#### **Supporting Documents-**

#### **Department of Computer Science & Engineering**

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



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

## B. Tech CSE 3<sup>rd</sup> Sem

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

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	CO5	C04	CO3	CO2	C01	CO No.		
	Demonstrate the reusability of Data Structures for implementing complex iterative problems	Students will be able to choose appropriate Data Structure as applied to specific problem definition	Student will 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;	Student will be able to handle operation like searching, insertion, deletion, traversing on various Data Structures and determine time and computational complexity	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness;	CO Statements		
	ы	з	ω	ω	ω	PO-a	Engineering Knowledge	BICS() (Data Structure)
	а	ω	ω	ω	ω	РО-Ь	Problem Analysis	
	ω	ω	ω	N	N	PO-c	Design/development of solutions	
	ω	ω	ω .	N	ω	PO-d	Conduct investigations of complex problems	s
	N	2	-	-	2	РО-е	Modern tool usage	
	N	2	-	N	ω	PO-f	The engineer and society	
	0	0	0	0	0	PO-g	Environment and sustainability	
	0	0	0	0	0	PO-h	Ethics	
	ω	ω	-	-	0	PO-i	Individual and team work	
	0	0	o	0	0	PO-J	Communication	
	ω	ω	-	-	-	PO-k	Project management and finance	
	ω	ω	ω	ω	ω	PO	Life-long Learning	
	ω	ω	ω.	ω	ω	PSO-m	Honing Domain Knowledge	
	ω	ω	ω	ω	ω	PSO-n	Innovation and design	
	_	-	-	_	-	PSO-o	Entrepreneurship Skills	ないで、一般のないないない
	0	0	0	0	0	PSO-p	Ethical values	Secondaria - Contra
	Demonstrate	Apply	design	Analyze	Analyze	Learning Level(understand/a nalyse/ deisgn etc)		
DBDBINNEIM	Employability	Employability	Employability	Employability	Employability	Focus on Assessment Employability / Tools to Measure Entrepreneurship Attainment of CO		
Claberta in Annhance	HOD Computer Stiffice & Enginee	Ð	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO		

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	CO5	C04	CO3	CO2	ç 2	CO No.		
	Demonstrate the concept of file operations, streams in C++ and various I/O manipulators	Understand and demonstrate the concept of data encapsulation, inheritance, polymorphism with virtual functions	Create function templates, overload function templates	Demonstrate the concept of constructors and destructors. And create new definitions for some of the operators	Identify classes, objects, members of a class and the relationships among them needed to solve a specific problem operotors	CO Statements (UC- BTEC-502-18: Digital Signal Processing)		BTCS( type code) : (Object oriented programming)
	ω	ω	ω	ω	ω	PO-a	Engineering Knowledge	: (Object c
	ω	ω	ω	ω	ω	РО-Ь	Problem Analysis	riented pro
	ω	ω	ω	ω	ω	PO-c	Design/development of solutions	ogramming
	ω	ω	ω	ω	3	PO-d	Conduct investigations of complex problems	
	N	Ν	-	7	. 2	РО-е	Modern tool usage	(6,112)
	N	Ν	-	N	ω	PO-f	The engineer and society	
	0	o	0	o	0	PO-g	Environment and sustainability	100
	0	o	0	o	0	PO-h	Ethics	
it.	ω	ω	-	-	o	PO-i	Individual and team work	and the second second
	0	0	0	o	0	PO-j	Communication	
	ω	ω		1	-	PO-k	Project management and finance	
	ω	ω	ω	ω	ω	PO-I	Life-long Learning	
	ω	ω	ω	ω	ω	PSO-m	Honing Domain Knowledge	
	ω	ω	ω	ω	ω	PSO-n	Innovation and design	のないのである
	_	_	_	_	-	PSO-o	Entrepreneurship Skills	
	0	0	0	0	0	PSO-p	Ethical values	
	Demonstratre	Understand	Apply	Demonstratre	identify	Learning Level(understand/an alyse/ deisgn etc)		
Internation of the	Employability	Employability	Employability	Employability	Employability	Focus on Asses Employability / Measu Entrepreneurship of CO		
PTU Main Campus	D Computer Science & Engineering	A	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO		

A MARINE A LAND THAT I T						
	CO No.	C01	CO2	CO3	C04	C 05
BTCS()	CO Statements	Improve practical skills in designing and implementing basic linear data structure algorithms	Improve practical skills in designing and implementing Non-linear data structure algorithms;	Use Linear and Non-Linear data structures to solve relevant problems;	Choose appropriate Data Structure as applied to specific problem definition;	Implement Various searching algorithms and become familiar with their design methods
ngineering Knowledge	PO-a	з	ω	ω	ω	ы
roblem Analysis	PO-b	ω	ω	ω	ы	ω
esign/development of solutions	POr	ω	ω	ω	ы	ω
conduct investigations of complex problems	Pod	ω	ω	ω	ω	ы
lodem tool usage	PO-e	2	-	-	2	N
The engineer and society	PO-f	ω	N	-	2	2
Environment and sustainability	PO-g	0	o	0	0	0
Ethics	PO-h	0	0	0	0	0
ndividual and team work	PO	0	-	-	ы	ω
Communication	PO-j	0	0	0	0	0
Project management and finance	PO-k	-	-	-	ω	ω
Life-long Learning	PO-I	ω	ω	ы	ω	ω
Honing Domain Knowledge	PSO-m	ω	ω	ü	ω	ω
Innovation and design	PSO-n	ω	ω	ω	ω	ω
Entrepreneurship Skills	PSO-o	_	-	-	_	-
Ethical values	PSO-p	0	0	0	0	0
	Learning Level(understand/a nalyse/ deisgn etc)	Apply	design	Implement	Apply	Implement
	Focus on Employability / Entrepreneurship	Skill Development	Skill Development	Skill Development	Skill Development	Skill Development
	Assessment Tools to Measure Attainment of CO	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests		

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

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

# B. Tech CSE 4<sup>th</sup>Sem

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Department of Computer Science & Engineering IKG PTU Mani Cani. Kapurthata \*

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CO5	CO4	CO3	CO2	CO1	CO No.	
Understand the concept of pipelining and its performance metrics	Classify hardwired and microprogrammed control units	Design a memory module and analyze its operation by interfacing with the CPU;	Apply instruction set for Writingassembly language programs	Understand functional block diagram of microprocessor	CO Statements (UC-BTES-401-18: Computer Organisation and Architecture)	
ω	ω	ω	ω	ω	PO-a	Engineering Knowledge
ω	-1	ω	N	-	РО-Ь	Problem Analysis
ω	2	ω	ω	N	PO-c	Design/development of solutions
ω	N	ω	ω	N	PO-d	Conduct investigations of complex problem
ω	ω	N	N	2	PO-e	Modern tool usage
-				-	PO-f	The engineer and society
		1	-		PO-g	Environment and sustainability
-					PO-h	Ethics
ω	-	ω	ω	_	PO-I	Individual and team work
N		N	N	-	POj	Communication
-	-	-	N		PO-k	Project management and finance
ω	ω	ω	ω	ω	PO-I	Life-long Learning
ω	ω	ω	ω	ω	PSO-m	Honing Domain Knowledge
N		ω	-		PSO-n	Innovation and design
ω		N	ω	-	PSO-o	Entrepreneurship Skills
_		1			PSO-p	Ethical values
Understand	Apply	Design	Apply	Understand	Learning Level(understand/ analyse/ deisgn etc)	
Employability	Employability	Employability	Employability	Employability	Focus on	
		MSTs, ESE, Class/Quiz Tests			Assessment Tools to Measure Attainment of CO	

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CO5	C04	CO3	CO2	C01	CO No.	
To develop the given problem as graph networks and solve with techniques of graph theory.	To evaluate Boolean functions and simplify expressions using the properties of Boolean algebra	For a given a mathematical problem, classify its algebraic structure	To derive the solution for a given problem using deductive logic and prove the solution based on logical inference	To be able to express logical sentence in terms of predicates, quantifiers, and logical connectives	CO Statements (UC-BTEC 502-18: Digital Signal Processing)	
ω	ω	3	ω	ω	PO-a	Engineering Knowledge
	ω	ω	ω	ω	PO-b	Problem Analysis
ω	ω	ω	ω	ω	PO-c	Design/development of solutions
ω	 ω	N	ω	N	Po-d	Conduct investigations of complex problems
-					ро-е	Modern tool usage
N	N		-	-	PO-f	The engineer and society
-				-	PO-g	Environment and sustainability
-					PO-h	Ethics
2		-	2	-1	PO-i	Individual and team work
N	N				PO-j	Communication
N	-				PO-k	Project management and finance
N	_		-		РОЧ	Life-long Learning
N	-1	-	N	N	PSO-m	Honing Domain Knowledge
N	N.	-			PSO-n	Innovation and design
2					PSO-0	Entrepreneurship Skills
					PSO-p	Ethical values
Design	Design	Design	Design	Understand	Learning Level (understand/ analyse/ deisgn etc)	
Employability	Employability	Employability	Employability	Employability	Focus on Employability / Entrepreneurship	
MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	

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

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Γ	CO6	CO5	CO4	CO3	CO2	C01	No.	
	Appraise high-level operating systems concepts such as file systems, disk- scheduling algorithms and various file systems.	management system;	Examine and categorize various memory management techniques like caching, paging, segmentation, virtual memory and thrashing	Analyze and apply CPU scheduling algorithms, deadlock detection and prevention algorithms;	Distinguish concepts related to processes, threads, process scheduling, race conditions and critical sections;	Explain basic operating system concepts such as overall architecture, system calls, user mode and kernel mode;	CO Statements (UC-BTEC- 502-18: Digital Signal Processing)	nu an ann ann an Star Star 
	ω	ы	3	з	ω	ω	PO-a	Engineering Knowledge
	ω	ω	ω	ω	ω	2	РО-ь	Problem Analysis
Ī	ω	ω	ω	ω	ω	N	PO-c	Design/development of solutions
	ω	ω	ω	ω	ω	-	PO-d	Conduct investigations of complex problem:
-	ω	ω	ω	ω	ω	-	PO-e	Modern tool usage
	ω	ω	ω	ω	N	2	PO-f	The engineer and society
	N	2	-	N	N	···	PO-g	Environment and sustainability
	-			-	-		PO-h	Ethics
	N	N	N	2	N	N	PO	Individual and team work
	N	N	. N	N	N	-	PO	Communication
	N	N	N	N	N	-	PO-k	Project management and finance
	ω	ω	ω	ω	ω	N	PO-I	Life-long Learning
	ω	ω	ω	ω	ω	N	PSO-m	Honing Domain Knowledge
·	ω	ω	N	ω	ω	N	PSO-n	Innovation and design
	ω	N		N	N		PSO-o	Entrepreneurship Skills
	_	-			-		PSO-p	Ethical values
HOD	Understand	Design	Analyse	Design	Design	Understand	Bullion and an and and an a street	
HOD Kennouter Science & Engineering	Entrepreneurship	Entrepreneurship	Entrepreneurship	Skill Development/ Entrepreneurship	Entrepreneurship/ Skill Development	Employability	Focus on I Employability <i>I</i> Entrepreneurship	
HOD Computer Science & Engineering	MSTs, ESE, Class/Quiz Tests	Class/Quiz Tests		/ MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Tools to Measure Attainment of CO	According

artment Computer Science and Engineering rogram : B.Tech. (Computer Science and Engineering)

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CO5	CO4	CO3	CO2	C01	CO No.	
Examine the necessity for NP class based problems and explain the use of heuristic techniques	Demonstrate the ways to analyze approximation/randomized algorithms	Explain model for a given engineering problem, using tree or graph, and writethe corresponding algorithm to solve the problems	Explain when an algorithmic design situation calls for which design paradigm (greedy/ divide and conquer/backtrack etc.	For a given algorithms analyze worst- case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms	CO Statements	Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problems Modern tool usage
ω	ω	ω	ω	ω	PO-a	Engineering Knowledge
ω	ω	ω	ω	ω	РО-Ь	Problem Analysis
ω	ω	ω	ω	1	PO-c	Design/development of solutions
ω	ω	ω	ω	ω	PO-d	Conduct investigations of complex problems
N	2	-			РО-е	Modern tool usage
N	-	-		-	PO-f	The engineer and society
					PO-g	Environment and sustainability
					PO-h	Ethics
					PO	Individual and team work
	9				POJ	Communication
					PO-k	Project management and finance
					POJ	Life-long Learning
3	ω	ω	ω	ω	PSO-m	Honing Domain Knowledge
2	2	N	N	N	PSO-n	Innovation and design
					PSO-o	Entrepreneurship Skills
					PSO-p	Ethical values
Design	Design	Analyse	Analyse	Understand	Learning Level (understand/ analyse/ deisgn etc)	
Employability	Employability	Employability	Employability	Employability	Focus on	
		0	MSTs, ESE,	÷.	Assessment Tools to Measure Attainment of CO	

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

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	CO3	CO2	C01	CO No.		
	Demonstrate the functioning of microprocessor/ microcontroller based systems with I/O interface	Implement the various assembly language problems for basic arithmetic and logical operations	Assemble personal compuer	CO Statements (UC-BTES-402-18: Computer Organisation and Architecture Lab)		<ul> <li>Program: o. recu. Computer Section and Architecture Lab)</li> <li>BTE5(402-18): (Computer Organisation and Architecture Lab)</li> </ul>
	ω	ω	з	PO-a	Engineering Knowledge	: (Comput
	1	ω	2	РО-Ь	Problem Analysis	er Organis
Sector Sector	ω	ω	2	PO-c	Design/development of solutions	ation and ,
1000	ω	ω	ω	PO-d	Conduct investigations of complex problems	Frogram : D. IECH. (Computer Science and Engineering) 5(402-18) : (Computer Organisation and Architecture La)
	1	2	2	ро-е	Modern tool usage	re Lab)
al alle	1	1	2	PO-f	The engineer and society	
			2	PO-g	Environment and sustainability	
1			1	PO-h	Ethics	
	2	ω	ω	PO-i	Individual and team work	
A STATE	2	N	1	PO-j	Communication	
	ω	ω	1	PO-k	Project management and finance	
a contraction	ω	ω	ω	P	Life-long Learning	
aller to be	ω	ω	ω	PSO-m	Honing Domain Knowledge	
	2	ц	1	PSO-n	Innovation and design	
	ω	1	2	PSO-0	Entrepreneurship Skills	
	4		1	PSO-p	Ethical values	
The sub- and store	Demonstrate	implement	Understand	Learning Level (understand / analyse/ deisgn etc)		
and the second second	Skill development	Skill development	Skill development	Focus on		
	Skill development MST5, ESE, ClassQQuiz	Skill development Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO		

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

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66	CO5	604	CO3	602	10	CO No.	
Understand the concepts of deadlock in operating systems and implement them in multiprogramming system.	Simulate file allocation and organization techniques;	Understand and implement the concepts of shell programming;	Implement commands for files and directories;	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority;	Understand and implement basic services and functionalities of the operating system;	CO Statements (UC-BTEC-502-18: Digital Signal Processing)	
ω	ω	ω	ω	ω	ω	po-a	Éngineering Knowledge
ω	ω	2	ω	ω	ω	ро-ь	Problem Analysis
ω	ω	ω	ω	ω	ω	РО-с	Design/development of solutions
ω	ω	2	ω	ω	ω	PO-d	Conduct investigations of complex problems
ω	u	ω	ω	ω	ω	РО-е	Modern tool usage
ω	2	ω	2	ω	2	PO-f	The engineer and society
ω	2	ω	2	ω	2	PO-g	Environment and sustainability
-				1		ро-ћ	Ethics
ω	з	2	2	ω	ω	PO-i	Individual and team work
ω	2	ω	2	ω	2	PO-j	Communication
3	2	2	2	ω.	ω	PO-k	Project management and finance
ω	2	U	2	з	ω	PO-I	Life-long Learning
ω	2	ω	u	ω	ω	PSO-m	Honing Domain Knowledge
ω	2	ω	з	υ	ω	PSO-n	Innovation and design
ω	2	2	2	ω	2	PSO-o	Entrepreneurship Skills
1				1		PSO-p	Ethical values
Design	Understand & Design	Understand & Design	Design	Analyse	Understand	PSO-o PSO-p Learning analyse/ deisgn etc)	
Entrepreneurship/ Skill MSTs, ESE, Practice development Assignments Tests	Entrepreneurship/ Skill MSTs, ESE, Practical development Assignments Tests	Entrepreneurship/ Skill MSTs, ESE, Practical development Assignments Tests	Entrepreneurship/ Skill MSTs, ESE, Practical development Assignments Tests	Entrepreneurship/ Skill MSTs, ESE, Practical development Assignments Tests	Employability	Focus on	
III MSTs, ESE, Practical Assignments Tests	II MSTs, ESE, Practical Assignments Tests	II MSTs, ESE, Practical Assignments Tests	II MSTs, ESE, Practical Assignments Tests	II MSTs, ESE, Practical Assignments Tests	MSTs, ESE, Practical Assignments Tests	Assessment Tools to Measure Attainment of CO	

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Department Computer Science and Engineering

CO4	соз	CO2	CO1	No.		
Design and Implement heuristics for real world problems.	Implement Various tree and graph based algorithms and become familiar with their design methods;	Understand comparative performance of strategies and hence choose appropriate, to apply to specific problem definition;	Design and implement complex problems with different techniques	CO Statements		BICS
ω	ω	ω	ω	PO-a	Engineering Knowledge	: (UAA Lab)
ω	ω	ω	ω	РО-Ь	Problem Analysis	Lab)
ω	ω	ω	ω	PO-c	Design/development of solutions	and the loss
ω	N	ω	ы	PO-d	Conduct investigations of complex problems	
ω	ω	ω	ω	РО-е	Modern tool usage	Contraction of the second
2	-	N	N	- <b>h</b>	The engineer and society	
				ė	Environment and sustainability	
		2		PO-h	Ethics	
		N	N	PO-i	Individual and team work	
				PO-j	Communication	
				PO-k	Project management and finance	
		r		PO-I	Life-long Learning	
ω	ω	ω	ω	в PSO-	Honing Domain Knowledge	
ω	-	ω	ω	pso-	Innovation and design	
2	N			PSO-	Entrepreneurship Skills	
				p pso-	Ethical values	
Design	Apply	understand	design	Learning Level (understand/ analyse/ deisgn etc)		
Skill Development/Em ployability	Skill Development/Em ployability	Skill Development/Em ployability	Skill Development/Em ployability	Focus on		
		n MSTs, ESE, Class/Quiz Tests		Assessment Tools to Measure Attainment of CO		

