	2	2	1	3	3	3	3	3	3	3	2	Design	Skill Development	MSTs, ESE, Class/Quiz Tests
CO2	Demonstrate and Understanding anatomy of an Android application	3	3	3	3	3	3	3		3	3	2	3	3	3	3	1	Understand	Skill Development	MSTs, ESE, Class/Quiz Tests
CO3	Illustrate the android wifi features and advance android development	2	1	1	2	1	2	1	1	3	3	1	2	1	2	1	1	Analyse	Skill Development	MSTs, ESE, Class/Quiz Tests
CO4	Develop an application using basic graphical primitives and databases	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	2	Design	Skill Development	MSTs, ESE, Class/Quiz Tests

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CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	To understand Internet of Things and its hardware and software components	1	1	1	2	1	1	1		1	3	1	3	2	1	1		Understand	Skill Development	MSTs, ESE, Class/Quiz Tests
CO2	To develop an Interface I/O devices, sensors & communication modules	3	3	3	3	3	3	2		3	3	2	3	3	2	1	1	Develop	Skill Development	MSTs, ESE, Class/Quiz Tests
CO3	To remotely monitor data and control devices	3	3	3	3	3	3	1	1	3	3	2	3	3	3	1	1	Analyse	Skill Development	MSTs, ESE, Class/Quiz Tests
CO4	To develop real life IoT based projects	3	2	2	3	3	3	3		3	1	2	3	3	3	3	1	Develop	Skill Development	MSTs, ESE, Class/Quiz Tests

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CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/analyse/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.	3	3	3	3	3	2			2				3	3	2		design	Employability & Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO2	To demonstrate the importance of Viewing and projections.	3	3	3	2	3				2				3	2			understand	Entrepreneurship	
CO3	To apply the fundamentals of animation, virtual reality and its related technologies	3	3	3	3	3				2				3	3	2		Apply	Employability & Entrepreneurship	
CO4	To implement a typical graphics pipeline	3	3	3	3	3				2				3	2			Design	Employability	



CO No.	CO Statements (U.C.-BTCS-505-18: Database Management System Lab)	Engineering Knowledge													Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO					
		PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m			PSO-n	PSO-o	PSO-p	Practicals	Viva	Assignments
CO1	retrieve data from relational databases using SQL	1	3	2	2	1	1	1	1	3	2	3	3	2	2	2	1	Analyse	employability	Practicals	Viva	Assignments
CO2	implement generation of tables using datatypes	1	2	2	2	1	1	1	1	3	3	3	3	2	2	2	1	Design	entrepreneurship	Practicals	Viva	Assignments
CO3	design and execute the various data manipulation queries.	1	2	2	2	1	1	1	1	3	2	3	3	2	2	2	1	Design	employability	Practicals	Viva	Assignments
CO4	execute triggers, cursors, stored procedures etc.	1	3	3	3	2	1	1	1	3	3	3	3	2	2	2	1	Design	entrepreneurship	Practicals	Viva	Assignments

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Department Computer Science and Engineering
Program : B.Tech. (Computer Science and Engineering)
B.TCS(type code) : BTCS 507-18UC (Computer Network Lab)

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Know about the various networking devices, tools and also understand the implementation of network topologies.	3	1	3	2	3	3	3	2	2	3	1	3	3	3	2	2	3	3	MSTs, ESE, Class/Quiz Tests
CO2	Create various networking cables and know how to test these cables.	3		2	2	3	3	3	1	2	3	1	3	3	2	2	1	2	2	MSTs, ESE, Class/Quiz Tests
CO3	Create and configure networks in packet tracer tool using various network devices and topologies.	3	1	3	1	3	3	3	1	2	3	2	3	3	3	2	1	3	2	MSTs, ESE, Class/Quiz Tests
CO4	Configure routers using various router configuration commands.	3		2	2	3	3	3	1	2	3	3	3	3	2	1	1	3	3	MSTs, ESE, Class/Quiz Tests

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Department of Computer Science & Engineering

B. Tech CSE

6th Sem

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B. Tech CSE

6th Sem

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Understand the major phases of compilation including front-end and back-end.	3	1	1	1	3	2	2	2	2	1	1	1	2	1			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Develop the parsers and experiment the knowledge of different parsers design	3	3	3	2	3	3	2	1	3	1	2	2	3	2	3	1	Create	Skill Development & Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO3	Construct the intermediate code representations and generation	3	2	2	2	2	2	1	1	2		2	2	3	2	2	1	Create	Skill Development & Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO4	Convert source code for a novel language into machine code for a novel computer	3	3	3	3	3	3	2	1	3	1	1	3	3	3	3	1	Create	Skill Development & Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO5	Apply for various optimization techniques for dataflow analysis	3	2	1	2	2	3	3		2	2	2	2	2	2	3		Create	Skill Development & Entrepreneurship	MSTs, ESE, Class/Quiz Tests

Department Computer Science and Engineering
Program : B. Tech. (Computer Science and Engineering)
Artificial Intelligence

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/analyse/deisgn etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand different types of AI agents.	3	2	2	2	1	1	1	1	1	2	2	2	2	1			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Develop different types of various AI search algorithms.	3	3	3	3	3	2	2	1	2	2	2	3	3	3	3	1	Create	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO3	Construct simple knowledge-based systems and to apply knowledge representation.	3	3	3	3	3	2	2		2	2	2	3	3	3	1		Design	Skill Development &Entrepreneurs hip	MSTs, ESE, Class/Quiz Tests
CO4	Convert intermediate representation in context to understand learning.	3	2	2	2	3	3	2	1	2	3	3	3	3	3	3		Understand and Design	Skill Development &Entrepreneurs hip	MSTs, ESE, Class/Quiz Tests
CO5	Apply for various techniques for Expert Systems.	3	2	2	3	3	2	2		2	2	3	3	3	2			Understand and Design	Skill Development &Entrepreneurs hip	MSTs, ESE, Class/Quiz Tests

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understand and/analyse/design etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Explain artificial Intelligence, its characteristics and its application areas.	3	2	2	1	2	2	3	2	2	2	2	3	3	3	1	2	Understand	Employability	Practical Assignments
CO2	Formulate real-world problems as state space problems, optimization problems or constraint satisfaction problems.	3	3	3	3	3	2	2	2	3	2	2	3	3	3	3	2	Design	Skill Development &Entrepreneurship	Practical Assignments
CO3	Select and apply appropriate algorithms and AI techniques to solve complex problems.	3	3	3	3	3	3	2		3	3	3	3	3	3	3		Design	Entrepreneurship	Practical Assignments
CO4	Design and develop an expert system by using appropriate tools and techniques.	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	Design	Entrepreneurship	Practical Assignments

Department Computer Science and Engineering
Program : B.Tech. (Computer Science and Engineering)
BTCS (type code) : BTCS BTCS606-18UC (Network Security and Cryptography)

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understand/ analyse/ deisgn etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Understand real time systems for identifying security threats.	3	3	2	2	3	3	2	1	2	3		2	3	3	2	1	Understand	Skill Development	MSTs, ESE, Class/Quiz Tests
CO2	Compare public and private cryptographic algorithms and make use of the same for encryption and decryption of messages.	3	1	3	3	3	3	3	1	2	3		3	3	2	2	1	Understand	Skill Development	MSTs, ESE, Class/Quiz Tests
CO3	Design confidential systems with minimum possible threats.	3	2	3	3	3	3	3	1	2	3	1	3	3	3	2	1	Design	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Apply both cryptography and hashing to create digital signatures and certificates for achieving integrity	3		3	3	3	3	3	1	2	3		3	3	2	2	1	Apply	Skill Development	MSTs, ESE, Class/Quiz Tests

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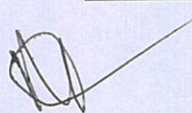
CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Develop and implement a java interface for encryption and decryption algorithms i.e., AES, MD5 and RSA algorithms	3	3	2	2	3	3	2	1	2	3		2	3	3	2	1	Implement	Skill Development	MSTs, ESE, Class/Quiz Tests
CO2	Identify the security issues in the network and resolve it.	3	1	3	3	3	3	3	1	2	3		3	3	2	2	1	Apply	Skill Development	MSTs, ESE, Class/Quiz Tests
CO3	Analyse the vulnerabilities in any computing system and hence be able to design a security solution.	3	2	3	3	3	3	3	1	2	3	1	3	3	2	2	1	Design	Skill Development	MSTs, ESE, Class/Quiz Tests