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

# B. Technical University, 1 a star CSE

### 5<sup>th</sup>Sem

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

	CO5	CO4	CO3	C02	C01	No.	and the state of the state	alumon Binnen
Serializability of scheduling		determine the transaction atomicity, consistency, isolation, and durability	construct the SQL queries for Open source and Commercial DBMS-MYSQL, ORACLE, and DB2.	design the databases using ER method and normalization.	write relational algebra expressions for a query and optimize the Developed expressions	CO Statements (UC-BTCS-501- 18: Database Management System)		BTCS( type code) BTCS-501-18 Database Management System
	-	-	_	-	-	PO-a	Engineering Knowledge	B.Tech BTCS-
	N	N	N	ω	ω	PO-b	Problem Analysis	501-18
	N	-	N	ω	ω	PO-c	Design/development of solutions	Databa
-	N		N	N	N	PO-d	Conduct investigations of complex problems	ase Mar
	_	-	N	N	0	РО-е	Modern tool usage	and En
	_	0	-		0	PO-f	The engineer and society	gineerii ent Syst
	_	0	_	-	0	PO-g	Environment and sustainability	lem .
	_	0	_	-	0	PO-h	Ethics	
	ω	ω	N	ω	ω	PO-i	Individual and team work	
	ω	ω	N	ω	ω	PO-j	Communication	
	N	N	N	N	N	PO-k	Project management and finance	
	N	N	N	N	N	PO-I	Life-long Learning	_
	ω	ω	ω	ω	ω	рso-	Honing Domain Knowledge	
- 10	N	_	N	ω	N	PSO-	Innovation and design	
	N		ω	ω	-	PSO-	Entrepreneurship Skills	
		0	-	-	0	pso-	Ethical values	
	design	understand	design .	Analyse	understand	Learning Lever (understand/ analyse/ deisgn etc)		
tritent of Con	employability	employability	enterpreneurship	enterpreneurship	employability	Focus on Employability / Entrepreneurship		
tment of Computer Science & Engineering	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Tests	MSTs, ESE, Class/Quiz Tests	Assessment roots to Measure Attainment of CO	HOD Department of Computer Science & IKG PTU Main C Kapurthala	, Engineerin ampus

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	C07	CO6	CO5	C04	CO3	C02	C01		N CO	502-18) - Memory (1997) - Memory (1997)
	Distinguish between computability and non-computability and Decidability and undecidability.	Write the hierarchy of formal languages, grammars and machines.	Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars	Design context free grammars to generate strings of context free language.	For a given language determine whether the given language is regular or not.	Design finite automata to accept a set of strings of a language.	Write a tormal notation for surings, languages and machines.		CO Statements (UC-BTEC-502-18: Digital Signal Processing)	502-18) :Formal Language & Automata Theory
	N	N	ω	ω	ω	з	з		PO-a	Engineering Knowledge
	-	-	ω	N	ω	ω	N		РО-Ь	Problem Analysis
	_	-	ω	ω	ω	ω	2		PO-c	Design/development of solutions
	-	_	ω	N	ы	2	-		PO-d	Conduct investigations of complex problems
			N	-	N	-			PO-e	Modern tool usage
	_	_	_		N	-1			PO-f	The engineer and society
	_	_	N	_	-				PO-g	Environment and sustainability
			-						PO-h	Ethics
	-		N	N	N	-	-	<b>-</b>	PO-i	Individual and team work
			-		-				PO-j	Communication
		-	_	N	N	_		-	PO-k	Project management and finance
			ω	-	N	N		N,	PO	Life-long Learning
	N	_	ω	N	ω	2	8		л PSO-	Honing Domain Knowledge
	-		ω	2	ω	2			PSO-n	Innovation and design
			N	N	N				PSO-	Entrepreneurship Skills
									PSO-o PSO-p	Ethical values
HOD Department IKG F	Understand	Understand	DEsign	Design	Analyse	Design		Understand	Learning Level (understand/ analyse/ deisgn etc)	
HOD Department of Computer Science & Engineering IKG PTU Main Campus	Émployability	Employability	Entrepreneurship	Entrepreneurship	Entrepreneurship		Employability	Employability	Focus on Employability / Entrepreneurship	
& Engineering ampus	Class/Quiz Tests	Class/Quiz Tests	MSTs, ESE, MSTs, ESE,	Class/Quiz Tests	Class/Quiz Tests	MSTs, ESE,	MSTs, ESE,	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	

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	603	C04	G	CO2	100	CO No.	
	Proficiently apply standards, CASE tools and techniques for engineering software projects	Identify and apply the principles, processes and main knowledge areas for Software Project Management	Work with various techniques, metrics and strategies for testing software projects.	Analyze various software engineering models and apply methods for design and development of software projects.	Students should be able to identify the need for engineering approach to software development and various processes of requirements analysis for software engineering problems.	CO Statements (UC-BTEC-502-18 (Software Engineering)	BICS(Survey)
	ω	ω	ω	ω	ω	PO-a	Engineering Knowledge
	ω	ω	ω	ω	Ν	РО-Ь	Problem Analysis
	ω	ω	ω	ω	N	РО-с	Design/development of solutions
	ω	ω	2	2	N	PO-d	Conduct investigations of complex problem
	ω	ω	ω	ω	1	РО-е	Modern tool usage
	ω	ω	2	ω	N	po-f	The engineer and society
	ω	2	1	2	N	PO-g	Environment and sustainability
		1	1	1	N	PO-h	Ethics
	2	ω	2	ω	N	PO-i	Individual and team work
	2	<u></u>	2	2	ω	PO-j	Communication
	2	ц	2	ω	ω	PO-k	Project management and finance
	ω	ω	ω	ω	ω	Po-I	Life-long Learning
	ω	ω	ω	ω	ω	PSO-IT	Honing Domain Knowledge
	ω	ω	ω	2	N	PSO-n	Innovation and design
	ω	ω	2	ω		PSO-m PSO-n PSO-o	Entrepreneurship Skills
		1	1		N	PSO-p	Ethical values
	Design	Design	Create	Analyse	Understand	PSO-p (understand/ analyse/ deisgn etc)	
Department of C	Entrepreneurship	Entrepreneurship	Entrepreneurship	Entrepreneurship	Employability	Focus on Employability / Entrepreneurship	
HOD Department of Computer Science & Engineering IKG PTU Main Campus	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	

	C04	CO3	C02	C01	CO No.		
10013.	Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and toole	Develop the network programming for a given problem related TCP/IP protocol	Describe the function of each block of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)	Explain the functions of the different layer of the OSI Protocol	CO Statements: BTCS 504 -18UC (Computer Network)		BTCS( type code) : BTCS 504 -18UC (Computer Network)
	ω	ω	ω	ω	PO-a	Engineering Knowledge	: BTCS 5
	ω	ω	2	ω	РО-Ь	Problem Analysis	04 -18U
	ω	ω	ω	ω	PO-c	Design/development of solutions	C (Comp
	ω	ω	2	2	PO-d	Conduct investigations of complex problem	uter Ne
	ω	ω	ω	ω	РО-е	Modern tool usage	twork)
	ω	ω	ω	ω	PO-f	The engineer and society	
	ω	ω	ω	ω	PO-g	Environment and sustainability	
	ω	2	2	2	PO-h	Ethics	
		ω	ω	2	PO-i	Individual and team work	
	ω	ω	ω	ω	PO-j	Communication	_
	1	1	2	1	PO-k	Project management and finance	
	ω	ω	ω	ω	PO-I	Life-long Learning	
	ω	ω	ω	З	PSO-m	Honing Domain Knowledge	
	ω	2	ω	2	PSO-n	Innovation and design	
	2	2	1	2	PSO-o	Entrepreneurship Skills	
	2	14	4	2	PSO-p	Ethical values	
	2	ω	2	2	Learning Level (understand/ analyse/ deisgn etc)		
A	3	ω	2	2	Focus on Employability / Entrepreneurship		
	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Tools to Measure Attainment of CO	According	

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	CO2	CO1	No.		abi
	develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management	develop web based application using suitable client side and server side web technologies	CO Statements	Inclusion and an example it.	BTCS 512-18: (Web and Open Source Technologies Lab)
	ω	ω	PO-a	Engineering Knowledge	Program : B. lech. (Computer science and congrisering) S 512-18 : (Web and Open Source Technologies Lab)
	ω	2	РО-Ь	Problem Analysis	and O
-	ω	2	PO-c	Design/development of solutions	pen Sou
	ω	ω	PO-d	Conduct investigations of complex problems	urce Te
	2	ω	РО-е	Modern tool usage	chnolog
		ω	PO-f	The engineer and society	gies Lab
		2	PO-g	Environment and sustainability	116/ •
	4	2	PO-h	Ethics	
	ω	ω	PO-I	Individual and team work	
	2	2	PO-j	Communication	
	ω	ω	PO-k	Project management and finance	
	ω	ω	PO-I	Life-long Learning	
	ω	ω	л РО-	Honing Domain Knowledge	
	ω	ω	PSO-n	Innovation and design	
	ω	ω	PSO-o	Entrepreneurship Skills	
T	N	2	PSO-p	Ethical values	
	ω	ω	PSO-n PSO-o PSO-p (understand/analyse/ deisgn etc)		
A	ω	ω	Focus on Employability / Entrepreneurship		
	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO		

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	CO4	CO3	C02	C01	CO No.	sper - tool -
	Read and write data from & to files in Python and develop Application using Pygame	Use functions and represent Compound data using Lists, Tuples and Dictionaries	Implement Conditionals and Loops for Python Programs	Write, Test and Debug Python Programs	nts (Programming i	nua investi desse ofisite moderni nua investi nua is una se intranche fui nu is una se intranche fui nu is una se intranche fui nu investi nu intersti interstitut
	ω	ω	ω	ω	PO-a	Engineering Knowledge
	ω	2	ω	ω	РО-Ь	Problem Analysis
	ω	2	2	ω	РО-с	Design/development of solutions
	ω	ω	ω	ω	PO-d	Conduct investigations of complex problems
F	ω	2	2	ω	РО-е	Modern tool usage
	ω	ω	ω	ω	PO-f	The engineer and society
-	1	2	2	2	РО-в	Environment and sustainability
ŀ	. 2	4	2	1	PO-h	Ethics
	4	2	ь	Ľ	PO-i	Individual and team work
	2	4	1	2	PO-j	Communication
	1	2	4	2	PO-k	Project management and finance
	2	2	ω	4	PO-I	Life-long Learning
	2	ω	2	2	pso- m	Honing Domain Knowledge
	2	4	2	4	PSO-n	Innovation and design
	2	2	2	2	PSO-c	Entrepreneurship Skills
		4			PSO-p	Ethical values
	Design	Apply	Implement	Test and Evaulate	PSO-n PSO-o PSO-p (understand/ analyse/ deisgn etc)	
·	Employability	Employability	Employability	Employability	Focus on Employability / Entrepreneurshi p	
	Class/Quiz Tests	Class/Quiz Tests	Class/Quiz Tests	MSTS, ESE, Class/Quiz Tests MSTS, ESE,	Assessment Tools to Measure Attainment of CO	

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Department Computer Science and Engineering

CO2	CO4	CO3	CO2	CO1		S S		Partie .
Deploy applications to the Android marketplace for distribution	Program mobile applications for the Android operating system that use basic and advanced phone features,	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,	Critique mobile applications on their design pros and cons	Describe those aspects of mobile programming that make it unique from programming for other platforms		CO No. CO Statements		BTCS : Mobile Application Development
ω	ω	ω	ω	ω		PO-a	Engineering Knowledge	: Mobile Application Development
ω	ω	ω	ω	ω		РО-Ь	Problem Analysis	Applicat
ω	ω	ω	ω	·		РО-с	Design/development of solutions	ion Devi
ω	ω	2	ω	ω		PO-d	Conduct investigations of complex probler	elopmer
ω	ω	ω	ω	ω		ро-е	Modern tool usage	nt -
2	2	1	2		an and a second	PO-f	The engineer and society	
						PO-g	Environment and sustainability	
				1. 	1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	PO-h	Ethics	
2		2	2	2	the second	PO-i	Individual and team work	
	2				10100	PO-j	Communication	
					- ball of a line	PO-k	Project management and finance	
		1.1			The second s	PO-I	Life-long Learning	
. ω	ω	ω	ω	ω		PSO-m	Honing Domain Knowledge	States of
ω	ω	1	ω	ω		-m PSO-n PSO-o	Innovation and design	
		2				PSO-0	Entrepreneurship Skills	
2	2					PSO-p	Ethical values	
Design	Design	Apply	understand	design	etc)	(understand/ analyse/ deisgn	Learning Level	
Employability	Employability	Employability	Entrpreneurship	Employability		Employability / Entrepreneurship	Foreson	
		MSTs, ESE, Class/Quiz Tests			•	to Measure Attainment of CO	Assessment Tools	

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C04		CO3	CO2	<u>6</u>	CO No.			(Bull
basic graphical primitives and databases	Develop an application using	Illustrate the android wifi features and advance android development	Demonstrate and Understanding anatomy of an Android application	Demonstrate the android features and create, develop using android	CO Statements		BTCS( type code)	Program
ω		2	ω	ω	ά.	Engineering Knowledge	Mobile Application Development Lab	B. Lect
ω		_	ω	ω.	4	Problem Analysis	Applicat	I. (Com
ω		-	ω	ω	4	Design/development of solutions	ion Dev	puter of
ω		N	ω	ω	à	Conduct investigations of complex problem	elopme	
ω	,	-	ω	ω		Modern tool usage	nt Lab	B. Jech. (Computer Science and Engineering)
6	,	N	ω	N	PO-f	The engineer and society		JIIICCIII
u	2	-	ω	N	PO-g	Environment and sustainability		31
N	2	_			PO-h	Ethics		
0	٥ ٥	ω	ω	ω	PO-i	Individual and team work		
	u a	ω	ω	ω	PO-j	Communication		
	w.	-	N	ω	PO-k	Project management and finance		
	ω	N	ω	ω	PO-I	Life-long Learning		1000
	ω		ω	ω	m m	Honing Domain Knowledge	-	
	ω	N	ω	ω	рso- п	Innovation and design		
	ω	-	ω	ω	PSO-	Entrepreneurship Skills		
	N	-		N	pso-	Ethical values		
	Design	Analyse	Understand	Design	Learning Level (understand/ analyse/ deisgn etc)			
	Skill Development	Skill Development	Skill Development	Skill Development	Focus on Employability / Entrepreneurship			
5	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO			

HOD Department of Configurate Configuration IKG PTU Main Campus Kapurthala

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CO4	СОЗ	C02	C01	No.	The second station of
To develop real life IoT based projects	To remotely monitor data and control devices	To develop an Interface I/O devices, sensors & communication modules	To understand internet of Things and its hardware and software components	CO Statements	Engineering Knowledge
ω	З	ω	1	PO-a	Engineering Knowledge
2	ω	ω	1	РО-Ь	Problem Analysis
2	ω	ω	4	PO-c	Design/development of solutions
ω	ω	ω	2	РО-4	Conduct investigations of complex problems
ω	ω	ω	4	ро-е	Modern tool usage
ω	ω	ω	4	PO-f	The engineer and society
ω	4	2	1	PO-g	Environment and sustainability
	4			PO-h	Ethics
ω	ω	ω	Ě	PO-i	Individual and team work
4	ω	ω	ω	PO-j	Communication
2	2	2	1	PO-k	Project management and finance
ω	ω	ω·	ω	PO-I	Life-long Learning
ω	ω	ω	2	m PSO-	Honing Domain Knowledge
ω	ω	2	1	pso-	Innovation and design
ω	4	2	. 1	o PSO-	Entrepreneurship Skills
ц	4	1		pso-	Ethical values
Develop	Analyse	Develop	Understand	Learning Level (understand/ analyse/ deisgn etc)	
Skill Development	Skill Development	Skill Development	Skill Development	Focus on Employability / Entrepreneurship	
MSTs, ESE, Class/Quiz Tests	Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	

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		O No.	C01	CO2	СОЗ	C04
21		CO No. CO Statements	To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.	To demonstrate the importance of viewing and projections.	To apply the fundamentals of animation, virtual reality and its related technologies	To implement a typical graphics pipeline
Comp	Engineering Knowledge	РО-а	ω	ω	ω	ω
BLC2 : (computer or ability and	Problem Analysis	РО-Ь	ω	ω	ω	ω
	Design/development of solutions	PO-c	ω	ω	ω	ω
	Conduct investigations of complex pr	PO-d	ω	2	ω	ω
	Modern tool usage	РО-е	ω	ω	ω	ω
	The engineer and society	PO-f	2			
	Environment and sustainability	PO-g				
	Ethics	PO-h				
	Individual and team work	PO-i	N	2	2	2
	Communication	PO-j				
e	Project management and finance	PO-k	126			
	Life-long Learning	PO-I		1		
	Honing Domain Knowledge	PSO-m	ω	ω	ω	ω
	Innovation and design	PSO-n	ω	2	ω	2
	Entrepreneurship Skills	PSO-o	2		2	
	Ethical values	PSO-o PSO-p				
		Learning Level (understand/ analyse/ deisgn etc)	design	understand	Apply	Design
		Focus on Employability / Entrepreneurship	Employability & Entrpreneurship	Entrpreneurship	Employability & Entrpreneurship	Employability
		Assessment Tools to Measure Attainment of CO		MSTs, ESE, Class/Quiz Tests		A

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

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	C04	соз	C02	CO1	CO No.	CERCO CONT	and the second
	execute triggers, cursors, stored procedures etc.	design and execute the various data manipulation queries.	impiement generation of tables using datatypes	retrieve data from relational databases using SQL	CO Statements (UC-BTC5-505-18: Database Management System Lab)		Prograim: B.Tech. (Computer Science and Engineering) BTCS( type code): BTCS-505-18 Database Management System Lab
	ц	1	1	1	PO-a	Engineering Knowledge	: B.Tech. : BTCS-5
	ω	2	2	ω	РО-Ь	Problem Analysis	(Compt 05-18 D
	ω	2	2	2	РО-с	Design/development of solutions	atabase
	ω	2	2	2	PO-d	Conduct investigations of complex problems	nce and Manage
	2	1	1	Þ	РО-е	Modern tool usage	Enginee ment Sy
	1	1	1	1	PO-f	The engineer and society	ering) stem La
	1	1	1	1	PO-g	Environment and sustainability	0
Ī	Ч	1	1	1	PO-h	Ethics	
Ī	ω	ω	ω	ω	PO-i	Individual and team work	
Ī	ω	2	ω	2	PO-j	Communication	
	ω	ω	ω	ω	PO-k	Project management and finance	
	ω	ω	ω	ω	PO-I	Life-long Learning	
	2	2	2	2	PSO-m	Honing Domain Knowledge	
	2	2	2	2	PSO-n	Innovation and design	
	2	2	2	2	PSO-o	Entrepreneurship Skills	
	1	1	1	1	PSO-p	Ethical values	
	Design	Design	Design	Analyse	D-m PSO-n PSO-o PSO-p (understand/ analyse/ deisgn etc)		
	enterpreneurship	employability	enterpreneurship	employability	Focus on Employability / Entrepreneurship		
N	Practicals	Practicals	Practicals	Practicals	Asses		•
A	cals Viva	als Viva	als Viva	als Viva	Assessment Tools to Measure Attainment of CO	Section and the	
		al Cabrie			sment Tools to Me Attainment of CO		
	Assignments	Assignments	Assignments	Assignments	Measuri CO		

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					7.0	The refreed asserty
	CO4	CO3	CO2 0	CO1	No.	
	Configure routers using various router configuration	Create and configure networks in packet tracer tool using various network devices and topologies.	Create various networking cables and know how to test these cables.	Know about the various networking devices, tools and also understand the implementation of network topologies.	CO Statements	Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problems Modern tool usage The engineer and society
	ω	ω	ω	ω	PO-a	Engineering Knowledge
		Ľ		1	РО-Ь	Problem Analysis
	2	ω	2	ω	РО-с	Design/development of solutions
	2	4	2	2	PO-d	Conduct investigations of complex problems
F	ω	ω	ω	ω	ро-е	Modern tool usage
	ω	ω	ω	ω	PO-f	The engineer and society
	ω	ω	ω	ω	PO-g	Environment and sustainability
	1	4	1	2	PO-h	Ethics
-	2	N	2	2	PO-i	Individual and team work
	ω	ω	ω	ω	PO-j	Communication
	ω	2	1	1	PO-k	Project management and finance
	ω	ω	ω	ω	PO-I	Life-long Learning
	ω	ω	ω	ω	PSO-m	Honing Domain Knowledge
	2	ω	2	ω	PSO-n	Innovation and design
	4	2	2	2	PSO-o PSO-p	Entrepreneurship Skills
	1	1	4	N	PSO-p	Ethical values
	ω	ω	. 2	ω	Learning Level(understand/ analyse/ deisgn etc)	
HOD A Connection	ω	2	2	ω	Focus on Employability / Entrepreneurship	
n include 9 Envinopring	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	

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KG PTU Main Campus Kapurthala

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

#### I.K. Gujral Puni do Teconical University, La purto A B. Technical University, La purto A B. Technical

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### 6<sup>th</sup>Sem

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

						Conference investigations of complex problems
CO5	CO4	003	CO2	C01	CO No.	Mon im tool usage
Apply for various optimization techniques for dataflow analysis	Convert source code for a novel language into machine code for a novel computer	Construct the intermediate code representations and generation	Develop the parsers and experiment the knowledge of different parsers design	Understand the major phases of compilation including front-end and back-end.	CO Statements	
ω	ω	ω	ω	ω	PO-a	Engineering Knowledge
N	ω	N	ω		РО-ь	Problem Analysis
-	ω	N	ω	1	PO-c	Design/development of solutions
N	ω	N	N		PO-d	Conduct investigations of complex problems
2	ω	N	ω	ω	PO-e	Modern tool usage
ω	ω	N	ω	N	PO-f	The engineer and society
ω	N	-	N	N	PO-g	Environment and sustainability
	-	-	-		PO-h	Ethics
N	ω	N,	ω	N	PO-i	Individual and team work
N	-		-	-	PO-j	Communication
N	-	N	N	-	PO-k	Project management and finance
N	ω	N	N	-	PO-I	Life-long Learning
N	ω	ω	ω	N	з <mark>O</mark> SO	Honing Domain Knowledge
N	ω	N	N		⊐ Pso-	Innovation and design
ω	ω	N	ω		o PSO- F	Entrepreneurship Skills
	-	-			PSO-	Ethical values
Create	Create	Create	Create	Understand	Learning Level (understand/ analyse/ deisgn etc)	
Skill Development &Entrepreneurship	Skill Development &Entrepreneurship	Skill Development &Entrepreneurship	Skill Development &Entrepreneurship	Employability	Focus on	A
MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	NA

Department Computer Science and Engineering

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	CO5	CO4	CO3	CO2	CO1	CO No.	ADIC PERSONNEL
	Apply for various techniques for Expert Systems.	Convert intermediate representation in contest to understand learning.	Construct simple knowledge-based systems and to apply knowledge representation.	Develop different types of various Al search algorithms.	Understand different types of AI agents.	CO Statements	
	ω	ω	ω	ω	ω	PO-a	Engineering Knowledge
	N	N	ω	ω	2	PO-b	Problem Analysis
	N	N	ω	ω	N	PO-c	Design/development of solutions
	ω	N	ω	ω	2	PC	Conduct investigations of complex problems
	ω	ω	ω	ω	-	0	Modern tool usage
	N	ω	N	2	-	PO-f	The engineer and society
	N	N	N	N	-	PO-g	Environment and sustainability
		-		-			Ethics
	N	N	N	2	-	PO-i	Individual and team work
	N	ω	2	2	N	PO-j	Communication
	ω	ω	2	2	N	PO-k	Project management and finance
	ω	ω	ω	з	N	P	Life-long Learning
	ω	ω	ω	ω	N	PSO-	Honing Domain Knowledge
0	ω	ω	ω	ω	-	PSO-	Innovation and design
	N	ω	-	ω		PSO-	Entrepreneurship Skills
				-		pso-	Ethical values
XZBI	Understand and Design	Understand and Design	Design	Create	Understand	Learning Level (understand/an alyse/ deisgn etc)	
HOD Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala	Skill Dvelopment &Entrepreneuts hip	Skill Dvelopment &Entrepreneurs hip	Skill Dvelopment &Entrepreneurs hip	Entrepreneurshi p	Employability	Focus on Employability / Entrepreneurs hip	
in Campus	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	

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

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	0	0	2	0	CO No.	The eligineer and societ
	CO4	CO3	C02	C01	No.	English Soft and Single Soft and
	Design and develop an expert system by using appropriate tools and techniques.	Select and apply appropriate algorithms and AI techniques to solve complex problems.	Formulate real-world problems as state space problems, optimization problems or constraint satisfaction problems.	Explain artificial intelligence, its characteristics and its application areas.	CO Statements	netty i i ano in sov wo
	ω	ω	ω	ω	PO-a	Engineering Knowledg
	ω	ω	ω	N	РО-р	Problem Analysis
	ω	ω	ω	N	PO-c	Design/development of solutions
	ω	ω	ω	4	PO-d	Conduct investigations of complex problems
	ω	ω	ω	2	РО-е	Modern tool usage
	ω	ω	2	2	PO-f	The engineer and society
	ω	2	2	ω u	po-g	Environment and sustainability
	2		2	2	PO-h	Ethics
	ω	ω	ω	2	PO-i	Individual and team work
	ω	ω	2	2	PO-j	Communication
	ω	ω	2	2	PO-k	Project management and finance
	ω	ω	ω	ω	PO-	Life-long Learning
	ω	ω	ω	ω	PSO-m	Honing Domain Knowledge
	ω	ω	ω	ω	PSO-m PSO-n PSO-o	Innovation and desig
	ω	ω	ω	1	PSO-o	Entrepreneurship Ski
	ω		2	2	pso-	Ethical values
	Design	Design	Design	Understand	Learning Level(underst and/analyse/ deisgn etc)	
HOD	Entrepreneurship	Entrepreneurship	Skill Development &Entrepreneurship	Employability	Focus on	
AU AU	Practical Assignments	Practical Assignments	Practical Assignments	Practical Assignments	Assessment Tools to Measure Attainment of CO	

Department Computer Science and Engineering

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

BTCS605-18UC : Artificial Intelligence Laboratory

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	C04	CO3	CO2	CO1	CO No	e mana e esta se	(and a loss
	Apply both cryptography and hashing to create digital signatures and certificates for achieving integrity	Design confidential systems with minimum possible threats.	Compare public and private cryptographic algorithms and make use of the same for encryption and decryption of messages.	Understand real time systems for identifying security threats.	CO No. CO Statements		BTCS( type code) : BTCS BTCS606-18UC (Network Security and Cryptography)
10000	ω	ω	ω	ω	ро-а	Engineering Knowledge	: BTCS E
		2	1	ω	ро-ь	Problem Analysis	STCS606
	ω	ω	ω	2	РО-с	Design/development of solutions	-18UC (
	ω	ω	ω	2	PO-d	Conduct investigations of complex problems	Networ
Ī	ω	ω	ω	ω	ро-е	Modern tool usage	< Securit
Ī	ω	ω	ω	ω	PO-f	The engineer and society	y and C
	ω	ω	ω	2	PO-g	Environment and sustainability	ryptogra
	1	1	1	1	ро-л	Ethics	iphy)
Ī	2	2	2	2	PO-i	Individual and team work	
Ī	ω	ω	ω	ω	PO-j	Communication	
		1			PO-k	Project management and finance	
	ω	ω	ω	2	PO-I	Life-long Learning	
-	ω	ω	ω	ω	PSO-m	Honing Domain Knowledge	
-	2	ω	2	ω	PSO-n	Innovation and design	
	2	2	2	2	PSO-o	Entrepreneurship Skills	
	P	1	1	1	PSO-m PSO-n PSO-p	Ethical values	
	Apply	Design	Understand	Understand	Learning Level(understand/ analyse/ deisgn etc)		
	Skill Development	Employability	Skill Development	Skill Development Class/Quiz	Focus on		
	t MSTs, ESE Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MST5, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO		

Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala

	CO3	CO2	C01	CO No.	n, .	
	Analyse the vulnerabilities in any computing system and hence be able to design a security solution.	Identify the security issues in the network and resolve it.	Develop and implement a java interface for encryption and decryption algorithms i.e., AES, MD5 and RSA algorithms	CO Statements	nun - octean work	BICS (type code) : BICS BICSBU9-1BUC (Network Security and Cryptography Lab)
	ω	ω	ω	PO-a	Engineering Knowledge	: BICS I
	2	1	ω	PO-b	Problem Analysis	STOSO S
	ω	ω	2	PO-c	Design/development of solutions	-TRUC
	ω	ω	2	PO-d	Conduct investigations of complex problems	Networ
	ω	ω	ω	PO-e	Modern tool usage	K Securi
	ω	ω	ω	PO-J	The engineer and society	ty and c
	ω	ω	2	PO-g	Environment and sustainability	ryprogra
	1	1	1	PO-h	Ethics	
	2	2	2	PO-i	Individual and team work	
States -	ω	з	W	PO-j	Communication .	
	4			PO-k	Project management and finance	
	ω	υ	2	POL	Life-long Learning	
	ω	<b>B</b>	ω	PSO-m	Honing Domain Knowledge	and the second
and the second se	ω	2	Ψ	PSO-n	Innovation and design	
	2	2	N	PSO-o	Entrepreneurship Skills	
	4	1	<u>н</u>	PSO-p	Ethical values	
	Design	Apply	Implement	Learning Level (understand/ analyse/ deisgn etc)		
	Skill Development	Skill Development	Skill Development	Focus on Employability		
	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Focus on Employability / Assessment Tools to Entrepreneurship CO		

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			The street of the	Constant and and the same	the agineer of society	
C04	CO3	CO <sub>2</sub>	CO1	CO No.		
Explore recent trends in data mining such as web mining, spatial-temporal mining	Extract knowledge using data mining techniques on data sets	Execute algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction	Apply data cleaning, pre- processing and integration on data sets	CO No. CO Statements	t rem 1 m	BTCS
ω	ω	ω	ω	PO-a	Engineering Knowledge	
Ν	ω	ω		РО-Ь	Problem Analysis	(Data minng Lab)
ω	ω	ω	ω	PO-c	Design/development of solutions	ab)
ω	ω	ω	ω	PO-d	Conduct investigations of complex problems	
ω	ω	w	ω	РО-е	Modern tool usage	
	ω	ω		PO-f	The engineer and society	
				PO-g	Environment and sustainability	
	1	1	(中国) (中国)	PO-h	Ethics	
N	2	2	2	PO-i	Individual and team work	
		- Latin		PO-j	Communication	
1				PO-k	Project management and finance	
				PO-I	Life-long Learning	
ω	ω	ω	ω	РЅО-т РЅО-п	Honing Domain Knowledge	
2				PSO-n	Innovation and design	
		2	2	PSO-o	Entrepreneurship Skills	
	1			PSO-p	Ethical values	
Design	Apply	Design	Apply	Learning Level (understan Focus on d/analyse/ deisgn etc)		
Skill development	Skill development	Skill development	Skill development	Focus on		
		MSTs, ESE, Class/Quiz Tests		Assessment Tools to Measure Attainment of CO		

Department Computer Science and Engineering

HOD bepartment of Computer Science & Engineering MCG PTU Main Campus Capurthala di

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	CO5	C04	CO3	CO2	C01	CO No.	
	To explore future trends of cloud computing	To develop any one type of cloud	To install cloud computing environments	Implement applications on the Cloud	Use the cloud tool kits.	CO Statements (UC- : BTCS-612-18 Cloud Computing Lab)	Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problem Modern tool usage
	1	1	4	4	1	PO-a	Engineering Knowledge
	1	2	1	ω	1	РО-Ь	Problem Analysis
	2	ы	2	ω	2	PO-c	Design/development of solutions
	2	1	4	ω	1	PO-d	Conduct investigations of complex problem
· · · · · ·	ω	з	з	ω	ω	РО-е	Modern tool usage
	2	2	1	2	1	PO-f	The engineer and society
•	2	2	1	2	1	PO-g	Environment and sustainability
	1	1	1	ц	4	PO-h	Ethics
	ω	ω	2	ω	4	PO-i	Individual and team work
	ω	ω	4	ω	ру С. С. С	PO-j	Communication
	2	2	2	ω	Ц	PO-k	Project management and finance
	ω	ω	ω	ω	ω	PO-I	Life-long Learning
	2	ω	ω	ω	ω	PSO-m	Honing Domain Knowledge
	2	2	4	2	4	PSO-n	Innovation and design
•	ω	ω	4	ω	ц	PSO-m PSO-n PSO-p PSO-p	Entrepreneurship Skills
	1	1	ц	н	1		Ethical values
	Design	Apply	Apply	Apply	Implement	Learning Level(understan d/analyse/ deisgn etc)	
HOD Department IKG P	Skill Development	Skill Development	Skill Development	Skill Development	Skill Development	Focus on	
HOD Computer Science & Engineering	Practicals	Practicals	Practicals	Practicals	Practicals	Assessment Tools to Measure Attainment of CO	

	CO5	CO4	CO3	CO2	C01	CO No.		181
	Apply various coding schemes for text, speech and audio.	Understand and Construct codes using different error control techniques.	Compute the capacity of various types of channels.	Apply source coding techniques	Understand various entropies and Define the information theories.	CO Statements	un nordientiane inebilitis	18UC)
	ω	ω	ω.	3	ω	PO-a	Engineering Knowledge	
	2	2	ω	з	2	РО-Ь	Problem Analysis	
	ω	2	ω	ω	2	РО-с	Design/development of solutions	
	ω	2	2	ω	2	PO-d	Conduct investigations of complex problems	Contraction of the local distance
	ω	ω	ω	ω	1	РО-е	Modern tool usage	
	. 2	ω	2	2	1	PO-f	The engineer and society	
	2	2	2	2	1	PO-g	Environment and sustainability	
		1		1		PO-h	Ethics	
	2	2	2	2	1	PO-i	Individual and team work	
	2	2	1	2	2	PO-j	Communication	
	ω	2	2	. 2	2	PO-k	Project management and finance	
	ω	ω	2	ω	1	PO-I	Life-long Learning	
	ω	ω	ω	ω	2	PSO-m	Honing Domain Knowledge	No. of Concession, Name of
	ω	ω	2	ω	1	PSO-n	Innovation and design	Contraction of the owner of the
	2	ω	1	2		PSO-o	Entrepreneurship Skills	The second
				1		PSO-p	Ethical values	THE REAL PROPERTY AND INCOME.
	Understand and Design	Understand and Design	Design	Create	Understand	Learning Level(understand/ analyse/ deisgn etc)		
J	Entreprendurship	Entrepreneurship	Entrepreneurship	Entrepreneurship	Employability	Focus on Employability / Entrepreneurship		
	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO		

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

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Department of Computer Science & Engineering IKG PTU Main Campus Capurthala

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	C04	CO3	C02	C01	CO No.	tori in ad sorier
	calculate entropy, joint entropy, relative entropy, conditional entropy, and channel capacity of a system	Illustrate various security oriented coding techniques for Block codes	Implement various error control techniques for Convolutional codes	Compare various capacity reduction based coding techniques for image and video type of data.	CO Statements	
	ω	ω	ω	ω	PO-a	Engineering Knowledge
	ω	ω	ω	ω	ро-ь	Problem Analysis
	ω	ω	ω	N	PO-c	Design/development of solutions
	ω	ω	ω	N	PO-d	Conduct investigations of complex problem
	ω	ω	ω	ω	РО-е	Modern tool usage
	ω	ω	2	Ν	PO-f	The engineer and society
	ω	ω	2	ω	ро-е	Environment and sustainability
		2	2		PO-h	Ethics
	ω	ω	ω	з	PO-i	Individual and team work
	ω	ω	2	3	POH	Communication
	з	ω	2	ω	PO-k	Project management and finance
	ω	ω	3	ω	P.	Life-long Learning
1.8	ω	з	ω	ω	PSO-m PSO-n	Honing Domain Knowledge
	ω	ω	ω	ω	PSO-n	Innovation and design
	ω	ω	ω	ω	PSO-o PSO-p	Entrepreneurship Skills
		2	2			Ethical values
	Understand & Design	Understand & Design	Understand & Design	Understand & Design	Learning Level(understan d/analyse/ deisgn etc)	
HOD	Skill Developmen t	Skill Developmen t	Skill Developmen t	Skill Developmen t	Focus on	
HOD Department of Computer So	Practical Assignments	Practical Assignments	Practical Assignments	Practical Assignments	Assessment Tools to Measure Attainment of CO	