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Department Computer Science and Engineering
Program : B.Tech. (Computer Science and Engineering)
B.TCS : (Data mining Lab)

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/analyse/design etc)	Focus on Skill development	Assessment Tools to Measure Attainment of CO
CO1	Apply data cleaning, pre-processing and integration on data sets	3		3	3	3				2				3		2		Apply	Skill development	MSTs, ESE, Class/Quiz Tests
CO2	Execute algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction	3	3	3	3	3	3			2				3	2			Design	Skill development	
CO3	Extract knowledge using data mining techniques on data sets	3	3	3	3	3	3		1	2				3			1	Apply	Skill development	
CO4	Explore recent trends in data mining such as web mining, spatial-temporal mining	3	2	3	3	3				2		1		3	2			Design	Skill development	

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Department Computer Science and Engineering
Program : B.Tech. (Computer Science and Engineering)
BTCS(type code) : BTCS-612-18 Cloud Computing Lab

CO No.	CO Statements (UC- : BTCS-612-18 Cloud Computing Lab)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understand/analyse/deisgn etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Use the cloud tool kits.	1	1	2	1	3	1	1	1	1	1	1	3	3	1	1	1	Implement	Skill Development	Practicals
CO2	Implement applications on the Cloud	1	3	3	3	3	2	2	1	3	3	3	3	3	2	3	1	Apply	Skill Development	Practicals
CO3	To install cloud computing environments	1	1	2	1	3	1	1	1	2	1	2	3	3	1	1	1	Apply	Skill Development	Practicals
CO4	To develop any one type of cloud	1	2	3	1	3	2	2	1	3	3	2	3	3	2	3	1	Apply	Skill Development	Practicals
CO5	To explore future trends of cloud computing	1	1	2	2	3	2	2	1	3	3	2	3	2	3	1	1	Design	Skill Development	Practicals

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand various entropies and Define the information theories.	3	2	2	2	1	1	1		1	2	2	1	2	1			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Apply source coding techniques	3	3	3	3	3	2	2	1	2	2	2	3	3	3	2	1	Create	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO3	Compute the capacity of various types of channels.	3	3	3	2	3	2	2		2	1	2	2	3	2	1		Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO4	Understand and Construct codes using different error control techniques.	3	2	2	2	3	3	2	1	2	2	2	3	3	3	3		Understand and Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO5	Apply various coding schemes for text, speech and audio.	3	2	3	3	3	2	2		2	2	3	3	3	2			Understand and Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understand/analyse/design etc)	Focus on Skill Development	Assessment Tools to Measure Attainment of CO
CO1	Compare various capacity reduction based coding techniques for image and video type of data.	3	3	2	2	3	2	3	2	3	3	3	3	3	3	3	2	Understand & Design	Skill Development	Practical Assignments
CO2	Implement various error control techniques for Convolutional codes	3	3	3	3	3	2	2	2	3	2	2	3	3	3	3	2	Understand & Design	Skill Development	Practical Assignments
CO3	Illustrate various security oriented coding techniques for Block codes	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	2	Understand & Design	Skill Development	Practical Assignments
CO4	calculate entropy, joint entropy, relative entropy, conditional entropy, and channel capacity of a system	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand & Design	Skill Development	Practical Assignments

Department Computer Science and Engineering
Program : B.Tech. (Computer Science and Engineering)
BTCS (type code) : BTCS-617-18 Data Science Lab

CO No.	CO Statements (UC-BTCS-617-18 Data Science Lab)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(unders tand/analyse/ deisgn etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Plan the projects in the domain of data science.	1	3	2	3	2	2	1	1	3	3	3	3	3	3	3	1	Analyze	Skill Development	MSTs, ESE, Class/Quiz Tests
CO2	Use data analytics tools towards problem solving and solution analysis.	1	1	3	1	3	1	1	1	1	1	2	3	3	2	3	1	Knowledge	Skill Development	MSTs, ESE, Class/Quiz Tests
CO3	Apply Mathematical sciences and recent technologies in Computer Science to solve real life problems	3	3	3	3	1	2	1	1	2	3	3	3	3	3	3	1	Apply	Skill Development	MSTs, ESE, Class/Quiz Tests
CO4	Apply data science concepts and methods to solve problems in real-world context.	3	3	3	3	1	2	1	1	2	3	3	3	2	3	3	1	Apply	Skill Development	MSTs, ESE, Class/Quiz Tests

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CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Understand various soft computing concepts for practical applications	3	2	1	3									3	1	2		understand	Skill development	
CO2	Design suitable neural network for real time problems	3	2	3	3	2	1							3	2	2		Design	Skill development	
CO3	Construct fuzzy rules and reasoning to develop decision making and expert system	3	2	3	3	2	2							3	2	2		Apply	Skill development	
CO4	Apply the importance of optimization techniques and genetic programming	3	2	3	3	2	1							3	2	3		Apply	Skill development	
CO5	Review the various hybrid soft computing techniques and apply in real time problems	3	2	3	3	2	2							3	2	2		Design	Skill development	

MSTs, ESE, Class/Quiz Tests

CO No.	CO Statements (Soft Computing Lab)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/analyse/ design etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Reveal different applications of these model:H7:B11s to solve engineering and other problems.	3	3	3	3	3	3	2	1	1	2	2	1	2	2			Estimate	Skill Development	MSTs, ESE, Class/Quiz Tests
CO2	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems	3	3	3	3	3	3	2	1	1	2	2	3	3	2	1	1	Apply	Skill Development	MSTs, ESE, Class/Quiz Tests
CO3	Apply genetic algorithms to combinatorial optimization problems	3	3	3	3	3	3	2	1	2	1	2	2	3	2	1		Design	Skill Development	MSTs, ESE, Class/Quiz Tests
CO4	Effectively use existing software tools to solve real problems using a soft computing approach	3	3	3	3	3	3	1	1	1	2	2	3	3	2	1	1	Compute	Skill Development	MSTs, ESE, Class/Quiz Tests
CO5	Evaluate and compare solutions by various soft computing approaches for a given problem.	3	3	3	3	3	3	2	1	1	2	3	3	3	2	1		Evaluate	Skill Development	MSTs, ESE, Class/Quiz Tests

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I.K. Gujral Punjab Technical University, Kapurthala (Main Campus)
Department of Computer Science & Engineering

B. Tech CSE

7th Sem

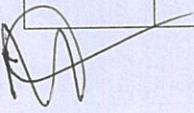
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CO No.	CO Statements (UC619-18 Machine Learning Lab)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/analyse/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Solve problems using the machine learning models.	1	2	2	2	3	1	1	1	2	1	2	3	2	2	2	1	Apply	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Apply various reinforcement algorithms to solve real time complex problems.	2	3	2	2	3	1	1	1	2	2	2	3	3	3	2	1	Apply	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO3	Identify the core components of deep neural network model.	1	2	2	1	3	1	1	1	2	1	2	3	2	1	1	1	Knowledge	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Implement unsupervised models through programming language.	1	2	2	2	3	1	1	1	2	1	2	3	2	2	2	1	Apply	Employability	MSTs, ESE, Class/Quiz Tests

Department Computer Science and Engineering
Program : B.Tech. (Computer Science and Engineering)
BTCS (type code) Speech and Natural Language Processing

CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on	Assessment Tools to Measure Attainment of CO
CO1	Describe the fundamental concepts and techniques of natural language processing.	3	2	3	2	3	3	3	1	1	3	3	2	3	2	3	1	Understand	Skill Development	MSTs, ESE, Class/Quiz Tests
CO2	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each.	3	3	3	3	3	3	3	1	3	3	2	3	1	2	2	1	Apply	Skill Development	MSTs, ESE, Class/Quiz Tests
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions.	2	3	3	3	3	3	3	1	3	3	2	2	2	3	2		Design	Skill Development	MSTs, ESE, Class/Quiz Tests
CO4	Analyze large volume text data generated from a range of real-world applications.	2	1	1	2	3	2	2	1	2	2	2	2	1	2	2	1	Understand	Skill Development	MSTs, ESE, Class/Quiz Tests