# Department Computer Science and Engineering •

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

BTCS615-18UC : Information Theory and Coding Lab

IKG PTU Main Campus Kapurthala

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Γ	CO4	CO3	C02	C01	CO No.		in the second se
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	Apply data science concepts and methods to solve problems in real-world context.	Apply Mathematical sciences and recent technologies in Computer Science to solve real life problems	Use data analytics tools towards problem solving and solution analysis.	Plan the projects in the domain of data science.	CO Statements (UC-BTCS-617-18 Data Science Lab)		B.Tech. (Computer Science and Engineering) BTCS( type code) : BTCS-617-18 Data Science Lab
	υ 	ω	1	f 1	PO-a	Engineering Knowledge	: B.Tec : BTCS
	ω	ω	1	ω	РО-в	Problem Analysis	B.Tech. (Computer Science and BTCS-617-18 Data Science Lab
	ω	ω	З	2	PO-c	Design/development of solutions	3 Data S
F	ω	ω	-	ω	PO-d	Conduct investigations of complex problems	Science
	-	-	ω	2	РО-е	Modern tool usage	Lab
	N	N		N	PO-f	The engineer and society	igineerii
		1	_ <b>_</b> _		PO-g	Environment and sustainability	(Bu
	-	-		-	PO-h	Ethics	
	N	N		ω	PO-i	Individual and team work	
	ω	ω	-	ω	PO-j	Communication	
	ω	ω	ю	ω	PO-k	Project management and finance	1
	ω	ω	ω	ω	PO-I	Life-long Learning	
	ω	ω	ω	ω	m m	Honing Domain Knowledge	
	N	ω	N	З	PSO- n	Innovation and design	
	ω	ω	ω	ω	PSO- o	Entrepreneurship Skills	
	-	-		-	PSO- p	Ethical values	
	Apply	Apply	Knowledge	Analyze	Learning Level(unders tand/analyse/ deisgn etc)		
HOD Department of Computer IKG PTU Ma	Skill Development	Skill Development	Skill Development	Skill Development	Focus on		
HOD Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO		

	CO5 Re pr	CO4 AF	CO3 de sy	CO2 De	CO1 Un	:0 No. CC		
	Review the various hybrid soft computing techniques and apply in real time problems	Apply the importance of optimization techniques and genetic programming	Construct fuzzy rules and reasoning to develop decision making and expert system	Design suitable neural network for real time problems	Understand various soft computing concepts for practical applications	CO No. CO Statements	Engineering Knowledge Problem Analysis	Program - Difecti (computer science and engineering)
	ω	з	ω	ω	ω	ро-а	Engineering Knowledge	. D. ICUI
	2	2	. 2	2	2	PO-b	Problem Analysis	100.10
	ω	ω	ω	ω	1	PO-c	Design/development of solutions	-
	ω	ω	ω	ω	ω	PO-d	Conduct investigations of complex problem	
	2	2	2	2		РО-е	Modern tool usage	
	2	1	2	4		PO-f	The engineer and society	
						PO-g	Environment and sustainability	
						РО-Һ	Ethics	
				4	i u gi ne	РО- <u>і</u>	Individual and team work	
						POJ	Communication	
						PO-k	Project management and finance	
						PO	Life-long Learning	
	ω	ω	ω	ω	ω	PSO-m	Honing Domain Knowledge	
	2	2	2	2	-	PSO-n	Innovation and design	
	2	ω	2	2	2		Entrepreneurship Skills	
						o pso-j	Ethical values	
	Design	Apply	Apply	Design	understand	PSO-o PSO-p (understand/ analyse/ Focus on deisgn etc)		
	Skill development	Skill development	Skill development	Skill development	Skill development	Focus on		
HOD Degatment of Compute IKG PTU Mit Kapurthala			Misis, Est, class/ quiz Tests			Assessment Tools to Measure Attainment of CO		
HOD Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala	A							•

C05	CO4	CO3	CO2	CO1	CO No.	ICS(612-18U
Evaluate and compare solutions by various soft computing approaches for a given problem.	Effectively use existing software tools to solve real problems using a soft computing approach	Apply genetic algorithms to combinatorial optimization problems	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems	Reveal different applications of these model+87:B11s to solve engineering and other problems.	CO Statements (Soft Computing Lab)	BTCS(612-18UC) Soft Computing Lab
ω	ω	ω	ω	ω	PO-a	Engineering Knowledge
ω	ω	ω	ω	ω	РО-Ь	Problem Analysis
ω	ω	ω	ω	ω	PO-c	Design/development of solutions
ω	ω	ω	ω	ω	PO-d	Conduct investigations of complex problems
ω	ω	ω	ω	ω	РО-е	Modern tool usage
ω	ω	ω	ω	ω	PO-f	The engineer and society
2	H	2	2	2	PO-g	Environment and sustainability
4	н	H	1	1	PO-h	Ethics
4	4	2	1	1	PO-I	Individual and team work
2	2	4	2	2	PO-j	Communication
ω	2	2	2	2	PO-k	Project management and finance
ω	ω	2	ω	1	PO-I	Life-long Learning
ω	ω	ω	ω	2	PSO-m	Honing Domain Knowledge
2	2	2	2	2	PSO-n	Innovation and design
1	Ľ	1	1		PSO-o	Entrepreneurship Skills
	1		1		PSO-p	Ethical values
Evaluate	Compute	Design	Apply	Estimate	Learning Level (understand/ analyse/ deisgn etc)	
Skill Development	Skill Development	Skill Development	Skill Development	Skill Development	Focus on	
MSTs, ESE, Class/Quiz Tests	Skill Development MSTs, ESE, Class/Quiz Tests	Skill Development MSTs, ESE, Class/Quiz Tests	Skill Development MSTs, ESE, Class/Quiz Tests	Skill Development MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	

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

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

## B. Tech CSE 7<sup>th</sup>Sem

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

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	C04	CO3	CO2	C01	No.		
	Implement unsupervised models through programming language.	Identify the core components of deep neural network model.	Apply various reinforcement algorithms to solve real time complex problems.	Solve problems using the machine learning models.	CO Statements (UC619-18 Machine Learning Lab)	ve historen durance	
	-	-	2	-	PO-a	Engineering Knowledge	
	N	N	ω	N	РО-Ь	Problem Analysis	
	N	N	N	N	PO-c	Design/development of solutions	
	N	-	N	2	PO-d	Conduct investigations of complex problems	
	ω	ω	ω	ω	PO-e	Modern tool usage	
		-	-	-	PO-f	The engineer and society	
	_	_		-	PO-g	Environment and sustainability	
	-	-	-	-	PO-h	Ethics	
	N	N	N	N	PO	Individual and team work	
	-	-	N	-	PO-J	Communication	
	N	N	N	N	PO-k	Project management and finance	
	ω	ω	ω	ω	PO-I	Life-long Learning	
	N	N	ω	N	в Pso-	Honing Domain Knowledge	
	N	-	ω	N	n PSO-	Innovation and design	
	N	-	N	N	o PSO-	Entrepreneurship Skills	
	_	-	_		p PSO-	Ethical values	
	Apply	Knowledge	Apply	Apply	Learning Level(understand/a nalyse/ deisgn etc)		
	Employability	Employability	Enterpreneurship	Employability	Focus on Employability / Entrepreneurship		
HOD Department of Computer Science & Engin	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO		

& Engineering

CO4	CO3	CO2	CO1	No.	enmen und sustainability
Analyze large volume text data generated from a range of real- world applications.	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions.	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each.	Describe the fundamental concepts and techniques of natural language processing.	CO Statements	
2	2	ω	ω	PO-a	Engineering Knowledge
1	ω	ω	2	ро-ь	Problem Analysis
4	ω	ω	ω	PO-c	Design/development of solutions
2	ω	ω	N	PO-d	Conduct investigations of complex problems
ω	ω	ώ	ω	РО-е	Modern tool usage
2	ω	ω	ω	PO-f	The engineer and society
2	4	1	1	PO-g	Environment and sustainability
Р			1	PO-h	Ethics
2	ω	ω	ω	PO-i	Individual and team work
2	ω	ω	ω	PO-j	Communication
2	2	2	2	PO-k	Project management and finance
2	2	ω	ω	PO-I	Life-long Learning
1	2	1	2	т	Honing Domain Knowledge
2	ω	2	2	n PSO	Innovation and design
2	2	2	ω	o PSO-	Entrepreneurship Skills
4		4	1	p PSO-	Ethical values
Understand	Design	Apply	Understand	Learning Level (understand/ analyse/ deisgn etc)	
Skill Development Class/Quiz Tests	Skill Development Class/Quiz Tests	Skill Development Class/Quiz	Skill Development	Focus on	
MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTS, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	

Department of Computer Science & Engineering IKG PTiU Main Campus Kapurthala

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	CO3	C02	CO1	CO No.	ontres and so at	BTCS 713- 18UC
	Evaluate security, privacy, and efficiency of a given blockchain system.	Design, build, and deploy a distributed application.	Interact with a blockchain system by sending and reading transactions.	CO Statements		BTCS 713- Block chain Technology Lab
	ω	ω	ω	PO-a	Engineering Knowledge	ology La
	ω	ω	ω	РО-Ь	Problem Analysis	ē
	ω	ω	N	PO-c	Design/development of solutions	
	ω	ω.	N	PO-d	Conduct investigations of complex problems	9
	ω	ω	ω	PO-e	Modern tool usage	
	ω	ω	ω	PO	The engineer and society	
	N	ω	ω	PO-g	Environment and sustainability	
	ω		N	PO-h	Ethics	
	ω	ω	ω	PO	Individual and team work	
	ω	ω,	N	PO-j	Communication	
	ω	ω	N	PO-k	Project management and finance	
	ω	ω	ω	PO-I	Life-long Learning	
	ω	ω	ω	в PSO-	Honing Domain Knowledge	
	ω	ω	ω	л РSO-	Innovation and design	
	ω	ω	N	o O-	Entrepreneurship Skills	
	ω		N	pso-	Ethical values	
'I	Design	Design	Understand	Learning Level (understand/ analyse/ deisgn etc)		
HOD	Skill Development	Skill Development	Skill Development Assignme	Focus on Employability / Entrepreneurshi p		
Co & Enrinpering	Practical Assignments	Practical Assignments	t Assignments	Assessment Tools to Measure Attainment of CO		

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C06	COS	C04	CO3	CO2	CO1	CO No.	n nviene a pend scottan Julity -	
To identify and analyse various security threats in SDN based networks	To develop various applications and protocols for SDN architecture	To design topologies using Mininet and various APIs	To provide an overview and comparison of various SDN controllers	To describe software defined architecture and open flow protocol for communication between controller and switches	To define and understand terminology involved in the field of software defined networking	CO Statements		BTCS 614-18UC : (Software Defined Networks)
ω	ω	ω	ω	ω	ω	ро-а	Engineering Knowledge	: (Softw
2	2	2				РО-Ь	Problem Analysis	are Defi
	ω	ω		ω		РО-с	Design/development of solutions	ned Net
						PO-d	Conduct investigations of complex problem	works)
	1	4	H			РО-е	Modern tool usage	
1		4			the second	PO-f	The engineer and society	
						PO-g	Environment and sustainability	
1						PO-h	Ethics	
						PO-i	Individual and team work	
						PO-j	Communication	
		1				PO-k	Project management and finance	
						PO-I	Life-long Learning	
ω	3	ω	ω	ω	ω	PSO-m PSO-n	Honing Domain Knowledge	
	2	2				PSO-n	Innovation and design	
						PSO-o	Entrepreneurship Skills	
1						PSO-p	Ethical values	
identify	Design	Design	Apply	Design	understand	PSO-o PSO-p (understand/ analyse/ deisgn etc)		
Employability	Employability	Employability	Employability	Employability	Employability	Focus on Employability / Entrepreneurship		
			MSTs, ESE, Class/Quiz Tests			Assessment Tools to Measure Attainment of CO		

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

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CO5	CO4	CO3	C02	C01	CO No	Moden Nool usa
Understand various image compression techniques and apply such techniques to compress digital images for reducing the sizes of digital images.	Segment digital images and extract various features from digital images	Understand and De-noise Digital Images	Improve the quality of digital images	Understand the basic concepts of DIP	CO Statements (UC-BTEC-502- 18: Digital Signal Processing)	Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problems
-f ω	N	N	ω	N	РО-а	Engineering Knowledge
N	N	ω	N	-	РО-Ь	Problem Analysis
ω	N	ω	ω	N	PO-c	Design/development of solutions
N	N	N	ω	-	PO-d	Conduct investigations of complex problems
ω	ω		N	-	PO-e	Modern tool usage
N	-	-	-	2	PO-f	The engineer and society
				ω	PO-g	Environment and sustainability
	-			de la	Ро-ћ	Ethics
ω	-		-	<u> </u>	PO-i	Individual and team work
-	-		-		PO-j	Communication
N	-				PO-k	Project management and finance
ω	N	N	2	З	PO-I	Life-long Learning
ω	ω	ω	ω	3	m PSO-	Honing Domain Knowledge
N	N	ω	ω		pso- n	Innovation and design
N	-	-	-		PSO- o	Entrepreneurship Skills
	-	-			pso-	Ethical values
Understand	Apply	Understand	Apply	Understand	Learning Level (understand/ analyse/ deisgn etc)	
Skill Development	Skill Development	Skill Development	Skill Development	Skill Development	Focus on Employability / Entrepreneursh ip	
MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment Tools to Measure Attainment of CO	

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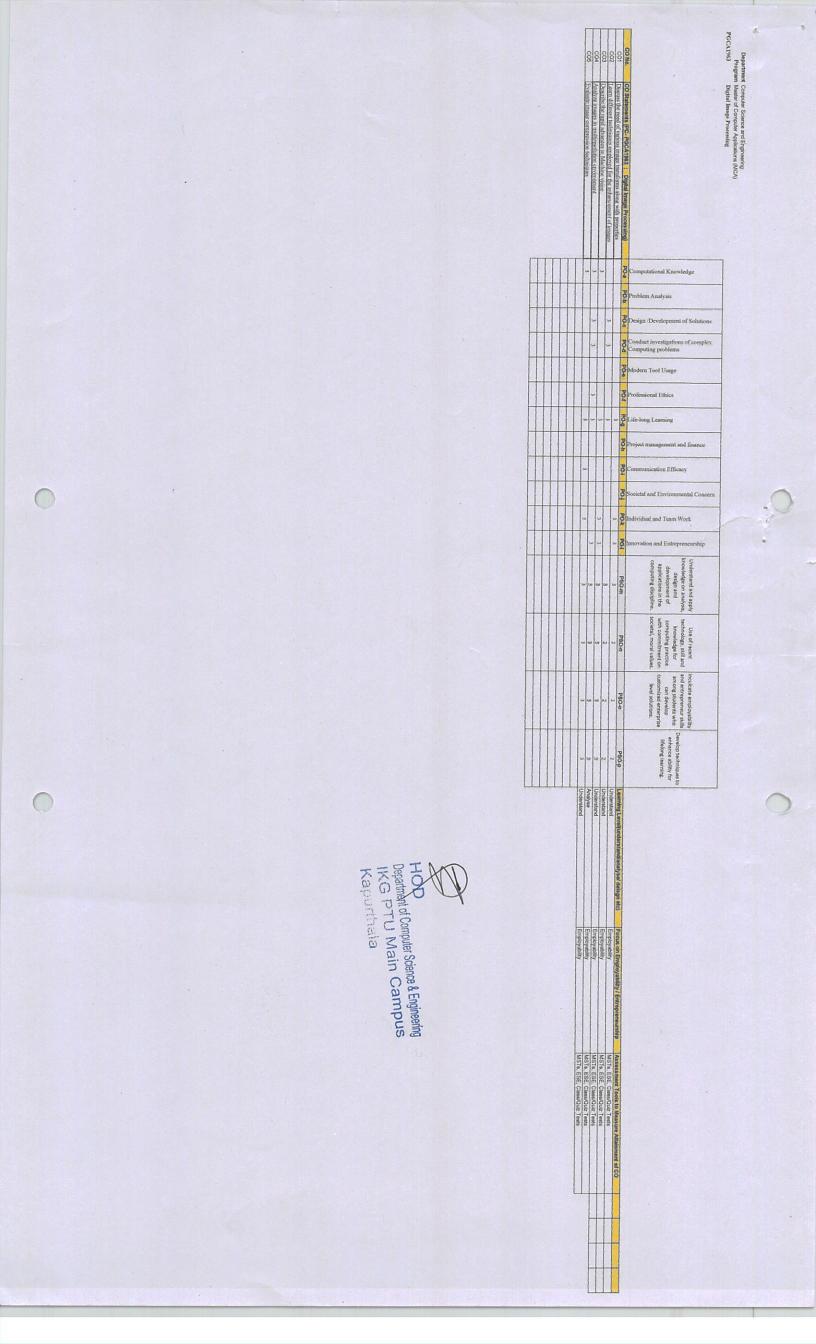
Department of Computer Science & Engineering IKG PTU Main Camputs Kapurthala

F						The engineer and society	1
	CO4	соз	C02	CO1	:0 No	Enviropent attach Calanda a Bolity	ering)
	Perform image enhancement techniques in spatial and frequency domain	learn different techniques employed for the enhancement of images.	understand the rapid advances in Machine vision.	develop any image processing application.	CO No CO Statements	e nic. L'annt : la toera chix nin : la toera chix	BTCS715-18UC) : (Digital Image Processing Lab)
	N	ω	N	N	ро-а	Engineering Knowledge	: B.Tec : (Digita
	ω	N	N	N	РО-Ь	Problem Analysis	h. (Con al Image
	ω	ω	ω	ω	PO-c	Design/development of solutions	Proce
	ω	ω	ω	ω	PO-d	Conduct investigations of complex problems	Science
	N	ω	ω	ü	РО-е	Modern tool usage	and Er ab)
	N	ω	N	ω		The engineer and society	ngineer
	ω	ω	N	N	PO-f PO-g	Environment and sustainability	ing)
	_	N	-	N	PO-h	Ethics	
	N	N	ω	N	PO-i	Individual and team work	
	N	N	ω	N	PO-j	Communication	
	ω	ω	ω	N	PO-k	Project management and finance	
	ω	ω	ω	ω	PO-I	Life-long Learning	
	ω	ω	ω	ω	m m	Honing Domain Knowledge	
	ω	N	ω	ω	n PSO-	Innovation and design	
	ω	ω	ω	ω	o PSO-	Entrepreneurship Skills	
	N	N	N	N	PSO- P	Ethical values	
	Design	Apply	Apply	implement	Learning Level(understand/a nalyse/ deisgn etc)		
HOD Department of Com	Skil Development	Skil Development	Skil Development	Skil Development	Focus on Employability / Entrepreneurship		
HOD K Department of Computer Science & Engineering	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	MSTs, ESE, Class/Quiz Tests	Assessment loois to Measure Attainment of CO		

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IKG PTU Main Campus Kapurthala



	COMM         Consultation           001         Indemnsity IPC- INCOMING-I: Objited Image Processing Lubors           002         Alphy filters on images as per file versus oversitions which can be performed on images           003         Implement different techniques employed for the enhancement of Images           005         Implement different techniques employed for the enhancement of Images           005         Implement different techniques employed for the enhancement of Images           005         Implement different techniques employed for the enhancement of Images           005         Implement different techniques employed for the enhancement of Images           005         Implement different techniques employed for the enhancement of Images           005         Implement different techniques employed for the enhancement of Images           005         Implement different techniques employed for the enhancement of Images           006         0           007         0           008         0           009         0           009         0           009         0           009         0           009         0           009         0           009         0           009         0           009         0 <th>Department Computer Science and Engineering Program Maalee of Computer Applications (IUCA) PFCCA1964 Digital Image Processing Laboratory</th>	Department Computer Science and Engineering Program Maalee of Computer Applications (IUCA) PFCCA1964 Digital Image Processing Laboratory
	Image: Solution of Solutions       Image: Solutions       Image: Solutions         Image: Solution of Solutions       Image: Solution of Solutions       Image: Solution of Solutions         Image: Solution of Soluti	
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				CO5 Describe the concept of speech recognition and text to speech conversion	CO4 Fainflarige with chalters and phonetics				Program Maske of Computer Science and Engineering Program Maske of Computer Applications (MCA) PGCA 1965 NLP and Speech Recognition
•							J         J	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	
0		HOD Department of Computer IKG PTU Ma Kapurthala	AD		3         3         3         3         Understand           3         3         3         3         3         Understand	3	-m PSO-n PSO-o PSO-p 3 3 3 3	Understand and apply Understand and apply knowledge on aalwas, degle and development of seplications in the seplications in the societat, moral values. Incluste employability and entropmanur skills and entropmanur skills and entropmanur skills and entropmanur skills Develop techniques to develop techniques to develop techniques to entropmanur skills Develop techniques to entropmanur skills Develop techniques to entropmanur skills Develop techniques to Belong lierning. Belong lierning.	
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				Tests	Teets Teets	Tests	Assessment Tools to Measure Atlahment of CO MSTs ESE Class/Dub Teels		

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		CO1         Discuss the terminology and enabling technologies of JoT and Blockchain           CO1         Discuss the terminology and enabling technologies of JoT and Blockchain           CO2         Identify antrus element of for           CO3         Inimizers the stdgst interview of JoT availables/or           CO3         Inimizers the stdgst interview of JoT availables/or           CO4         Inimizers the stdgst interview of JoT availables/or           CO3         Inimizers the stdgst interview of		Bepartment Computer Science and Engineering Program Master of Computer Applications (MCA) PGCA1967 10T & Blockchaluf Technology	
		POL         POL <th>apply Use of recent ahysis, technology, skill an knowledge for of computing preside the with commitment o line. societal, moral value</th> <th></th> <th></th>	apply Use of recent ahysis, technology, skill an knowledge for of computing preside the with commitment o line. societal, moral value		
bepartment of Computer Science & Engineenty KG PTU Main Campus Kapurthala	Emporadetty	PBOp         Learning Level/Indensionalized billing i etc.)         Focus on Employability / Entrepreneurable         Assessment Tools to Measure Attalianeed of CO           j         Undentand         Employability / Entrepreneurable         MSTs. ESE. Class/Quiz Tests           3         Undentand         Employability         MSTs. ESE. Class/Quiz Tests	Incluste employability     Incluste employability       I and entroprenew Kills     Develop technique to enhance ability for inclusted entroprise       I seed solutions.     Information of the solution of the solut		

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	COS Crute docker based application			CO1 Use IoT sensory and remotely monitor data and control devices. CO2 Develop real life IoT based provides	CO'Ne. CO'Statement's IPC- PGCA1955 : IOT & Slookizhan Technolooru L	Department Computer Science and Exploreering Program Maaie of Computer Applications (MCA) PGCA1968 IOT & Blockshain Technology Laboratory
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HOD begattment of Computer KGC PTU Ma Kapurthala	3 2		40 40 40 40 40 40 40 40 40 40 40 40 40 4		Use of reserve technology, skill and entreprene vr.skill knowledge for computing practice societal, mod i values societal, mod values	-
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	Practical Assignments	Practicel Assignmets		Employability Entrepreventishen Assessment Tools to Measure Atlainment of CO Employability Practical Assgments		

005	CO4	CO3	C02	001	CO No.		Departn Prog PGC
Explain various concepts of C programming language.	Choose the right data type and statements for programs.	Implement programs using C .	Design algorithms for solving various real life problems	Express the logical flow used in Programming.	CO Statements (PC- PGCA-B1 : Computer Programming using C )		Department Computer Science and Engineering Program Master of Computer Applications (MCA) PGCA-BI Computer Programming using C
3	2	з	3	3	PO-a	Computational Knowledge	
		3	3	3	PO-b	Problem Analysis	
-	3	3	3		0	Design /Development of Solutions	
1	1	3	3			Conduct investigations of complex Computing problems	
2	1	3			PO-e	Modern Tool Usage	
1	1				1	Professional Ethics	
3	3	3	3	ω	PO-g	Life-long Learning	
					PO-h	Project management and finance	
				2	PO-i	Communication Efficacy	
	_				PO	Societal and Environmental Concern	
	2	3			PO-k	Individual and Team Work	
3	3	3	3		POI	Innovation and Entrepreneurship	
3	έ	3	3	2	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	
w	3	2	3	1	PSO-n	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	
3	2	3	3	3	PSO-o	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.	
2	-	3	3	3	PSO-0	Develop techniques to enhance ability for lifelong learning.	
Understai Employability	Understa: Employability	Understat Employad MSTs. ESE. Class/Quiz Tests	Understal Employad MSTs, ESE, Class/Quiz Tests	Understa chipioya MSTs. ESE. Class/Ouiz Tests	Learning Focus or Assessment Tools to Measure Attainment of CO		

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Statements (PC- PGCA	CO Statements (PC- PGCA1937 ; Cloud Computing)	PO-4	PO-b	PO-c	PO-d	PO-e	PO-1	PO-g	PO-h	PO4	Pod	PO:k	POU	PSO-m	PSO-n	P\$0-0	PSO-p		Learning Level/understand/analyse/	Learning Level/understand/analyse/ delson etc)	
	Evolution the proposes of microting to a cloud solution for different			*			3	3	3		200		3	3	3	3	3		Understand		Understand Employability
	applications.							3	3			3	3	w	w	3	2		Understand		
CO3 Compare and evaluate the virtualization technologies.	virtualization technologies.	3	3	3	3								3	3			3		Understand		
CO4 addressing the security concerns.	addressing the security concerns.				3		3		ł				3	3	ω				Understand And Design		
CO5 Use cloud solutions offered by	Use cloud solutions offered by industry leaders for various applications.	3	з	2	3		3	3					3	3	3				Understand And Design		
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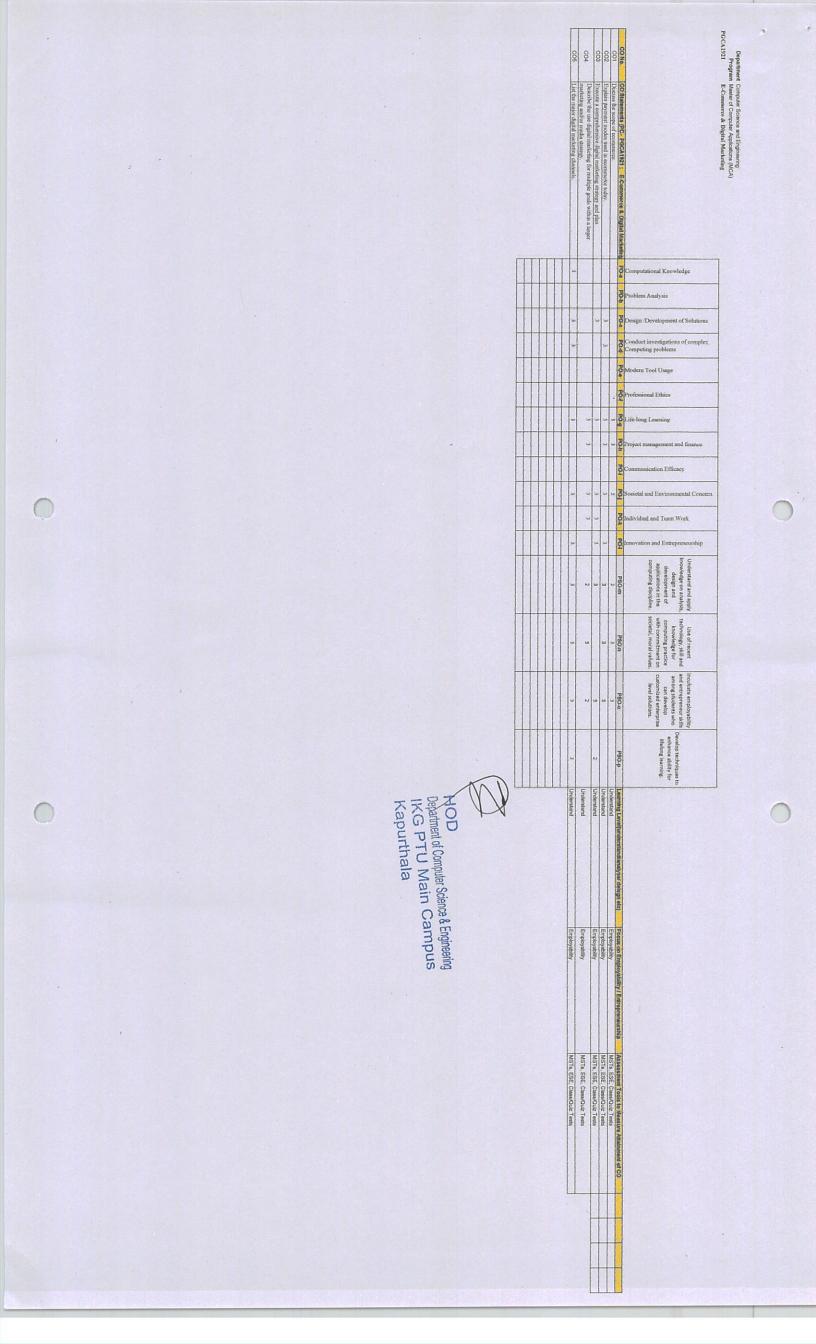
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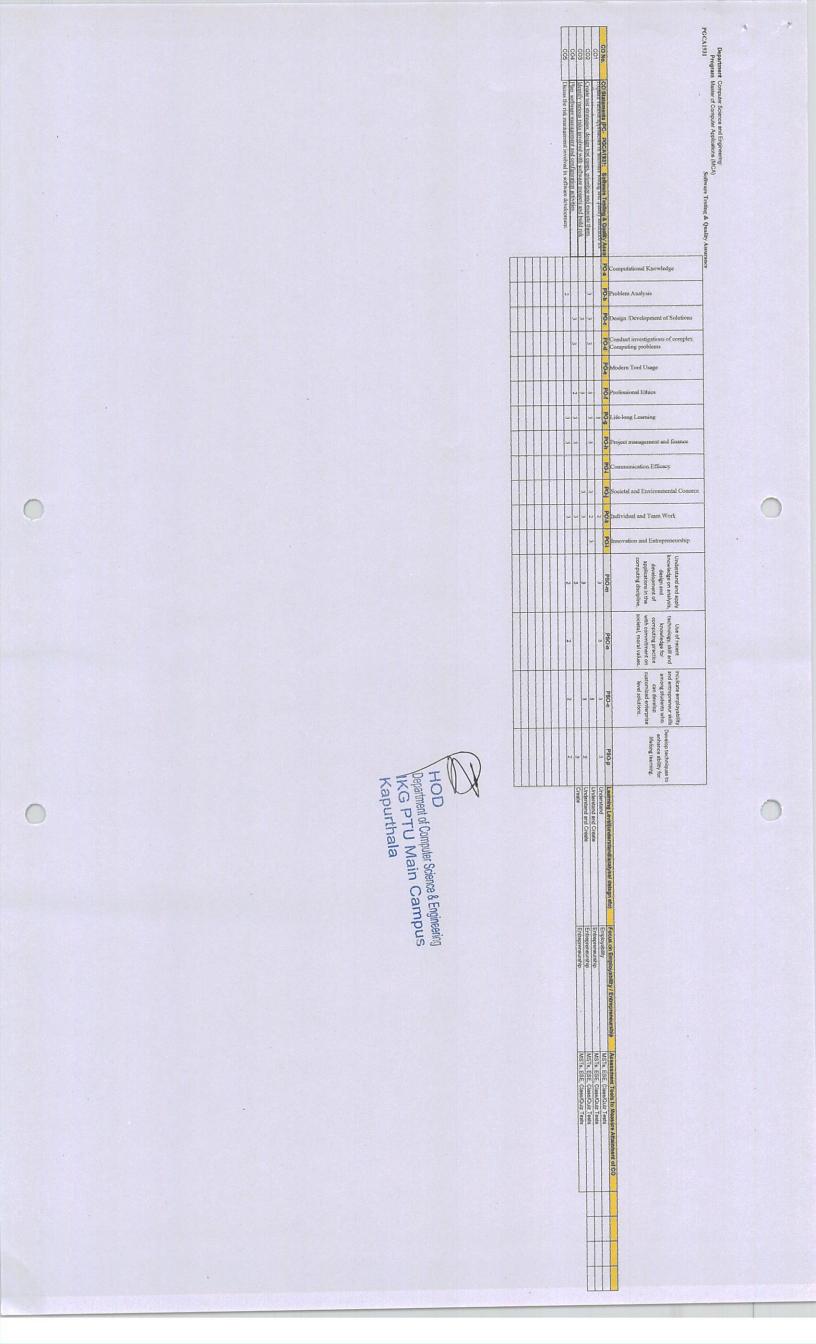
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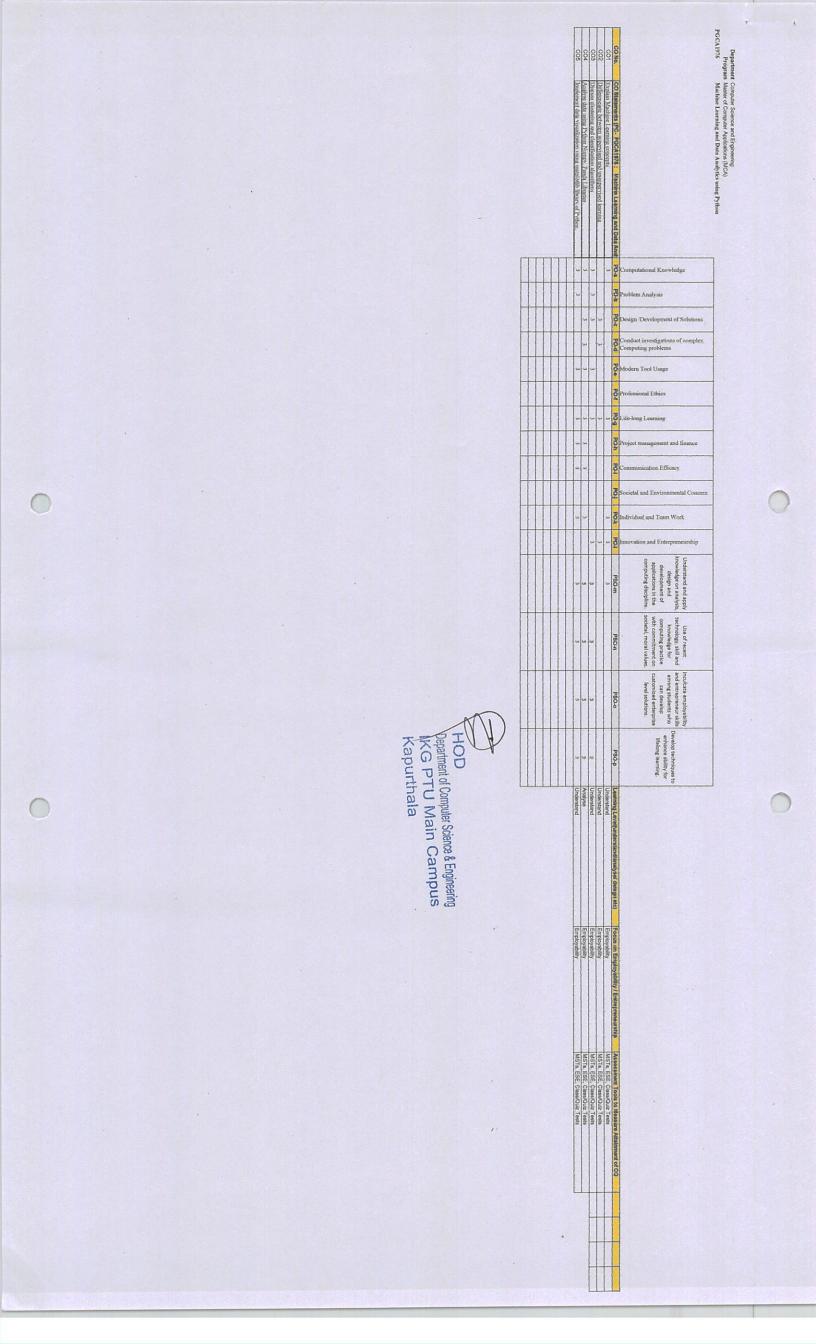
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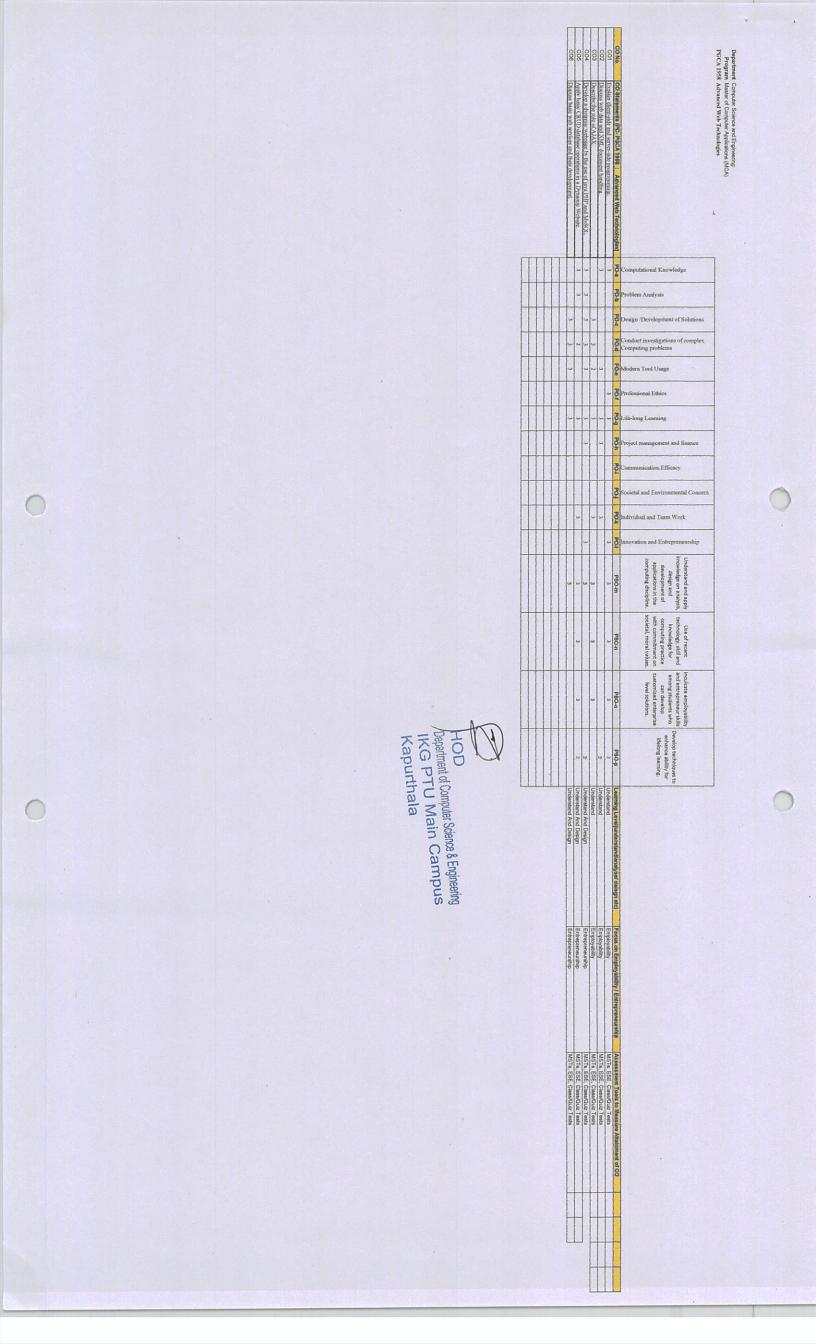