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CO No.	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO- m	PSO- n	PSO- o	PSO- p	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Interact with a blockchain system by sending and reading transactions.	3	3	2	2	3	3	3	2	3	2	2	3	3	3	2	2	Understand	Skill Development	Practical Assignments
CO2	Design, build, and deploy a distributed application.	3	3	3	3	3	3	3		3	3	3	3	3	3			Design	Skill Development	Practical Assignments
CO3	Evaluate security, privacy, and efficiency of a given blockchain system.	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	Design	Skill Development	Practical Assignments

CO No./CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1 To define and understand terminology involved in the field of software defined networking	3												3				understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2 To describe software defined architecture and open flow protocol for communication between controller and switches	3		3										3				Design	Employability	
CO3 To provide an overview and comparison of various SDN controllers	3				1								3				Apply	Employability	
CO4 To design topologies using Mininet and various APIs	3	2	3		1	1					1		3	2			Design	Employability	
CO5 To develop various applications and protocols for SDN architecture	3	2	3		1								3	2			Design	Employability	
CO6 To identify and analyse various security threats in SDN based networks	3	2				1							3			1	Identify	Employability	

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Department Computer Science and Engineering
Program : B.Tech. (Computer Science and Engineering)
BTCS712-18UC : (Digital Image Processing)

CO No	CO Statements (UC-BTEC-502-18: Digital Signal Processing)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level (understand/ analyse/ deisgn etc)	Focus on Employability / Entrepreneursh ip	Assessment Tools to Measure Attainment of CO
CO1	Understand the basic concepts of DIP	2	1	2	1	1	2	3	1	1	1	1	3	3	1	1		Understand	Skill Development	MSTs, ESE, Class/Quiz Tests
CO2	Improve the quality of digital images	3	2	3	3	2	1			1	1	1	2	3	3	1		Apply	Skill Development	MSTs, ESE, Class/Quiz Tests
CO3	Understand and De-noise Digital Images	2	3	3	2	1	1	1		1			2	3	3	1	1	Understand	Skill Development	MSTs, ESE, Class/Quiz Tests
CO4	Segment digital images and extract various features from digital images	2	2	2	2	3	1		1	1	1	1	2	3	2	1	1	Apply	Skill Development	MSTs, ESE, Class/Quiz Tests
CO5	Understand various image compression techniques and apply such techniques to compress digital images for reducing the sizes of digital images.	3	2	3	2	3	2	1		3	1	2	3	3	2	2		Understand	Skill Development	MSTs, ESE, Class/Quiz Tests

CO No	CO Statements	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Level(understand/analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	develop any image processing application.	2	2	3	3	3	3	2	2	2	2	2	3	3	3	3	2	implement	Skill Development	MST's, ESE, Class/Quiz Tests
CO2	understand the rapid advances in Machine vision.	2	2	3	3	3	2	2	1	3	3	3	3	3	3	3	2	Apply	Skill Development	MST's, ESE, Class/Quiz Tests
CO3	learn different techniques employed for the enhancement of images.	3	2	3	3	3	3	3	2	2	2	3	3	3	2	3	2	Apply	Skill Development	MST's, ESE, Class/Quiz Tests
CO4	Perform image enhancement techniques in spatial and frequency domain	2	3	3	3	2	2	3	1	2	2	3	3	3	3	3	2	Design	Skill Development	MST's, ESE, Class/Quiz Tests

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CO No.	CO Statement (pg. BCGA1965 - NLP and Speech Recognition)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p	Learning Level/Understand/analyze/design/eval.	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Discuss the fundamental concepts of natural language processing.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Understand	Employability	MSTa, ESE, Class/Quiz Tests
CO2	Explain text normalization, use of edit distance, and regular expressions	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Understand	Employability	MSTa, ESE, Class/Quiz Tests
CO3	Implement NLPs layers and sentiment classification algorithms	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Understand	Employability	MSTa, ESE, Class/Quiz Tests
CO4	Familiarize with chatbot and phonemes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Understand	Employability	MSTa, ESE, Class/Quiz Tests
CO5	Describe the concept of speech recognition and text to speech conversion	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Understand	Employability	MSTa, ESE, Class/Quiz Tests


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CO No.	CO Statement (PG- PGCA1967 - IOT & Blockchain Technology)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p	Learning Level/Understand/analyze/design/etc.	Focus on Employability/Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Discuss the terminology and enabling technologies of IoT and Blockchain	1																Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Identify various elements of IoT	1	1	1	1													Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Implement the design involved in IoT system design methodology	1	1	1	1													Understand And Design	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Describe the working of full stack applications	1	1	1	1													Understand And Design	Employability	MSTs, ESE, Class/Quiz Tests
CO5	List domain specific applications of IoT and Blockchain	1	1	1	1													Understand And Design	Employability	MSTs, ESE, Class/Quiz Tests


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CO No.	CO Statement (PG- PGCA1966 - NLP and Speech Recognition Lab)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p	Learning Level (Understand/analyze/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Develop knowledge of various learning models of data	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand	Employability	Practical Assignments
CO2	Analyze performance of various learning algorithms	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand	Employability	Practical Assignments
CO3	Evaluate models generated from data	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand	Employability	Practical Assignments
CO4	Apply the algorithms to a real-world problem	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand and Design	Employability	Practical Assignments
CO5	Optimize the model's learned and report on the expected accuracy that can be achieved by applying the models	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand and Design	Employability	Practical Assignments


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CO No.	CO Statement (PC - PGCA1968 - IOT & Blockchain Technology Lab)
CO1	Use IoT sensors and remotely monitor data and control devices
CO2	Develop real life IoT based projects
CO3	Discuss blockchain technology and develop blockchain based solutions
CO4	Deploy IoT based Blockchain applications for on-premise and cloud based architecture
CO5	Create docker based application

CO No.	CO Statement	Program Outcomes (POs)										PO-O	PO-P		
		PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10				
	Computational Knowledge	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Problem Analysis	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Design /Development of Solutions	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Conduct investigations of Complex Computing problems	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Modern Tool Usage	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Professional Ethics	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Life-long Learning	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Project management and finance	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Communication Efficacy	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Societal and Environmental Concern	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Individual and Team Work	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Innovation and Entrepreneurship	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Understand and apply knowledge on analysis, design and development of applications in the computing disciplines.	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Indicate employability among students who can develop customized enterprise level solutions.	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Develop techniques to enhance ability for lifelong learning.	3	3	3	3	3	3	3	3	3	3	3	3	3	3


Learning Level/Understand/analyze/design/eval	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
Understand And Design	Entrepreneurship	Practical Assignments
Understand And Design	Entrepreneurship	Practical Assignments
Understand And Design	Entrepreneurship	Practical Assignments
Understand And Design	Employability	Practical Assignments


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CO No.	CO Statements (PG- PGCA-B1 : Computer Programming using C)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Express the logical flow used in Programming.	3	3	3	3	3	3	3		2				2	1	3	3	Learning Focus of Assessment Tools to Measure Attainment of CO
CO2	Design algorithms for solving various real life problems	3	3	3	3	3	3	3						3	3	3	3	Understand Employee MSTs, ESE, Class/Quiz Tests
CO3	Implement programs using C.	3	3	3	3	3	3	3						3	2	3	3	Understand Employee MSTs, ESE, Class/Quiz Tests
CO4	Choose the right data type and statements for programs.	2		3	1	3	1	3						3	3	3	3	Understand Employee MSTs, ESE, Class/Quiz Tests
CO5	Explain various concepts of C programming language.	3		1	1	2	1	3						3	3	3	2	Understand Employee