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	COC Decass the risk management involved in software development.		CO1 software development. Create test strategies, design test cases, prioritize and execute them.	interneral roogram A 1975
		3 3 3 3 3 3	3 3	Computational Knowledge     Computational 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
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	Department       Compare       Sectors and Engineering         YerCA1977       Machine Learning and Data Analytics using Python Laborators         Non-Non-       Obligationality (Compare)       Holdback of the sectors and Data Analytics using Python Laborators         Non-Non-       Obligationality (Compare)       Holdback of the sectors and Data Analytics using Python Laborators         Non-Non-       Obligationality (Compare)       Holdback of the sectors and Data Analytics         Non-       Obligationality (Compare)       Holdback of the sectors and Data Analytics         Non-       Obligationality (Compare)       Holdback of the sectors and Data Analytics         Non-       Obligationality (Compare)       Holdback of the sectors and the se
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	Department Computer Science and Engineering Program       Annexed Web Technologies Laboratory         POCA 1960       Annexed Web Technologies Laboratory         POCA 1960       Colosis annexes [PC: POCA 1960]. Advanced Web Technologies Laboratory         Colosis       Colosis Annexes [PC: POCA 1960]. Advanced Web Technologies Laboratory         Colosis       Colosis Annexes (revealed Web Technologies Laboratory)         Colosis       Intelement Laboratory         Colosis       Intelement Advances (revealerment)       Pola         Colosis       Intelement Colosis Annexes (revealerment)       Pola         Colosis       Intelement Colosis (revealerment)       Do         Col
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	Assessment Tools to Measure Manufert er CO. Practical Asignment Practical Asignment Practical Asignment Practical Asignment Practical Asignment Practical Asignment Practical Asignment

							CO5 Describe the concept of Security policies and Cyber Laws.	CO4 Apply Symmetric Encryption techniques.	CO3 Demonstrate the concept of Intrusion Detection & Intrusion Prevention. 3	CO2 Explain the key security requirements of Confidentiality, Integrity & Availability. 3	CO1 Identify issues involved in the field of information security.	CO Statements (PC- PGCA1932 : Information Security and Cyber Law)	Computational Knowledge	Department Computer Science and Engineering Program Master of Computer Applications (MCA) PGCA 1932 Information Security and Cyber Law
		-		and the second					. 3	3	3		Problem Analysis	
				Construction of the second			3	3	3	3		-	Design /Development of Solutions	
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						1	3		3			PO-e	Modern Tool Usage	
-					1							PO-f	Professional Ethics	
-							3	3	3			PO-g	Life-long Learning	
		4					3		3		3	PO-h	Project management and finance	
					10							PO-i	Communication Efficacy	
							3	3	3	3	3	PO-j	Societal and Environmental Concern	
	States and							3		3		PO-k	Individual and Team Work	
								3	3		3	POH	Innovation and Entrepreneurship	
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			and the second s				3	3	3	3	3	PSO-n	Inderstand and apply Use of recent nowledge on analysis, technology, skill and design and computing practice applications in the with commitment on computing discipline. societal, moral values.	
							3	3	3	3	3	PSO-0	Inculcate employability and entrepreneur skills among students who can develop customized evelop customized evelop level solutions.	
							3	3	3.	3	3	PSO-p	Develop techniques to enhance ability for lifelong learning.	
			4				Understar Employability	Understar Employability	Understar Employad MSTs, ESE, Class/Quiz Tests	Understar Employat MSTs, ESE, Class/Quiz Tests	Understan Employat MSTs, ESE, Class/Quiz Tests	Learning Focus of Assessment Tools to Measure Att		
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HOD Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala

PGCA1914	Program	Department
PGCA1914 Web Technologies Laboratory	Program Master of Computer Applications (MCA)	Department Computer Science and Engineering

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							The start				0.	
						Execute a small web pased project for the benefit of scoiety	Implement	Illustrate	Create we	Design pa	CO Statements (PC- PGCA1914 : Web Technologies Laboratory)	
						small web	Implement advanced web designing concepts using java script	llustrate the movement from one web page to another	Create web pages with Auido and Video content in it.	Design pages with simple tags in HTML	ments (P	
						pased pro	ed web de	nent fron	vith Auid	simple tag	C- PGC/	
						ject for th	signing o	one web	and Vid	ys in HTN	11914 :	
						ve benefit	concepts	page to a	eo conter	AL	Web Tec	
						ofscolety	using java	nother	it in it.		hnologie	
							1 script	Contraction of the second		(constant)	s Laborat	
											(viv)	
Γ	Γ					3	3				PO-a	Computational Knowledge
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	-					3	3		3	3	PO-0 P	Conduct investigations of complex
							3	3	3		PO-d P	Computing problems
-	100						3	3	3	з	PO-0	Modern Tool Usage
						3		3	3		PO-F	Professional Ethics
						3	3		3	3	PO-g	Life-long Learning .
						3	3		3	3	PO-H	Project management and finance
											PO-1	Communication Efficacy
						2	3	3		3	PO-j	Societal and Environmental Concern
						3	3	3	3	w	PO-k	Individual and Team Work
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						3	w	3	3		PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.
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							10					Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.
-				-		3	ω	ω	ω		PSO-0	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.
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-	-		-		-	3	3	3	3		PSO-p	evelop techniques ( enhance ability for lifelong learning.
										3		Develop techniques to enhance ability for lifelong learning.
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								-		-	Learning Focus or Assessment Tools to Measure Attainment of CO	
								L			of CO	

CO No. CO1 CO2 CO3 CO5

HOD Department of Computer Science & Engineering IKG PTU Main Campus IKapurthala D

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PGCA1922	Program	Department
PGCA1922 Advanced Java Laboratory	Program Master of Computer Applications (MCA)	Department Computer Science and Engineering

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				Ō	4	3	2	1	No.	
				Create applications using advanced concepts like JavaBean, Struts, Hibernare, etc.	Outline the concept of SEO.	Implement the concept of database management,	Demonstrate session and cookies management	Implement serviets to handle HTTP requests	CO Statements (PC- PGCA1922 : Advanced Java Laboratory)	
				3	3	3	3		PO-a	Computational Knowledge
	- States			2		3			PO-b	Problem Analysis
				3		3	3	3		Design /Development of Solutions
					3		3	3	PO-d	Conduct investigations of complex Computing problems
									PO-e	Modern Tool Usage
				ω	3			3	PO-f	Professional Ethics
				ω	3	3	3	3	PO-g	Life-long Learning
				3	3		3		PO-h	Project management and finance
									PO-I	Communication Efficacy
									PO-j	Societal and Environmental Concern
				3	3		3	3		Individual and Team Work
				3	3		3	ω	PO-I	Innovation and Entrepreneurship 용 중 등
				ω	3	З	3	3	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.
				ω	3	ω	3	3	PSO-n	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.
				ω	ω	ω.	3	3	PSO-0	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.
				ω	з	ω	3	3	PSO-p	Develor enhar llífeic
F		F		< *	Understai Employability	Understal Employat MSTs, ESE, Class/Quiz Tests	Understal Employat MSTs, ESE, Class/Quiz Tests	Understan Employat MSTs, ESE, Class/Quiz Tests	Learning Focus of Assessment Tools to Measure Attainment of CC	

CO No. CO1 CO2 CO3 CO4 CO5

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							CO2 Write Shell Scripts	CO1 Prepare the environment for installation and use of Linux operating system	ument V1957	
				1		3	3	1.01	Computational Knowledge	
						3	3	-	Problem Analysis	
	-	-			3	3			Design /Development of Solutions	
	-	-				3	3	5	Conduct investigations of complex Computing problems	0
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	-	-			3 3	3 3	3		Professional Ethics	
	+			-	3 3	3 3	3 3	-	Project management and finance	
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	+	T	-	+					Societal and Environmental Concern	
				2	3	3	3		undividual and Team Work	
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3				3	3	3	3	3	Understand and apply knowledge on analysts, design and development of applications in the computing discipline.	0
Kapu					3	3	3		Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	
HOD Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala				ω	3	3	\$	3	Incultate employability and entrepreneur skils among students who can develop customized enterprise level solutions.	
& Engineering Campus						3	3	3 1	Develop techniques to enhance ability for lifelong learning.	
					Understai Employability	Understal Employal MSTs, ESE, Class/Quiz Tests	Understat Employat MSTs, ESE, Class/Quiz Tests	3 Inderstan Employat MSTs, ESE, Class/Quiz Tests	Isaming Focus of Assessment Tools to Measure Attainment of CO	

							CO5 Explain the protoc				CO1 Define computer networks	CO No. CO Statements	
							Explain the protocols used in wireless communication systems.	Highlight the benefits of Adhoc networks	Ouline the concept of Internet protocols and network security.	Identify the role played by different layers of network model	r networks	CO Statements (PC- PGCA1925: Advanced Computer Networking)	
and the second se							2	3	3				Computational Knowledge
								3	3				Problem Analysis
						The second second	3	3 3	3 3			0	Design /Development of Solutions Conduct investigations of complex Computing problems
				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-			3					Computing problems Modern Tool Usage
				And a state of the									Professional Ethics
the second		-	-	-			3	3	3	3			Life-long Learning
				-	-						3	PO-h	Project management and finance
				1 23 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 -								PO-I	Communication Efficacy
					-							PO-j	Societal and Environmental Concern
							2	3		3	3	PO-k	Individual and Team Work
							2	3		3	3	PO-1	Innovation and Entrepreneurship
		the second s					2	3	3	3	3	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.
			Construction of the second sec				2	3	3	3	3	PSO-n	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.
		the second secon		and the second s			3	3	3	3	3	PSO-o	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.
			State of the state	the second second second second				3	3	.3		PSO-p	Develop techniques to enhance ability for lifelong learning.
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												e Attainment of CO	



			C05	CO4	003	CO2	C01	CO No.	PGCA1926	Departme Progra
			Determine the use of Genetic algorithm to obtain optimized solutions to problems.	Apply artificial neural networks and fuzzy logic theory for various problems.	Explain neural network theory and fuzzy logic theory.	Examine the useful search techniques; learn their advantages, disadvantages and comparison.	Highlight the significance of Artificial Intelligence in knowledge representation.	CO Statements (PC- PGCA1926 : Artificial Intelligence & Soft Computing)	Artificial Intelligence & Soft Computing	Department Computer Science and Engineering Program Master of Computer Applications (MCA)
			-	3			3	PO-a	Computational Knowledge	
				3				PO-b	Problem Analysis	
		-		2	3	3		PO-c	Design /Development of Solutions	
			3	2	3		3		Conduct investigations of complex Computing problems	
			3	2	3	3	3		Modern Tool Usage	
				3		3		PO-f P		
			3		3	2	24		Life-long Learning Project management and finance	
			3	3		3	2			
		-	3					PO-I F		
				3					Societal and Environmental Concern	
			3		3		3		Individual and Team Work	•
			3		3	Ģ		FOC	Innovation and Entrepreneurship	
		and the state of the	3		3	3	3	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	
			3	3	3	3	£	PSO-n	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	
		and the second second second second	3		3	З	3	PSO-0	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.	
		The second second	3	3	3	З		PSO-p	Develop techniques to enhance ability for lifelong learning.	
1			Understal Employability	Understai Employability	Understad Employad MSTs, ESE, Class/Quiz Tests	Understar Employat MSTs, ESE, Class/Quiz Tests	Understan Employad MSTs, ESE, Class/Quiz Tests	Learning Focus on Assessment Tools to Measure Attainment of CO		

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

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	C05	CO4	CO3	C02	C01	CO No.		Program PGCA1927
	Define complexity and computability concepts	Illustrate how push down automata and Turing Machine can be used to solve computational problems.	Prepare context free grammar for various languages.	Design Finite Automata's for different Regular Expressions and Languages.	Define formal languages and automata.	CO Statements (PC- PGCA1927 : Theory of Computation)		Program Master of Computer Applications (MCA) PGCA1927 Theory of Computation
	3.	3	3	3		PO-a	Computational Knowledge	
	3	3	3			PO-b	Problem Analysis	
	3		3	3		PO-c	Design /Development of Solutions	
		2	3	3		PO-d	Conduct investigations of complex Computing problems	
		3			a stand	PO-e	Modern Tool Usage	
	3		3			PO-f	Professional Ethics	
	3	3	1	3	E	PO-g	Life-long Learning	
	3	3	3		100	PO-h	Project management and finance	
						PO-I	Communication Efficacy	
						PO-J	Societal and Environmental Concern	
						PO-k	Individual and Team Work	
	3	3		3		PO-1	Innovation and Entrepreneurship	
	3	ω	3	ω	3	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	
	3	ω	З	ω	3	PSO-n	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	
	3	· w	ω	ω	3	PSO-0	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.	
	3	ω	3	3	3	PSO-p	Develop techniques to enhance ability for lifelong learning.	
<u> </u>	Understal Employability	Understal Employability	Understal Employat MSTs, ESE, Class/Quiz Tests	Understal Employat MSTs, ESE, Class/Quiz Tests	3 Understan Employat MSTs, ESE, Class/Quiz Tests	Learning Focus or Assessment Tools to Measure Attainment of CO	and the second	

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Repartment of Computer Science & Engineering IKG PTU Main Campus Kapurthala

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	Image: Computer Science and Engineering Marcer Computer Applications (MCA)         Image: Computer Applications (MCA)         Image: Computer Networking Laboratory         Image: Computer Networking Laboratory
	Computational Knowledge
	Problem Analysis
	Conduct investigations of complex Computing problems
	Modern Tool Usage
	Professional Ethics
	Life-long Learning
	Societal and Environmental Concern
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	$\omega - \omega \omega_{\omega}$ Innovation and Entrepreneurship
	Understand and apply knowledge on analysis, destgn and development of applications in the computing discipline. 3 3 3 3 3 3
Kapersto	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values. 3 3 3 3 2 2
HOD Apartment of Computer Science & Engineering NKG PTU Main Campus Kapurthala	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions. 3 3 3 3 1
Campus	Develop techniques to enhance ability for lifelong learning. 3 3 3 3 3 3 3 3 3 3
	to Juderstan Employad MSTs, ESE, Class/Quiz Tests Understan Employad MSTs, ESE, Class/Quiz Tests

	Department       Computer Science and Engineering Program Masier of Computer Applications (MCA)         PGC(A1929       Artificial Intelligence & Soft Computing Laboratory         CO       Constanting free: PiscA1929: Artificial Intelligence & Soft Computing Laboratory         CO       Write programs for basic Al problems.         CO       Prepare training data         CO       Prepare training data         CO       Design back propogation metwork         CO       Design back propogation metwork         CO       Implement different operations on fuzzy sets	
<text></text>		

PGCA1930 S	Program M	Department C
Software Project Management	Program Master of Computer Applications (MCA)	Department Computer Science and Engineering

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				5	04	)3	)2	01	No,	
				Apply nianagement and development practices to develop software.	Comment upon risk and quality management.	Explain the fundamentals of Process Planning, effort estimation and quality planning.	Outline the basic concepts of Software projects.	Define the principal tasks of software project management	CO Statements (PC- PGCA1930 : Software Project Management)	
					3	3			PO-a	Computational Knowledge
	and the second					3	2	з	PO-b	Problem Analysis
					3		3	3	PO-c	Design /Development of Solutions
-	and the second				3	3			PO-d	Conduct investigations of complex Computing problems
					3	2	3	ы	PO-e	Modern Tool Usage
		To the second		3		3	3		PO-f	Professional Ethics
				3		3		ω	PO-g	Life-long Learning
				3	3	3		ω	PO-h	Project management and finance
				3	3	2	3	ω	PO-i	Communication Efficacy
				2					PO-J	Societal and Environmental Concern
				2	3		3	ω	PO-k	Individual and Team Work
				-	3	2	3	3	PO-1	Innovation and Entrepreneurship
				3	w	ω	ω	3	PSO-m	Understand and apply (nowledge on analysis, design and development of applications in the computing discipline.
	the second se			2	3	ω	3	3	PSO-n	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.
	the second secon			1	3	ω	ω	3	PSO-0	Inculate employability and entrepreneur skills among students who can develop customized enterprise level solutions.
	and the second s			3	U	ω	ω	3	PSO-p	Develop enhan lifelo
1	1			Understai Employability	Understai Employability	Understa Employat MSTs, ESE, Class/Quiz Tests	Understal Employat MSTs, ESE, Class/Quiz Tests	Understan Employat MSTs, ESE, Class/Quiz Tests	Learning Focus on Assessment Loois to Measure Attainment of Cu	

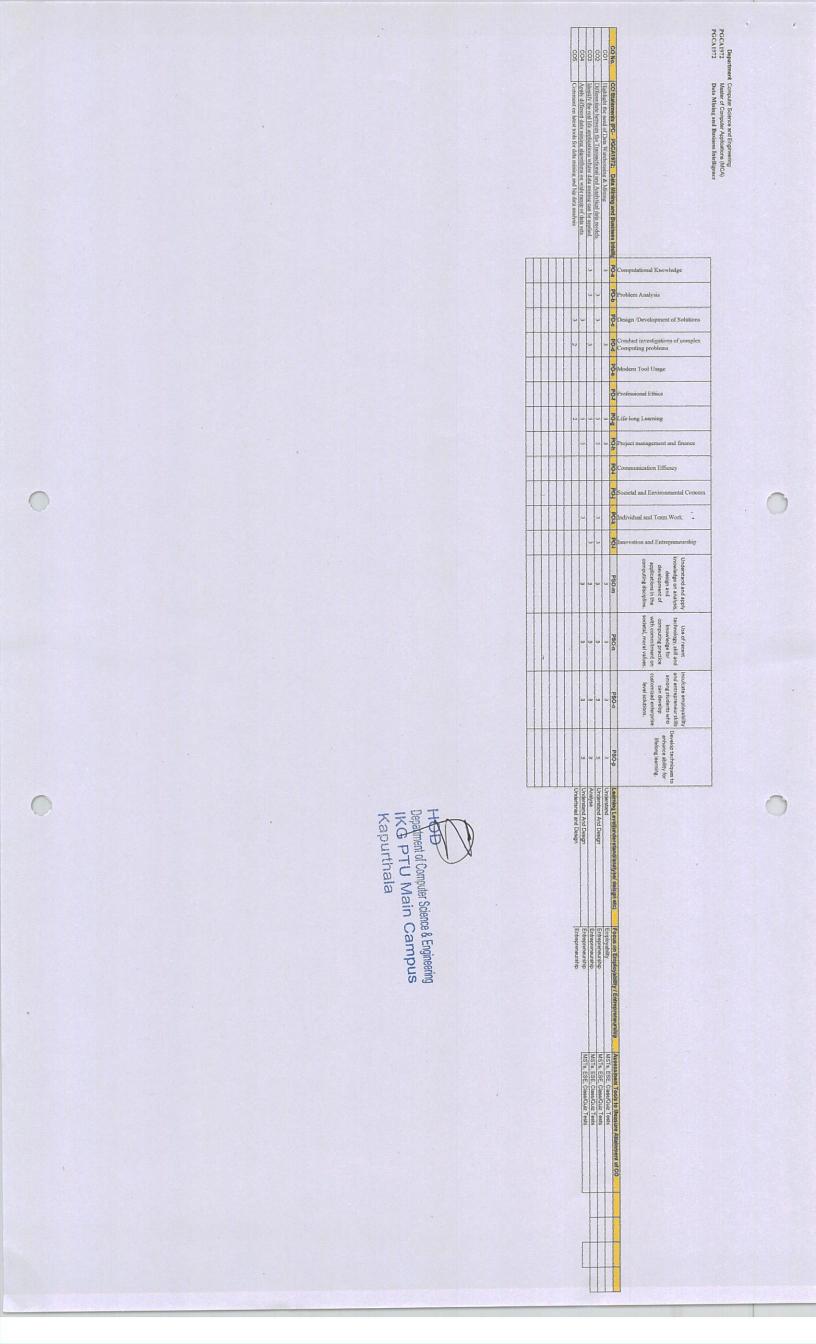
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Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala A D

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	S	202	000	003	002	001	Program Program PGCA1971
	Prina souulor to various optimizzation providents	Find a latitude to an international provering using Cram	Fighting the Devicet Management problems trians (PDM)	Dramary fassible solutions for transportation and assignment problems	Solve linear monorammine mobileme	Dafine the some of oneration research	Program Master of Computer Spikersforg Program Master of Computer Applications (MCA) 971 Optimization Techniques
			200		-		Computational Knowledge
			-		3		Problem Analysis
		-	-	2	3	1	Design /Development of Solutions
		-			1	3	Conduct investigations of complex Computing problems
		-	~	-		3	Modern Tool Usage
			-		1	+	Professional Ethics
		-		~	3		Life-long Learning
		-			1	+	Project management and finance
			-	-	-	+	Communication Efficacy
		1	-	-	1		Societal and Environmental Concern
		-	-	-	3		Individual and Team Work
		-	-	3	3	+	Innovation and Entrepreneurship
				u	2	3	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.
	ĸ	, c	2	w	33	3	Use of recent technology, skill and knowledge for computing practice with commitment on societa), moral values.
HOD Department of Computer Department of Computer IKG PTU Ma Kapurthala		u		2	3	3	Inculcate employability and entrepreneur skills among students who customized enterprise level solutions.
HOD Department of Computer Science & Engineering Department of Computer Science & Engineering NKG PTU Main Campus Kapurthala							Develop techniques to enhance ability for lifelong learning.
npus		Understand	Understand	Understand	Understand	Understand	Learning Level/understand/analyze/ deison etc)
		m	g	D			
		Employability	nployability	mployat MSTs, ESE, Class/Quiz Tests	Employat MSTs, ESE, Class/Quiz Tests	Employat MSTs, ESE, Class/Quiz Tests	Foots of Assessment Tools to Measure Attainment of CO
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		CONs.       COS Selements (PC. PGCA193)       Enterprise Resource Flaming         CO       Discuss the latest transference of the prise resource prism hereits         CO       Dynamic Reverse prise         Discuss the latest transfer and domains of ERP         Discuss the latest transfer a	
	Hod Department of Computer Science & Engineering Department of Computer Science & Engineering Med PTU Main Campus Kapurthala		

					C05	CO4	003	002	001	CO No.		PG
	1											Program M CA1955 A
					Execute the role of DBA.	Design new database and modi- the result.	velop PL/SQL programs inc	Analyze integrity constraints on a database	plement query a database us	Statements (PC-PGCA1s		Department Computer Science and Engineering Program Master of Computer Applications (MCA) PGCA1955 Advanced Database Management System Laboratory
						Design new database and modify existing ones for new applications and reason about the efficiency of the result.	Develop PL/SQL programs including stored procedures, stored functions, cursors	1 a database	Implement guery a database using SQL DML/DDL commands.	CO Statements (PC-POCA1955 : Advanced Database Management System Laboratory )		ering ns (MCA) nent System Laboratory
					1	ų		3	3	4	Computational Knowledge	
							3		3	9	Problem Analysis	
					3	3	3	3	3	ĉ	Design /Development of Solutions	
-					3		3		3	T	Conduct investigations of complex. Computing problems	
			-		3	ω	3		3	¢	Modem Tool Usage	
					3		3	3		4	Professional Ethics	
						3	3	3			Life-long Learning	
					3	42	3	3	3		Project management and finance	
					3						Communication Efficacy	
					3	3	3	3	ω	PO-J PO		
										*	Individual and Team Work Innovation and Entrepreneurship	
					3	3	3	3	3	5	× -	
					3	w	w	3	з	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	
					3	3	3	3	3	PSO-n	Inderstand and apply Use of recent nowledge on analysis, technology, skill and design and knowledge for development of computing practice applications in the with commitment on computing discipline. societal, moral values.	
					3	3	3	3	3	PSO-o	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.	•
					3	ω	3	3	3	PSO-p	Develop techniques to enhance ability for fifelong learning.	
	-	-	1		Understan	Design	Understar	Understar	Understan	Learning		
					Understar Employability	Employability	Understar Employat MSTs, ESE, Class/Quiz Tests	Employat MSTs, ESE, Class/Quiz Tests	Understand Employati MSTs, ESE, Class/Quiz Tests	Learning Focus of Assessment Tools to Measure Attainment of CO		
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HOD Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala

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Instruction         Production         Produc	Instance of Component Computing Application Laboratory         Now of Example with an Aboratory           Now of Computation Laboratory         Instance of Computation Laboratory         Instance of Computation Laboratory           Impute problems         Instance of Computation Laboratory         Instance of Computation Laboratory         Instance of Computation Laboratory           Impute problems         Instance of Computation Laboratory         Instance of Computation Laboratory         Instance of Computation Laboratory           Impute problems         Instance of Computation Laboratory         Instance of Computation Laboratory         Instance of Computation Laboratory         Instance of Computation Laboratory           Impute problems         Instance of Computation Laboratory         Instance of Computation Laboratory         Instance of Computation Laboratory         Instance of Computation Laboratory           Impute problems         Instance of Computation Laboratory         Instance of Computation Laboratory         Instance of Compute problems         Instance of Compute problems           Impute problems         Instance of Compute problems         Instance of Compute problems         Instance of Compute problems         Instance of Compute problems           Impute problems         Instance of Compute precent ship of Compute problems <tr< td=""><td>Understar Employability</td><td>3</td><td></td><td>2</td><td>3</td><td>3</td><td></td><td></td><td>3</td><td>3</td><td></td><td></td><td></td><td>2</td><td></td><td>Write their own clear and coherent texts.</td><td></td></tr<>	Understar Employability	3		2	3	3			3	3				2		Write their own clear and coherent texts.	
Apply spoken and written English linguage in their chosen beching all       2	Image: Computer Speciaal Circumunication Laboratory         Output computer Speciaal Circumunication Laboratory           Apply Spoke madringe their closen leabing lifeting         1	Understar Employability	3	3		3	. 3			3	3				3	2	Illustrate flueny in coversation.	4
Image: Second problems in the buefing of pro	Imment Computer Scence and Engineering           Upment Computer Scence and Engineering           Upment Computer Scence and Engineering           Imment Computer Scence and Engineering <t< td=""><td>Understar Employat MSTs, ESE, Class/Quiz Tests</td><td></td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td>3</td><td>3</td><td></td><td></td><td>2</td><td>2</td><td>2</td><td>Apply spoken and written English language in their chosen technical field.</td><td></td></t<>	Understar Employat MSTs, ESE, Class/Quiz Tests		3	2					3	3			2	2	2	Apply spoken and written English language in their chosen technical field.	
Image: Construction of Constructin of Construction of Construction of Construct	Impert Computer Science and Engineering         organin Masier of Computer Spinalistic (ICC)         A 1908 Technical Communication (ICC)         A 1909 Technical	Understar Employat MSTs, ESE, Class/Quiz Tests	2	3		2		3	and and	3	3		2		3	lls.	Execute proficiency in reading & listening, comprehension, writing and speaking skill	
ICO Statements (PC-POCATED)       PO4       PO4       Row Potential and apply         ICO Statements (PC-POCATED)       PO4       Row Potential and Solutions       Row Potential and Row Potential Area	Imment Computer Science and Engineering         organs       Master of Computer Splitzations (MCA)         A1908       Technical Communication Laboratory         A1909       Poblem Analysis         A1904       Poblem Analysis         Professional Ethics       Individual and Team Work         Individual and Team       Work         Individual and Team Work       Individue labers in the with commitment on outsomment of computing discipline.         Individual and Team       Individue labers in the with commitment on outsom and Entreprise         Individue labers in the wells luftions.       Iwel soluti	Jnderstan Employad MSTs, ESE, Class/Quiz Tests	2	3		2				3	3		2	-	2		Demonstrate the benefits of effective communication	
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 Computing discipline. Societal, moral values. Individual and Team Work Innovation and Entrepreneurship Infelong Learning. Individual and Team Work Innovation and Entrepreneurship Infelong Learning. Individual and Team Work Innovation and Entrepreneurship Infelong Learning. Individual and Team Work Innovation and Entrepreneurship Infelong Ital and Entrepreneurship Infelong Ital and Ital Ital and Ital Ital Ital Ital Ital Ital Ital Ital	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 explications in the omputing discipline societal, moral values, level solutions.	Learning Focu	PSO-p	PSO-o	PSO-n	PSO-m					PO-f	PO-e	PO-d			PO-	CO Statements (PC-PGCA1908 : Technical Communication Laboratory )	
	partment Computer Science and Engineering Program Master of Computer Applications (MCA) GCA1908 Technical Communication Laboratory		Develop techniques to enhance ability for lifelong learning.	Inculcate employability and entropreneur skills among students who can developh oustomized enterprise level solutions.							Professional Ethics	Modern Tool Usage	Conduct investigations of complex Computing problems			Computational Knowledge		

HOD Department of Computer Science & Engineering IMG PTU Main Campus

PGCA1909	Program	Department
PGCA1909 Web Technologies	Program Master of Computer Applications (MCA)	Department Computer Science and Engineering

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						Design forms with special controls using HTML	Outline the key web designing concepts using java script	Explain how to link webpages through hypertext or images a links	Design webpages with multiple sections or frames	Create pages with simple tags in HTML.	CO Statements (PC-PGCA1909 : Web Technologies )	
						3	3		*		PO-a	Computational Knowledge
	Statute and					3		3	3	3	PO-b	Problem Analysis
						3	3	2	3	3	PO-c	Design /Development of Solutions
						3	12	3	3			Conduct investigations of complex Computing problems
K						3	3		3	3	PO-e	Modern Tool Usage
						3		2	3		PO-f	Professional Ethics
						3	2	3	3	ŝ	PO-g	Life-long Learning
									3	3	PO-h	Project management and finance
							3		3		PO-I	Communication Efficacy
						3	3		2	3	PO-j	Societal and Environmental Concern
						3	2	3	3	3	PO-k	Individual and Team Work
						3	3	2	3	3	PO-I	Innovation and Entrepreneurship
						3	3	3	3	3	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.
						3	3	3	3	3	PSO-n	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.
						3	ω	33	3	3	PSO-0	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.
	Survey and the second second					3	3	3	3		PSO-p	Develop techniques to enhance ability for lifelong learning.
		L	I	F.	1	Design	Design	Design	Understa	3 Understau	Learnin	
						Entrepreneurship	Entrepreneurship	Design  Entreprer MSTs, ESE, Class/Quiz Tests	Understal Employat MSTs, ESE, Class/Quiz Tests	3 Understan Employat MSTs, ESE, Class/Quiz Tests	Learning Focus or Assessment Tools to Measure Attainment of	

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					C05	C04	C03	C02	001	CO No.		PGCAI
					Categorize problems as P, NP or NP Complete	Design algorithm using an appropriate design paradigm for solving a given	Develop Algorithms using iterative/recursive approach	Categorize problems based on their characteristics and practical importance	Define alforithm and its complexity	CO Statements (PC- PGCA1920 : Design & Analysis of Algorithms )		PGCA1920 Design & Analysis of Algorithms
and and a second second					3		3	3		PO-a	Computational Knowledge	
Contraction of the second seco		-					3	3		PO-b	Problem Analysis	
Contraction of the local division of the loc							3	3		PO-e	Design /Development of Solutions	
and and a second						3	3	3		PO-d	Conduct investigations of complex Computing problems	
Contraction of the second								Contraction of the		PO-e	Modern Tool Usage	
										PO-f	Professional Ethics	
					2	3	3	3	ę	PO-g	Life-long Learning	
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-			3	3			po-h	Project management and finance	
			-							PO-i	Communication Efficacy	
the second secon										Pod	Societal and Environmental Concern	
				-		.3	3	3		PO-k	Individual and Team Work	
The second						3	3	3		PO-I	Innovation and Entrepreneurship	
the second state of the second second					3	з	2	3	3	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	
and a state of the						3	3	3	3	PSO-n	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	
A State of the sta					2	3	3	3	.2	PSO-0	Inculcate employability and entrepreneur skills among students who can develop customized evelop level solutions.	
					.3	2	3	3	3	PSO-p	y 5 Develop techniques to enhance ability for lifelong learning.	
A NOT THE OWNER OF THE OWNER OWNER OF THE OWNER						Understa	Design	Design	Understan	Learning		
						Understai Employability	Employat MSTs, ESE, Class/Quiz Tests	Employat MSTs, ESE, Class/Quiz Tests	Understan Employat MSTs, ESE, Class/Quiz Tests			