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CO No.	CO Statement (PG-PC/CA/37) : Cloud Computing	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p	Learning Outcome/Understand/analyze/design etc.	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Discuss the basic concept and importance of Cloud computing.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand	Employability	MST's, ESE, Class/Quiz Tests
CO2	Explain the process of migrating to a cloud solution for different professional.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand	Employability	MST's, ESE, Class/Quiz Tests
CO3	Monitor and evaluate the virtualization technologies.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand And Design	Employability	MST's, ESE, Class/Quiz Tests
CO4	Monitor and manage the cloud resources, applications and data while addressing the security concerns.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand And Design	Employability	MST's, ESE, Class/Quiz Tests
CO5	Use cloud solutions offered by industry leaders for various applications.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand And Design	Employability	MST's, ESE, Class/Quiz Tests


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CO No.	CO Statement (PC - PGCA1936) Simulation & Modeling Laboratory	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p	Learning Level/Understand/analyze/ design etc.	Focus on Employability/ Entrepreneurship	Assessment Tool to Measure Attainment of CO
CO1	Use software tools for modeling and analysis of mathematical concepts for engineering application.		3	3		3												Understand And Create	Entrepreneurship	Practical Assignments
CO2	Semantic discrete problem using queueing systems.			3	3													Understand And Design	Entrepreneurship	Practical Assignments
CO3	Model and analyze simple engineering concepts and its importance in engineering applications.		3	3	3	3												Design and Analyse	Entrepreneurship	Practical Assignments
CO4	Apply simulation software to construct and execute goal-driven system models.		3	3	3	3												Understand And Design	Entrepreneurship	Practical Assignments
CO5	Create Simulation Projects		3	3	3	3												Understand And Design	Entrepreneurship	Practical Assignments


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CO No	CO statements (ref: PGCA 1974 : e-Commerce and Digital Market)
CO1	Implementational IT-Commerce applications.
CO2	Devotee digital marketing strategy and plan.
CO3	Devotee effective digital and social media strategies.
CO4	Devotee social and security issues concerning the digital marketing and e-commerce.
CO5	Implement a project for IT-Commerce and Digital Marketing

CO No	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

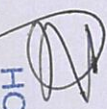
Learning Level(understand/analyze/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
Understand	Employability	Practical Assignments
Understand and Design	Entrepreneurship	Practical Assignments
Design	Entrepreneurship	Practical Assignments
Understand	Entrepreneurship	Practical Assignments


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CO No	CO Statement (PC- PGCA1915 : Software Testing & Quality Assurance)
CO1	Explain various approaches of software testing and quality assurance for software development.
CO3	Create test strategies, design test cases, prioritize and execute them. Identify various risks involved with software project and build risk management.
CO4	Plan, software management and configuration activities.
CO5	Discuss the risk management involved in software development.

PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p
Computational Knowledge	Problem Analysis	Design/Development of Solutions	Conduct investigations of complex Computing problems	Modern Tool Usage	Professional Ethics	Life-long Learning	Project management and finance	Communication Efficacy	Societal and Environmental Concern	Individual and Team Work	Innovation and Entrepreneurship	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	Use of recent technology, skill and knowledge for computing practices with commitment on societal, moral values.	Inculcate employability and entrepreneurship skills among students who can develop customized enterprise level solutions.	Develop techniques to enhance ability for lifelong learning.
1	3	3	3	3	3	1	1	1	3	3	3	3	3	3	3
1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2

Learning Level(understand/analyze/design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
Understand	Employability	Practical Assignments
Create	Entrepreneurship	Practical Assignments
Design	Entrepreneurship	Practical Assignments
Design	Entrepreneurship	Practical Assignments


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CO No	CO Statement (pg. PGCA1976)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p
CO1	CO Statement (pg. PGCA1976)	1															
CO2	Machine Learning concepts																
CO3	Machine Learning concepts and supervised learning																
CO4	Analyze data using Python NumPy, Pandas, Matplotlib																
CO5	Implement data visualization using Matplotlib library of Python																

Learning Level	Understand	Apply	Design	Code	Test	Debug	Collaborate	Communicate	Learn	Manage	Ethics	Entrepreneurship	Employability	Assessment Tools to Measure Attainment of CO
Understand	1	2	3	4	5	6	7	8	9	10	11	12	13	MCA1976
Apply	2	3	4	5	6	7	8	9	10	11	12	13	14	MCA1976
Design	3	4	5	6	7	8	9	10	11	12	13	14	15	MCA1976
Code	4	5	6	7	8	9	10	11	12	13	14	15	16	MCA1976
Test	5	6	7	8	9	10	11	12	13	14	15	16	17	MCA1976
Debug	6	7	8	9	10	11	12	13	14	15	16	17	18	MCA1976
Collaborate	7	8	9	10	11	12	13	14	15	16	17	18	19	MCA1976
Communicate	8	9	10	11	12	13	14	15	16	17	18	19	20	MCA1976
Learn	9	10	11	12	13	14	15	16	17	18	19	20	21	MCA1976
Manage	10	11	12	13	14	15	16	17	18	19	20	21	22	MCA1976
Ethics	11	12	13	14	15	16	17	18	19	20	21	22	23	MCA1976
Entrepreneurship	12	13	14	15	16	17	18	19	20	21	22	23	24	MCA1976
Employability	13	14	15	16	17	18	19	20	21	22	23	24	25	MCA1976



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CO No.	CO Statements (PG-PCCAI1932 - Information Security and Cyber Law)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Identify issues involved in the field of information security.	3	3	3	3	3			3	3	3	3	3	3	3	3	3	Understand Employed MSTs, ESE, Class/Quiz Tests
CO2	Explain the key security requirements of Confidentiality, Integrity & Availability.	3	3	3	3	3			3	3	3	3	3	3	3	3	3	Understand Employed MSTs, ESE, Class/Quiz Tests
CO3	Demonstrate the concept of Intrusion Detection & Intrusion Prevention.	3	3	3	3	3			3	3	3	3	3	3	3	3	3	Understand Employed MSTs, ESE, Class/Quiz Tests
CO4	Apply Symmetric Encryption techniques.	3	3	3	3	3			3	3	3	3	3	3	3	3	3	Understand Employed MSTs, ESE, Class/Quiz Tests
CO5	Describe the concept of Security policies and Cyber Laws.	3	3	3	3	3			3	3	3	3	3	3	3	3	3	Understand Employability




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CO No.	CO Statements (PG- PGCA1914 : Web Technologies Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Design pages with simple tags in HTML																	3 Understand Employed MST's, ESE, Class/Quiz Tests
CO2	Create web pages with Audio and Video content in it		3	3	3	3	3	3	3					3	3	3	3	Design Employed MST's, ESE, Class/Quiz Tests
CO3	Illustrate the movement from one web page to another		3	3	3	3	3	3	3					3	3	3	3	Design Employed MST's, ESE, Class/Quiz Tests
CO4	Implement advanced web designing concepts using java script		3	3	3	3	3	3	3					3	3	3	3	Design Employed MST's, ESE, Class/Quiz Tests
CO5	Execute a small web based project for the benefit of society		3	3	3	3	3	3	3					3	3	3	3	Understan Employability


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CO No.	CO Statements [PCCAI1957 : Linux System Administration Laboratory]	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Prepare the environment for installation and use of Linux operating system	3	3		3	3												3 Understand Employment/MS's, ESE, Class/Quiz Tests
CO2	Write Shell Scripts		3															3 Understand Employment/MS's, ESE, Class/Quiz Tests
CO3	Implement C programs using gcc compiler			3														3 Understand Employment/MS's, ESE, Class/Quiz Tests
CO4	Implement virtualization					3												3 Understand Employment/MS's, ESE, Class/Quiz Tests
CO5	Execute commands related to grant/and revoking user privileges.	1																3 Understand Employment/MS's, ESE, Class/Quiz Tests


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CO No.	CO Statements (PG- PGCA1925 : Advanced Computer Networking)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO	
CO1	Define computer networks																	3	Understand Employed MSTs, ESE, Class/Quiz Tests
CO2	Identify the role played by different layers of network model																	3	Understand Employed MSTs, ESE, Class/Quiz Tests
CO3	Outline the concept of Internet protocols and network security.																	3	Understand Employed MSTs, ESE, Class/Quiz Tests
CO4	Highlight the benefits of Adhoc networks																	3	Understand Employed MSTs, ESE, Class/Quiz Tests
CO5	Explain the protocols used in wireless communication systems.																	3	Understand Employability

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CO No.	CO Statements (PG - PGCA1926 : Artificial Intelligence & Soft Computing)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Highlight the significance of Artificial Intelligence in knowledge representation.	3			3	3	2	3						3	3	3	3	Understand Employability, MST's, ESE, Class/Quiz Tests
CO2	Examine the useful search techniques, learn their advantages, disadvantages and comparison.		3	3	3	3	3	2						3	3	3	3	Understand Employability, MST's, ESE, Class/Quiz Tests
CO3	Explain neural network theory and fuzzy logic theory.		3	2	3	3	3	3						3	3	3	3	Understand Employability, MST's, ESE, Class/Quiz Tests
CO4	Apply artificial neural networks and fuzzy logic theory for various problems.		3	2	3	3	3	3						3	3	3	3	Understand Employability
CO5	Determine the use of Genetic algorithm to obtain optimized solutions to problems.				3	3	3	3						3	3	3	3	Understand Employability


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CO No.	CO Statements (PC - PGCA1927 : Theory of Computation)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus or Assessment Tools to Measure Attainment of CO
CO1	Define formal languages and automata.	3		3	3			3						3	3	3	3	3 Understand/ Employability MST's, ESE, Class/Quiz Tests
CO2	Design Finite Automata's for different Regular Expressions and Languages.		3	3	3									3	3	3	3	3 Understand/ Employability MST's, ESE, Class/Quiz Tests
CO3	Prepare context free grammar for various languages.	3	3	3	3	3								3	3	3	3	3 Understand/ Employability MST's, ESE, Class/Quiz Tests
CO4	Illustrate how push down automata and Turing Machine can be used to solve computational problems.	3	3	3	2	3								3	3	3	3	3 Understand/ Employability
CO5	Define complexity and computability concepts	3	3	3													3	3 Understand/ Employability



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CO No.	CO Statements (PC- PGCA1929 : Artificial Intelligence & Soft Computing Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Write programs for basic AI problems.		3	3	3	3						3		3	3	3	3	Learning Focus of Assessment Tools to Measure Attainment of CO
CO2	Apply artificial neural networks and fuzzy logic theory for various problems.				3	3						3		3	3	3	3	Understand Employability, MSTs, ESE, Classroom Tests
CO3	Prepare training data.											3		3	3	3	3	Understand Employability, MSTs, ESE, Classroom Tests
CO4	Design back propagation network											3		3	3	3	3	Understand Employability, MSTs, ESE, Classroom Tests
CO5	Implement different operations on fuzzy sets											3		3	3	3	3	Understand Employability, MSTs, ESE, Classroom Tests

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CO No.	CO Statements (PG-PGCA1930 : Software Project Management)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Define the principal tasks of software project management		3															Understand/ Employ at MST's, ESE, Class/Quiz Tests
CO2	Outline the basic concepts of Software projects.		2															Understand/ Employ at MST's, ESE, Class/Quiz Tests
CO3	Explain the fundamentals of Process Planning, effort estimation and quality Planning.	3	3															Understand/ Employ at MST's, ESE, Class/Quiz Tests
CO4	Comment upon risk and quality management.			3														Understand/ Employ at MST's, ESE, Class/Quiz Tests
CO5	Apply management and development practices to develop software.																	Understand/ Employ at MST's, ESE, Class/Quiz Tests

CO No.	CO Statements (PG - PGCA1971: Optimization Techniques)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p	Learning Level (understand/analyze/design etc)	Focus of Assessment Tools to Measure Attainment of CO
CO1	Define the scope of operation research																	Understand	Employed MSTs, ESE, Class/Quiz Tests
CO2	Solve Linear programming problems																	Understand	Employed MSTs, ESE, Class/Quiz Tests
CO3	Prepare feasible solutions for transportation and assignment problems																	Understand	Employed MSTs, ESE, Class/Quiz Tests
CO4	Outline the Project Management problems using CPM																	Understand	Employability
CO5	Find solution to various optimization problems																	Understand	Employability


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CO No.	CO Statement (i.e. PGCA1972: Data Mining and Business Intelligence)
CO1	Highlight the need of Data Warehousing & Mining.
CO2	Differentiate between the Transactional and Analytical data models.
CO3	Identify the real life applications where data mining can be applied.
CO4	Apply different data mining algorithms on wider range of data sets.
CO5	Comment on latest tools for data mining and the data analysis.


PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p
Computational Knowledge	Problem Analysis	Design /Development of Solutions	Conduct investigations of complex Computing problems	Modern Tool Usage	Professional Ethics	Life-long Learning	Project management and finance	Communication Efficacy	Societal and Environmental Concern	Individual and Team Work	Innovation and Entrepreneurship	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	Indicate employability among students who can develop customized enterprise level solutions.	Develop techniques to enhance ability for lifelong learning.
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Learning Level(understand/analyze/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
Understand	Employability	M3, ESE, Case-Quiz Tests
Understand And Design	Entrepreneurship	M3, ESE, Case-Quiz Tests
Understand And Design	Entrepreneurship	M3, ESE, Case-Quiz Tests
Understand and Design	Entrepreneurship	M3, ESE, Case-Quiz Tests

CO No.	CO Statements (PG- PGCA1973 : Enterprise Resource Planning)
CO1	Define ERP & Related Technologies
CO2	Compare different types of ERP functional modules.
CO3	Explain Implementation Strategies of ERP
CO4	Discuss the latest trends and future of ERP
CO5	Apply the various case studies related to ERP implementation

PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p
Computational Knowledge	Problem Analysis	Design /Development of Solutions	Conduct investigations of complex Computing problems	Modern Tool Usage	Professional Ethics	Life-long Learning	Project management and finance	Communication Efficacy	Societal and Environmental Concern	Individual and Team Work	Innovation and Entrepreneurship	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	Indicate employability and entrepreneur skill among students who can develop customized enterprise level solutions.	Develop techniques to enhance ability for lifelong learning.
		1	1	1		3	3			3	3	3	3	3	2

Learning Level	Understand	analyze	design etc.	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
Understand and Analyse				Employability	MSTs, ESE, Class/Quiz Tests
Design				Employability	MSTs, ESE, Class/Quiz Tests
Understand				Employability	MSTs, ESE, Class/Quiz Tests
understand				Employability	MSTs, ESE, Class/Quiz Tests


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CO No.	CO Statements (PG-PGCA1908 : Technical Communication Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Demonstrate the benefits of effective communication		2											2		3	2	Understand/ Employed/ MST's, ESE, Class/Quiz Tests
CO2	Execute proficiency in reading & listening, comprehension, writing and speaking skills.		3													3	2	Understand/ Employed/ MST's, ESE, Class/Quiz Tests
CO3	Apply spoken and written English language in their chosen technical field	2	2	2												3	3	Understand/ Employed/ MST's, ESE, Class/Quiz Tests
CO4	Illustrate fluency in conversation		2														3	Understand/ Employed/ MST's, ESE, Class/Quiz Tests
CO5	Write their own clear and coherent texts.																3	Understand/ Employed/ MST's, ESE, Class/Quiz Tests

CO No.	CO Statements (PC- PCCAI1909 : Web Technologies)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO	
CO1	Create pages with simple tabs in HTML.		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand/ Employed MST's, ESE, Class/Quiz Tests
CO2	Design webpages with multiple sections or frames		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand/ Employed MST's, ESE, Class/Quiz Tests
CO3	Explain how to link webpages through hypertext or images a links		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Design/ Employer MST's, ESE, Class/Quiz Tests
CO4	Outline the key web designing concepts using java script		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Design/ Entrepreneurship
CO5	Design forms with special controls using HTML		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Design/ Entrepreneurship

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CO No.	CO Statements (PG- PGCA1920 : Design & Analysis of Algorithms)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Define algorithm and its complexity	3												3	3	2	3	Understand Employat MST's, ESE, Class/Quiz Tests
CO2	Categorize problems based on their characteristics and practical importance	3	3											3	3	3	3	Design Employat MST's, ESE, Class/Quiz Tests
CO3	Develop Algorithms using iterative/recursive approach			3										2	3	3	3	Design Employat MST's, ESE, Class/Quiz Tests
CO4	Design algorithm using an appropriate design paradigm for solving a given				3									3	3	3	2	Design Employat MST's, ESE, Class/Quiz Tests
CO5	Categorize problems as P, NP or NP Complete	3						2						3		2	3	Understand Employability


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CO No.	CO Statement (PC- PGCA1918 : Advanced Java)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Explain the role of servlets	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand Employability MST's, ESE, Class/Quiz Tests
CO2	Select the right technology/ tool for problem based solutions.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand Employability MST's, ESE, Class/Quiz Tests
CO3	Implement web concepts using java server Pages	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Design, Entrepreneurial MST's, ESE, Class/Quiz Tests
CO4	Implement database connectivity	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand
CO5	Illustrate invocation of remote methods	3	2	3	3	3	3	3	3	3	3	3	3	3	2	2	1	Understand

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CO No.	CO Statements (PC - PCCAI1956: Linux Administration)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO	
CO1	Discuss the evolution of Open Source operating systems.	3	3	2	3	3	3	3	3			3	3	3	3	3	3	3	Understand Employability
CO2	Prepare environment for working on open source operating system like	3	3	3	3	3	3	3	3			3	3	3	3	3	3	3	Understand Employability
CO3	Perform resource management in Linux			3								3	3	3	3	3	3	3	Understand Employability
CO4	Write scripts in Linux.			3								3	3	3	3	3	3	3	Understand Employability
CO5	Execute user level privileges				2										2	2	1		Understand Employability




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CO No.	CO Statements (PGCA-B2 : Computer Science Essentials)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO	
CO1	Identify various components of computer system including input and output devices.	3	3															2	Understand Employability MST's, ESE, Class/Quiz Tests
CO2	Prepare documents using word processing, Spreadsheet and Presentation tools	3	2	2	2	2								2	2	2	3	2	Understand Employability MST's, ESE, Class/Quiz Tests
CO3	Outline the key components of Database Management system	3		3	2				3					2	2	2	3	3	Understand Employability MST's, ESE, Class/Quiz Tests
CO4	Explain the role of operating system.	2	3	3	3				2					2	2	3	3	3	Understand Employability MST's, ESE, Class/Quiz Tests
CO5	Define various components, modes and topologies of computer networks.	2	3	3	3				2					2	2	3	3	3	Understand Employability



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CO No.	CO Statements (PC- PGCA1917: Discrete Structures & Optimization)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Explain the use of Venn diagrams to solve applied problems	3	3	3	2							2	3		3	3	3	Understand Employability MST's, ESE, Class/Quiz Tests
CO2	Apply rules of inference.	2	2	3	3							2	3	3	3	3	3	Understand Employability MST's, ESE, Class/Quiz Tests
CO3	Write proofs using symbolic logic and Boolean Algebra	3	3	3	2					3		3	3	3	3	3	3	Understand Employability MST's, ESE, Class/Quiz Tests
CO4	Applying elementary counting techniques using the product and sum rules, permutations, combinations, the pigeon-hole principle	3	3	3	3							3	3	3	3	3	3	Analyse Employability
CO5	Identify the type of graphs	3	3	3		1						1	1	3	3	3	3	Design Employability


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CO No.	CO Statements (PG, PGCA 1953 : Advanced Database Management System)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus or Assessment Tools to Measure Attainment of CO	
CO1	Express the basic concepts of DBMS and RDBMS.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand Employability MSTs, ESE, Class/Quiz Tests
CO2	Apply normalization theory to the normalization of a database	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand Employability MSTs, ESE, Class/Quiz Tests
CO3	Explain Transaction Management & Recovery techniques in RDBMS.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand Employability MSTs, ESE, Class/Quiz Tests
CO4	Outline characteristics of advanced databases prevailing in market.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand Employability
CO5	Demonstrate No SQL databases (Open Source)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand Employability


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CO No.	CO Statements (PG- PGCA1905 : Technical Communication)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PSO-m	PSO-n	PSO-o	PSO-p	Learning Focus of Assessment Tools to Measure Attainment of CO
CO1	Outline the benefits of effective communication	1					3	3						2	1	3	2	Understand/ Employed/ MST's, ESE, Class/Quiz Tests
CO2	Execute proficiency in reading & listening, comprehension, writing and speaking skills		3				3	3	2	3	3			2	1	3	2	Understand/ Employed/ MST's, ESE, Class/Quiz Tests
CO3	Apply spoken and written English language in their chosen technical field.	1					3	3	2	3	3			3	2	3	2	Understand/ Employed/ MST's, ESE, Class/Quiz Tests
CO4	Illustrate fluency in conversation		3				3	3	2	3	3			3	2	3	3	Understand/ Employed/ MST's, ESE, Class/Quiz Tests
CO5	Write their own clear and coherent texts						3	3	2	3	3			3	2	3	3	Understand/ Employed/ MST's, ESE, Class/Quiz Tests


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CO No.	CO Statements (PG- PGCA1954 : Data Structures using Python Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PO-n	PO-o	PO-p	Learning U	Focus on E	Assessment Tools to Measure Attainment of CO
CO1	Analyze various algorithms based on their time and space complexity.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand Employabil MST s, ESE, Class/Quiz Tests
CO2	Create different data structures in C/C++	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand Employabil MST s, ESE, Class/Quiz Tests
CO3	Implement various operations of all data structures	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Analyse Employabil MST s, ESE, Class/Quiz Tests
CO4	Illustrate the outcome of various operations with the help of examples.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Y
CO5	Write programs to implement various types of searching and sorting algorithms	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	d


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CO No.	CO Statements (UG-UGCA1947 : Digital Marketing)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level(understand/analyze/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Highlight the key elements of a digital marketing strategy.	3	2	2					2	2	3	3		3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Choose the right platform for digital marketing.	3	3	2					2	3	3	3		2	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Identify the major digital marketing channels.	3	3	3					3	3	3	2		3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Design content for digital marketing.	3	3	3					3	3	3	2		3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO5	Develop digital marketing strategy and plan.	3	3	3					3	3	3	2		3	Understand	Employability	MSTs, ESE, Class/Quiz Tests



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CO No.	CO Statements (UG-UGCA1949: Cyber Laws & IPR)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-k	PSO-l	PSO-m	Learning Level (understand/analyse/ design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Identify, analyze, regulatory, constitutional, and organizational laws that affect the information technology professional	3	3	2					2		3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Compare case law and common law to current legal dilemmas in the technology field	3	2	2					2		3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Outline the primary forms of intellectual property rights	3	3	2					3		3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Compare the different forms of intellectual property protection in terms of their key differences and similarities.	3	3	3					3		3	2			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO5	Analyze the effects of intellectual property rights on society as a whole	3	2	2					3		3	2		2	Understand	Employability	MSTs, ESE, Class/Quiz Tests


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CO No.	CO Statements (UG-UGCA1951: Artificial Intelligence Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level (understand/analyse/design etc.)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Identify right tool for different AI based problems.	3	2	2	2				2	2	3	3		3	Understand	Employability	Practical Assignments
CO2	Develop basic applications using AI tools.	3	3	3	2				3	3	3	3		3	Design	Employability	Practical Assignments
CO3	Represent various real life problem domains using logic based techniques	3	3	3	3	2			3	3	3	3		3	Design	Employability	Practical Assignments
CO4	Outline the use of Bayesian approach to solve uncertain problems.	3	3	3	3				3	3	3	3		3	Design	Employability	Practical Assignments
CO5	Implement basic Natural Language Processing programs.	3	3	3	3				3	3	3	3		3	Design	Employability	Practical Assignments

CO No.	GO Statements (UGC-A1952: R Programming Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level (Kendriya/analysis/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Write programs for arrays and matrices.	3	2	2	2	2	2	2	2	3	3	3	2	2	Design	Employability	Practical Assessments
CO2	Execute data frames and lists.	3	2	2	2	2	2	2	2	3	3	3	2	2	Design	Employability	Practical Assessments
CO3	Differentiate between arrays from vectors.	3	2	2	2	2	2	2	2	3	3	3	2	2	Design	Employability	Practical Assessments
CO4	Identify factors in R	3	2	2	2	2	2	2	2	3	3	3	2	2	Design	Employability	Practical Assessments
CO5	Execute minor projects using R.	3	2	2	2	2	2	2	2	3	3	3	2	2	Design	Employability	Practical Assessments


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CO No.	CO Statements (U/GCA1953: Digital Marketing Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level (understand/analyse/design etc.)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Highlight the key elements of a digital marketing strategy.	3	2	3					2			3			Design	Employability	Practical Assignments
CO2	Implement common digital marketing exercises using SEO, Social media and Blogs.	3	3	3					3			3			Design	Employability	Practical Assignments
CO3	Identify the major digital marketing channels.	3	3	3					3			3			Design	Employability	Practical Assignments
CO4	Design content for digital marketing.	3	3	3					3			3			Design	Employability	Practical Assignments
CO5	Develop digital marketing strategy and plan.	3	3	3					3			3			Design	Employability	Practical Assignments

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CO No.	CO Statements (UG-UGCA1955: Cyber Laws & IPR Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level(understand/analyse/ design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Identify statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.	3	3	2					2		3	3			Understand	Employability	Practical Assignments
CO2	Categorize case law and common law to current legal dilemmas in the technology field.	3	2	2					2		3	3			Understand	Employability	Practical Assignments
CO3	Outline the primary forms of intellectual property rights.	3	3	2			2		3	2	3	3			Understand	Employability	Practical Assignments
CO4	Compare the different forms of intellectual property protection in terms of their key differences and similarities.	3	3	3					3	2	3	2			Understand	Employability	Practical Assignments
CO5	Analyze the effects of intellectual property rights on society as a whole.	3	2	2					3	2	3	2		2	Understand	Employability	Practical Assignments


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CO No.	CO Statements [UGCA1957: Software Project Management]	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level(understand/analyse/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Define the principal tasks of software project managers, and basic concepts in software process.	3	2						2	3	2	3	2	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Outline the basic concepts of Software projects.	3	2						3	3	3	3	2	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Explain the fundamentals of Process Planning, effort estimation and quality planning.	3	3						3	3	3	3	2	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Comment upon risk and quality management.	3	3						2	3	3	2	2	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO5	Apply management and development practices to develop software.	3	3						2	3	3	2	2	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests


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CO No.	CO Statements (UC-UGCA1501: Mathematics)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-k	PSO-l	PSO-m	Learning Level (understand/analyse/ design etc.)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Define various mathematical notions.	3	2	1					2		3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Explain different terms used in basic mathematics.	3	3	3					3		3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Illustrate various operations and formulae used to solve mathematical problems.	3	3	3		2			3		3	3			Design	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Organize data in various models.	3	2	1					3		2	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO5	Prepare solutions for various real life problems.	3	3	3		3			3		2	3			Design	Employability	MSTs, ESE, Class/Quiz Tests



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CO No.	CO Statements (UG-UGQA 1939: Internet of Things Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-k	PSO-l	PSO-m	Learning Level (understand/analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Identify different types of IoT devices and sensors.	3	3	3	3				2	2	3	3	2	2	Understand	Entrepreneurship	Practical Assignments
CO2	Analyze sensor generated data	3	3	3	3				2	2	3	3	3	2	Analyse	Entrepreneurship	Practical Assignments
CO3	Outline the use of bluetooth for connectivity of mobile application with IoT device	3	3	3	3				3	2	3	3	3	3	Design	Entrepreneurship	Practical Assignments
CO4	Designing small IoT applications	3	3	3	3				3	2	3	3	3	2	Design	Entrepreneurship	Practical Assignments
CO5	Building interface of application with various devices	3	3	3	3				3	2	3	3	3	3	Design	Entrepreneurship	Practical Assignments


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Basic knowledge	Discipline knowledge	Experiments and practice	Tools Usage	Profession and society	Environment and sustainable	Ethics	Individual and team work	Communication	Life-long learning	PSO-k	PSO-l	PSO-m
3	3	2	2	2	2	2	2	2	3	3	2	2
3	3	3	2	2	2	2	3	2	3	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3	3	3	3


CO No.	CO Statements (UGCA1940: Computer Graphics Laboratory)	PSO-k	PSO-l	PSO-m	Learning Level(understand/analyze/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Implement algorithms for drawing basic shapes like circle, line and point.	3	2	2	Understand	Entrepreneurship	Practical Assignments
CO2	Write programs to implement 2-D and 3-D coordinate transformations.	3	2	2	Design	Entrepreneurship	Practical Assignments
CO3	Design basic shapes for loops.	3	2	2	Design	Entrepreneurship	Practical Assignments
CO4	Develop programs for basic animations using C or C++.	3	2	2	Design	Entrepreneurship	Practical Assignments
CO5	Design a small animating project.	3	2	2	Design	Entrepreneurship	Practical Assignments


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CO No.	CO Statements (UG-UGCA1941: Linux Operating System Lab)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-k	PSO-l	PSO-m	Learning Level(understand/analyse/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Prepare the environment for installation and use of Linux operating system	3	3	2					2	3	3	3			Understand	Entrepreneurship	Practical Assignments
CO2	Write Shell Scripts	3	3	3	2				2	3	3	3			Design	Entrepreneurship	Practical Assignments
CO3	Implement C programs using gcc compiler	3	3	3	2				2	3	3	3			Design	Entrepreneurship	Practical Assignments
CO4	Implement virtualization	3	3	3	2				2	3	3	3			Design	Entrepreneurship	Practical Assignments
CO5	Execute commands related to grantin and revoking user privileges.	3	3	3	3				2	3	3	3			Design	Entrepreneurship	Practical Assignments

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
CO No.	CO Statements (UG-UGCA1945: Artificial Intelligence)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level (understand/analyze/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Highlight the significance and domains of Artificial Intelligence and knowledge representation	3	3						2	2	3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Outline the advantages and disadvantages of various search techniques	3	3	2					3	2	3	3		2	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Identify various Expert Systems and AI applications	3	3	2					3	2	3	3		2	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Define the role of AI in different areas like NLP, Pattern Recognition etc	3	3	3					3	2	3	3		2	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO5	Select the right AI tool for different AI based applications	3	3	3					3	2	3	3		3	Design	Employability	MSTs, ESE, Class/Quiz Tests


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CO No.	CO Statements (UG-UGCA1946 : R Programming)	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PSO-A	PSO-B	PSO-C	Learning Level (understand/analyze/ design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Identify the key components of R programming Language.	3	2						2	3	3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Define the concept of data Science.	3	3						2	3	3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Differentiate between vectors and arrays.	3	3	2					2	2	3	3	2		Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Outline the usage of data frames, lists, factors, tables and R structures.	3	3	3					3	2	3	3	2		Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO5	Explain the need and utilization of various visualization tools.	3	3	3	3				3	2	3	3	3	3	Design	Employability	MSTs, ESE, Class/Quiz Tests



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CO No.	CO Statements (UG-UGCA1924 : Software Engineering Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level(understand/analyze/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Identify the scope and objective of different domains that have impact on society	3	3	3	3	3	3	3	3	3	3	3	3	3	Understand	Employability	Practical Assignments
CO2	Create data flow diagrams	3	3	3	3	3	3	3	3	3	3	3	3	3	Design	Employability	Practical Assignments
CO3	Compute software complexity using latest tools	3	3	3	3	3	3	3	3	3	3	3	3	3	Design	Employability	Practical Assignments
CO4	Design a software engineering process life cycle.	3	3	3	3	3	3	3	3	3	3	3	3	3	Design	Employability	Practical Assignments
CO5	Implement specification, design, implementation, and testing process using latest tools	3	3	3	3	3	3	3	3	3	3	3	3	3	Design	Employability	Practical Assignments


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CO No.	CO Statements (UG-UGCA1925: Database Management Systems Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-k	PSO-l	PSO-m	Learning Level(understand/analyze/ design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Differentiate between DDL, DML and DCL commands	3	3	3	3	3			2	3	3	2		2	Analyze	Employability	Practical Assignments
CO2	Implement DDL, DML and DCL commands	3	3	3	3	3			2	3	3	2	2	3	Design	Employability	Practical Assignments
CO3	Write integrity constraints on a database	3	3	3	3	3			3	3	3	3	2	2	Design	Employability	Practical Assignments
CO4	Design Database and Tables in relational model for some project related to society welfare	3	3	3	3	3		2	3	3	3	3	2	2	Design	Employability	Practical Assignments
CO5	Implement PL/SQL	3	3	3	3	3			3	3	3	3	2	2	Design	Employability	Practical Assignments

CO No.	CO Statements: UGC-A1926: Operating Systems Laboratory	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-k	PSO-l	PSO-m	Learning Level(understand/analysis/ design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Implement the installation and configuration of different operating systems.	3	3	3	3				3	2	3	1	3	3	Design	Employability	Practical Assignments
CO2	Write programs for different scheduling algorithms	3	3	3	3				3	3	3	1	3	3	Design	Employability	Practical Assignments
CO3	Execute various commands in Vi editor	3	3	3	3				3	3	3	2	3	3	Design	Employability	Practical Assignments
CO4	Implement the dual boot installation	3	3	3	3				3	3	3	2	3	3	Design	Employability	Practical Assignments
CO5	Execute commands in shell programming.	3	3	3	3				3	3	3	2	3	3	Design	Employability	Practical Assignments



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CO No.	CO Statements (UC-UCCAI931: Data Warehouse and Mining)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-k	PSO-l	PSO-m	Learning Level(understand/analyze/design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Highlight the need of Data Warehouse & Mining	3	3						2			2		PSO-m	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Differentiate between the Transactional and Analytical data models	3	3	2					3			2		PSO-m	Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO3	Identify the real life applications where data mining can be applied	3	3	2		2			3			3		PSO-m	Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO4	Apply different data mining algorithms on wide range of data sets	3	3	3					2			3		PSO-m	Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO5	Explain the role of visualization in data representation and analysis	3	3	2					2			3		PSO-m	Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests

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CO No.	CO Statements (UG-UGCAT1902: Fundamentals of Computer and	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-x	PSO-y	PSO-m	Learning Level(understand/analyse/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Identify of input and output devices of Computers	3	3	3	3	3			1	3	3	3	1	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Outline the functioning of various components of computer system	3	3	3	3	3			2	3	3	3	2	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Define the role of Operating system	3	3	2	2	2			2	3	3	3	1	1	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Prepare documents using word processing, Spreadsheet and Presentation Graphics Softwares.	3	2	3	3	2			3	3	3	3	1	1	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO5	Highlight the Internet safety, legally, and and other issues.	3	3	2	2	3			1	3	3	3	2	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests


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CO No.	CO Statements (UC-UGCAT 1904, Workshop on Desktop Publishing)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level (understand/analyse/design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Outlines the characteristics of desktop publishing tools	3													Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Identify the right components for designing documents.	3	1	2	2				2		3			2	Understand & Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO3	Apply knowledge in designing various documents.	3		3	3				2		3			3	Understand & Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO4	Prepare different types of graphic related documents.	3		3	3				3		3			3	Understand & Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests
CO5	Express the messages through graphical content	3		3	2				2		3			3	Understand & Design	Entrepreneurship	MSTs, ESE, Class/Quiz Tests


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CO No.	GO Statements (UGCAT1905: Problem Solving using C Laboratory)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	Learning Level(understand/analysis/ design etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Select the right statement for the program	2		1											Understanding	Employability	Practical Assignments
CO2	Experiment with different typed values	3	3	3	2				3	3	3	3	3	Understanding And Design	Employability	Practical Assignments	
CO3	Test the output with boundary conditions	3	2	3	3				3	3	3	3	3	Design	Employability	Practical Assignments	
CO4	Distinguish between various control statements and data types.	3	2	3	3				3	3	3	3	3	Design	Employability	Practical Assignments	
CO5	Implement programs for various problems.	3	2	3	3	2			3	3	3	3	3	Design	Employability	Practical Assignments	




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CO No.	CO Statements (UICCA1908: Computer System Architecture)	Basic knowledge										PSO-K	PSO-L	PSO-M	PSO-n	Learning Level(understand/analyse/ design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
		PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j							
CO1	Identify the various internal and peripheral components of computer system	3	3	2	2							3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Categorize different number system.	3	3	2	2							3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Outlines the role of various components of computer system	3	3	2	2							3	3			Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Identify micro-operations	3	3	2	2							3	3			Design	Employability	MSTs, ESE, Class/Quiz Tests
CO5	Comment on the design of Combinational & Sequential circuits	3	3	2	2							3	3			Design	Employability	MSTs, ESE, Class/Quiz Tests


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CO No.	GO Statements (UGCA1909: Object Oriented Programming using C++)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-k	PSO-l	PSO-m	Learning Level(understand/analyse/design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Outline the role of programming for solving real world problems	3	2	3	2	2	2	4	2	2	3	3	3	3	Understand	Employability	MST's, ESE, Class/Quiz Tests
CO2	Explain Object oriented approach for finding Solutions to various problems with the help of C++ language.	3	3	3	3	2	2	4	2	2	3	3	3	3	Design	Employability	MST's, ESE, Class/Quiz Tests
CO3	Implement computer based solutions to various real-world problems using C++	3	3	3	3	2	2	4	2	2	3	3	3	3	Design	Employability	MST's, ESE, Class/Quiz Tests
CO4	Select the right Object Oriented Concept for optimal solution	3	3	3	3	2	2	4	2	2	3	3	3	3	Design	Employability	MST's, ESE, Class/Quiz Tests
CO5	Review different solutions for a common problem	3	3	3	3	2	2	4	2	2	3	3	3	Review	Employability	MST's, ESE, Class/Quiz Tests	


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CO No.	CO Statements (UG/JGCA1914: Programming in Python)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PSO-k	PSO-l	PSO-m	Learning Level (understand/analyse/design etc)	Focus on Employability/Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Explain, environment, data types, operators used in Python.	3	2	3	2	2	2	1	2	2	3	3	3	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests
CO2	Compare Python with other programming languages.	3	3	3	3										Design	Employability	MSTs, ESE, Class/Quiz Tests
CO3	Outline the use of control structures and numerous native data types with their methods.	3	3	3	3				3	3	3	3	3	3	Design	Employability	MSTs, ESE, Class/Quiz Tests
CO4	Design user defined functions, modules, files, and packages and exception handling methods.	3	3	3	3				2	3	3	3	3	3	Design	Employability	MSTs, ESE, Class/Quiz Tests
CO5	Write solutions for Object Oriented Programming Concepts.	3	3	3	2				2	3	3	3	3	3	Understand	Employability	MSTs, ESE, Class/Quiz Tests

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CO No.	CO Statements (UG-UGCA1915 : Data Structures)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	PO-m	PSO-m	Learning Level(understand/analyze/ design etc)	Focus on Employability/ Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Apply appropriate constructs of Programming language, coding standards for application development	3	3	1				2	2	2	3	3	2		Understanding	Employability	MSTs, ESE, Class/Quiz Tests	
CO2	Select appropriate data structures for problem solving and programming.	3	3	1	2				3	3	3	3	2		Understanding	Employability	MSTs, ESE, Class/Quiz Tests	
CO3	Illustrate the outcome of various operations on data structures.	3	3	3	2				2	3	3	3	2		Understanding	Employability	MSTs, ESE, Class/Quiz Tests	
CO4	Identify appropriate searching and/or sorting techniques for wide range of problems and data types.	3	3	3	3				3	3	3	3	2		Understanding	Employability	MSTs, ESE, Class/Quiz Tests	
CO5	Differentiate between various types of data structures	3	3	3	3				3	2	3	3	3		Understanding	Employability	MSTs, ESE, Class/Quiz Tests	


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