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

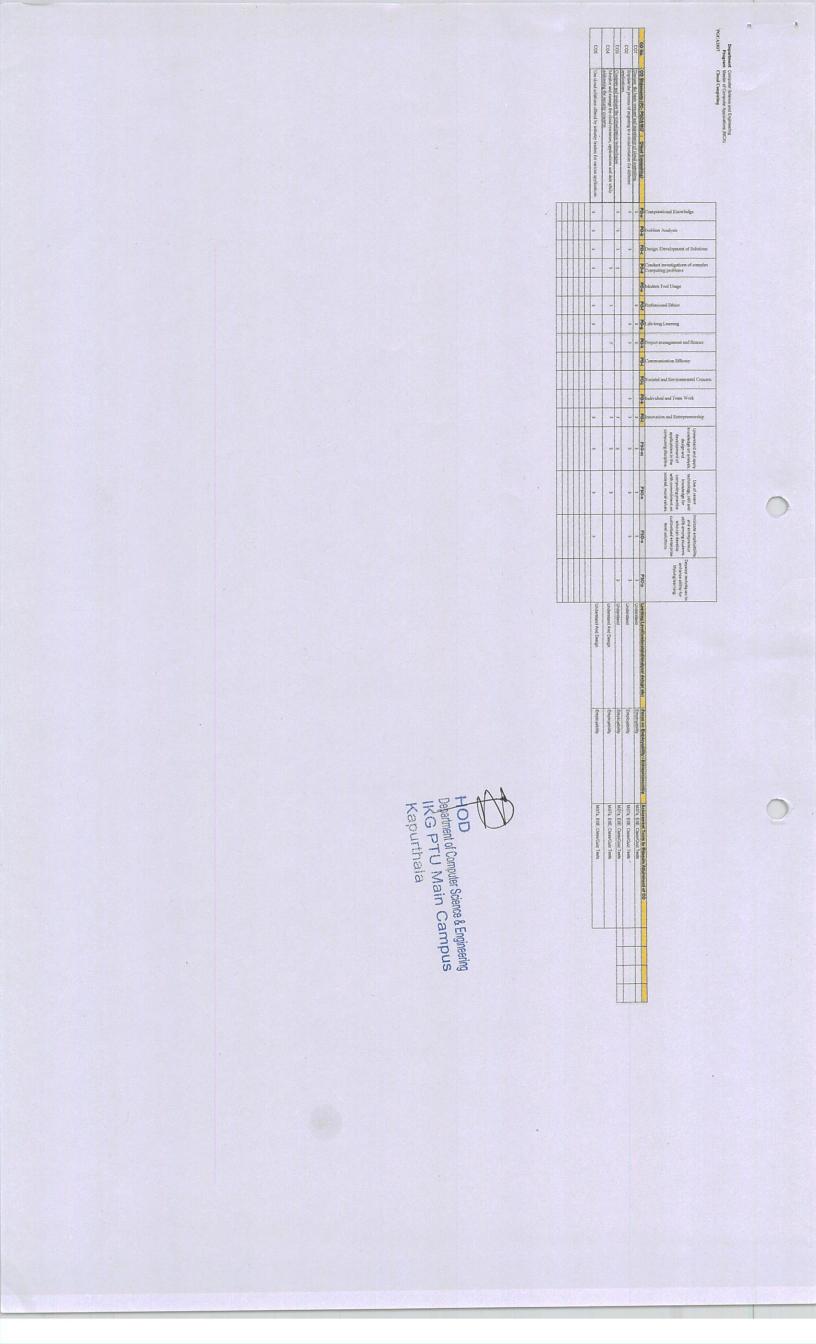
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	000	005	CO4	CO3	603	CO1	CO No.	PucAty	Prograt
		Thistrate invocation of remote methods	Implement database connectivity	Implement web concerts using java server nages	Select the right technolog/ tool for problem based solutions	Explain the role of servlets	CO Statements (PC-PGCA1918 : Advanced Java)	Proc.A.1936 Advanced anva	Program Master of Computer Applications (MCA)
[			3	3			PO-a	Computational Knowledge	
		2		3	2	3	PO-b	Problem Analysis	
		+	1	3	3	3	PO-c	Design /Development of Solutions	
				2 4	~	3		Conduct investigations of complex Computing problems	
		~	3	3		3	PO-e	Modern Tool Usage	
		1					PO-f	Professional Ethics	
		3		3	3	ω	PO-g	Life-long Learning	
		-	2	3	3	з	PO-h	Project management and finance	
		-	-	3			PO-I	Communication Efficacy	
				3			PO-J	Societal and Environmental Concern	
		-		3	2	3	PO-k	Individual and Team Work	
		3		3	3	3	PO-1	Innovation and Entrepreneurship	
		3	1	3	W	3	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	
ED.		2.		3	w	3	PSO-n	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	
OD OD - thorat of Computer Science & Engineering		2	3	3	2	3	PSO-0	Inculate employability and entrepreneur skills among students who can develop customized enterprise level solutions.	
the & Engineering		1		ω	3	3	PSO-p	Develor enhar liffelo	
		Understand	Understai e	Design Entreprer MSTs, ESE, Class/Quiz Tests	Understal Employat MSTs, ESE, Class/Quiz Tests	Understan Employat MSTs, ESE, Class/Quiz Tests	Learning Focus or Assessment Tools to Measure Attainment of CU	and the second	

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							-			-	7	-			Execute user level priviledges	Execute use	C05	Γ
Understai Employability	1	2	2	U,	2							+			Write scripts in Linux.	Write script	004	
Understal Employability	Cu la	ω	ω	ω	3	3	Service Service	2	1	2	2	2	1	1		1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	000	Τ
			4	u	3	3		3	3	3	2	3	3	3	Perform resource management in Linux	Perform reso	CO3	1
Understal Employal MSTs, ESE, Class/Quiz Tests		u.							2			2 5	3	3	Prepare environment for working on open source operating system like	Prepare env	CO2	
Understal Employat MSTs, ESE, Class/Quiz Tests	ω	3	a	a	2	2		+	,	0		-	-		Discuss the evolution of Upen Source operating systems.	Discuss the	001	
	3	3	3	3 3	u u	-	-	N		0			+	+	CO Statements (Los Loon 1999 - Lina Administration)	CC Statelle	CO NO.	
	PSO-p	PSO-0	PSO-n	PSO-m	-	D-J PO-k	PO-I PO-J	2	PO-a	_	7		6r	8	mante /DC. DCCA1958 · I inux Administration	ICO Statem	CO NO	1
	tues to the for the formation of the for	yability ur skills ts who op erprise ons.	Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	Understand and apply knowledge on analysis, development of applications in the computing discipline.	Innovation and Entrepreneurship	Individual and Team Work	Communication Efficacy Societal and Environmental Concern	Project management and finance	Life-long Learning	Professional Ethics	Modern Tool Usage	Conduct investigations of complex Conduct investigations of complex	Problem Analysis	Computational Knowledge	3CA1956 Linux Administration	PGCA1956 Linux Administration	PGCA	
															Department Computer Science and Engineering	ment Computer S	Depart	

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



PGCA-B2	Program	Department
PGCA-B2 Computer Science Essentials	Program Master of Computer Applications (MCA)	Department Computer Science and Engineering

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Define various components, modes and topologies of computer networks.	Explain the role of operating system.	Outline the key components of Database Management system	Prepare docaments using word processing, Spreadsheet and Presentation tools	Identify various components of computer system including input and output devices.	CO Statements (PC- PGCA-B2 : Computer Science Essentials )	
2	2	3	ω	3	PO-a	Computational Knowledge
3			2	2	PO-b	Problem Analysis
3	3	3	2	2	ò	Design /Development of Solutions
3	2	2	<b>د</b> ا		PO-d	Conduct investigations of complex Computing problems
1			2		PO-e	Modern Tool Usage
2					PO-f	Professional Ethics
3	3	3	3	3	PO-g	Life-long Learning
2	2	3			PO-h	Project management and finance
					PO-1	Communication Efficacy
			2		PO-J	Societal and Environmental Concern
				2	PO-k	Individual and Team Work
3		1	2	2	PO-I	Innovation and Entrepreneurship
2	2	2	2	1	PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.
2	2	2	2		PSO-n	nt for actice ent on values.
3	ω	2	2	2	PSO-o	and entrepreneur skillity and entrepreneur skillity among students who can develop customized enterprise level solutions.
	3	3	ω	2	PSO-p	Develop techniques to enhance ability for lifelong learning.
a	Understa	Understa	Understa	Jnderstan	Learning	
Y	Understal Employability	Employat	Employat	Employat	Focus or	
	bility	Understal Employat MSTs, ESE, Class/Quiz Tests	Understal Employat MSTs, ESE, Class/Quiz Tests	Understan Employat MSTs, ESE, Class/Quiz Tests .	Learning Focus of Assessment Tools to Measure Attainment of Lu	
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CO No.

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								CO5 Identify the type of graphs	CO4 Applying elementary cour rules, permutations, conth	CO3 Write proofs using symbo	CO2 Apply rules of inference.				Program Master of Computer Applications (MCA) PGCA1917 Discrete Structures &Optimization
								hs.	Applying elementary counting techniques using the product and sum rules, permutations, combinations, the pigeon-hole principle.	Write proofs using symbolic logic and Boolean Algebra		Explain the use of vein diagrams to solve applied providus.	diamonto to colice analiad anablema	CO Statemente (DC_DCCA1917 · Discrete Structures & Ontimitation	ptimization
								ω	ω	3	~		~ ~	P0-2	Computational Knowledge
					-	-		3	3	3	-		-	5	Problem Analysis
	-			-			1	з	ω	3			~	POL	Design /Development of Solutions
									G	2	0		2		Conduct investigations of complex Computing problems
								-						P0-e	Modern Tool Usage
														PO-f	Professional Ethics
		-						3	3	3		-		PO-a	Life-long Learning
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								ω	u		2			PSO-m	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.
								u				ω		PSO-n	Use of recent technology, still and knowledge for computing practice with commitment on societal, moral values.
1								U	a ' u		2	3	3	PSO-0	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.
												3	3	PSO-p	Develop techniques to enhance ability for lifelong learning.
L			1				1	Design Employability	Analyse Employability		Understal Employat MSTs, ESE, Class/Quiz Tests	Understal Employat MSTs, ESE, Class/Quiz Tests	Understan Employat MSTs, ESE, Class/Quiz Tests	Learning Focus of Assessment Tools to Measure Attainment of CO	

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Image: Compare Price Programming in Python with other programming in Python	Immet Concurst         Science and Engineering           organn         Master of Concurst           V191         Programming in Python           V191         Programing in Python           V191		0 0	~	3		3	2		2	2			3	3	-	ned functions, modules, files, and packages and exception	Design user define	C04
Image: Computer Pricon with other programming impuges         Problem Analysis         Computational Knowledge           Image: Price Pri	Intent Computer Science and Engineering         Number of Computer Science and Engineering           Organs         Master of Computer Science and Engineering         Number Science and Engineering           Image: Notice         Image: Notice         Image: Notice         Image: Notice           Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice           Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice           Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice           Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice           Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice         Image: Notice </td <td>Inter and and and and and</td> <td>20</td> <td>6</td> <td>u</td> <td>w</td> <td>3</td> <td></td> <td></td> <td>2</td> <td>2</td> <td></td> <td></td> <td>3</td> <td>3</td> <td>-</td> <td>of control structures and numerous native data types with</td> <td>Outline the use of</td> <td>CO3</td>	Inter and and and and and	20	6	u	w	3			2	2			3	3	-	of control structures and numerous native data types with	Outline the use of	CO3
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CO Statement [PC: POCA1961]       Pool         Pool       Computational Knowledge         Pool       Pool         Pool       Pool Pool [Pool [P	Algo Programming in Python)       Poil	Inderstal Employat MSTs ESE Class/Ouiz Tests			2		u	2		1	8			3	3		nent, data types, operators used in Python.	Explain environme	C01
0       Processional       Environment and spik       Use of recent         0       0       Design /Development of Solutions         0       Design /Development of Solutions       Includent which is the Knowledge for another the list for another the present is fully on analysis, technology, students which is the with commitment of computing protities another the list for another the present is fully on analysis, technology, students which is the with commitment of computing practice and evelop is enhance ability for another the list outforts in the with commitment on cutomized entreprise with commitment on cutomized entreprise is list outforts.         1       Individual and Team Work         1       Isele solutions.         1       Isele solutions.         1       Isele solutions.         1       Iseles	Any Si Program Master of Computer Applications (ICA) All Si Programming in Python Problem Analysis Problem Analysis Computational Knowledge Problem Analysis Computational Knowledge Problem Analysis Computational Ethics Professional	Inderstanl Employal MSTs. ESE Class/Quiz Tests		2			+	-			+	101	t	-			IFV- FOURIDOS, Flogramming in Fymon 1	CO Statements	UU NO.
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	Department Computer Science and Engineering Program Master of Computer Applications (MCA) PGCA1951 Programming in Python		Develop techniques to enhance ability for lifelong learning.		Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral values.	Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	nnovation and Entrepreneurship					rofessional Ethics	Aodern Tool Usage	conduct investigations of complex	Design /Development of Solutions				

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	a and finance icacy nmental Concern n Work epreneurship knowledge on analysis, technology, skill and and entrepreneurskills design and knowledge for among students who

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						C05	CO4	CO3	CO2	CO1	CO NO.			PGCA I
•						Demonstrate No SQL databases (Open Source)	Outline characteristics of advanced databases prevailing in market.	ExplainTransaction Management & Recovery techniques in RDBMS.	Apply normalization theory to the normalization of a database	Express the basic concepts of DBMS and RDBMS.	CO statements (PC-PGCA 1953 : Advanced batabase management bysterii )			PGCA 1953 Advanced Database Management System
		T						3	3		PO-4	Con	putational Knowledge	
					The second second		3	3		3	10-0	Pro	lem Analysis	
						3			3		TU-	Des	gn /Development of Solution	ns
		-				3	2	3	. 3		1000		duct investigations of compl putting problems	ex
						3	3		3	3	100	Мо	lern Tool Usage	
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	-					3	-	+	+	3	+	-	ovation and Entrepreneurshi	
						u				u			Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	
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						an and the second se	Understal Employability	Understal Employability	Understat Employat MSTs, ESE, Class/Quiz Tests	Understat Employat MSTs. ESE. Class/Quiz Tests	Inderstan Employad MSTs, ESE, Class/Quiz Tests	Learning Focus of Assessment Tools to Measure Attainment of CO		

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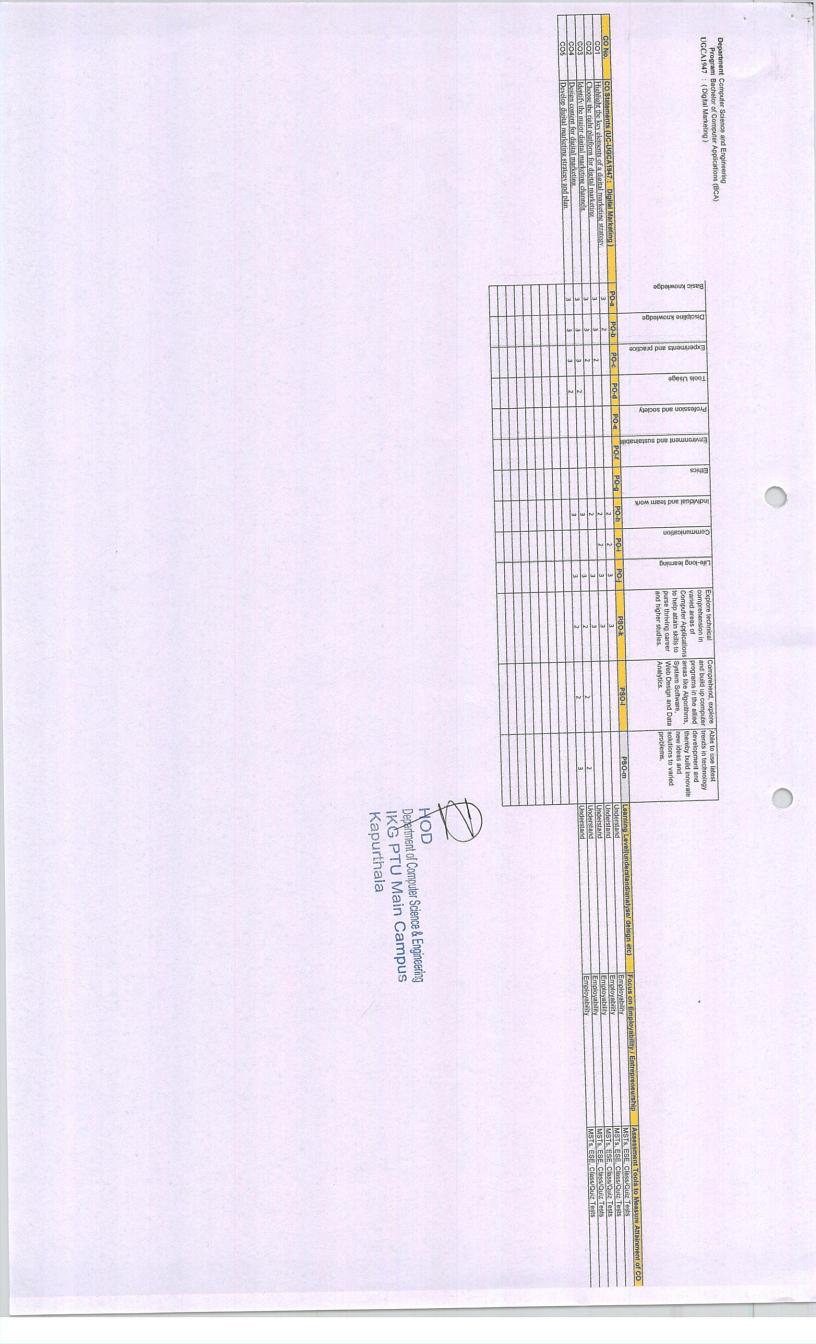
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Instruction         Output intervention         Output investigation of computing problems         Output investigation of computing problems         Instruction         Instruction           Instruction         -<				£		0	-	-	3	3	3						C05
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Auby solver and writer Electro communication       CO Statements (FC- PGCA1905): in behavior (FC- PGCA	Understai Employability	CL.						+	-	+							
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Outline the benefits of effective communication       Pool       Computational Knowledge         1       Pool       Problem Analysis       Pool         2       Pool       Pool       Pool       Pool         3       Pool       Pool       Pool       Pool         4       Pool       Pool       Pool       Pool         4       Pool       Pool       Pool       Pool         4       Pool       Pool       Pool       Pool         5       Pool       Pool       Pool       Pool         6       Pool       Pool       Pool       Pool         6       Pool       Pool       Pool       Pool         7       Pool       Pool       Pool       Pool       Pool         7       Pool       Pool       Pool       Pool       Pool       Pool         7       Pool       Pool       Pool       Pool       Pool       Pool       Pool         7       Pool<	Understal Employat MSTs, ESE, Class/Quiz Test		. <b>U</b>	1	2				2	3	3				3		CO2
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		Develop techniques to enhance ability for lifelong learning.	Inculcate employability and entrepreneur skills among students who can develop customized enterprise level solutions.		Understand and apply knowledge on analysis, design and development of applications in the computing discipline.	innovation and Entrepreneurship						Aodern Tool Usage		Design /Development of Solutions	roblem Analysis	Computational Knowledge	

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		CO5 Write programs to implement various types of searching and sorting algorithms				PGCA1954 Data Structures using Python Laboratory	- Department Computer Science and Engineering
		2	3	3	PO-a	Computational Knowledge	
		ωω	3	w		roblem Analysis	
			3		2	Design /Development of Solutions	
			3 3	2 23		Computing problems Modern Tool Usage	(
		2	2			Professional Ethics	
		53 5	3	ωω	PO-g	Life-long Learning	
			3		PO-h	Project management and finance	
						Communication Efficacy	
				-		Societal and Environmental Concern	
		2	3	3	-	Individual and Team Work	
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		3	u u	<b>W</b>	PSO-m	apply nalysis, t of t the ipfine.	
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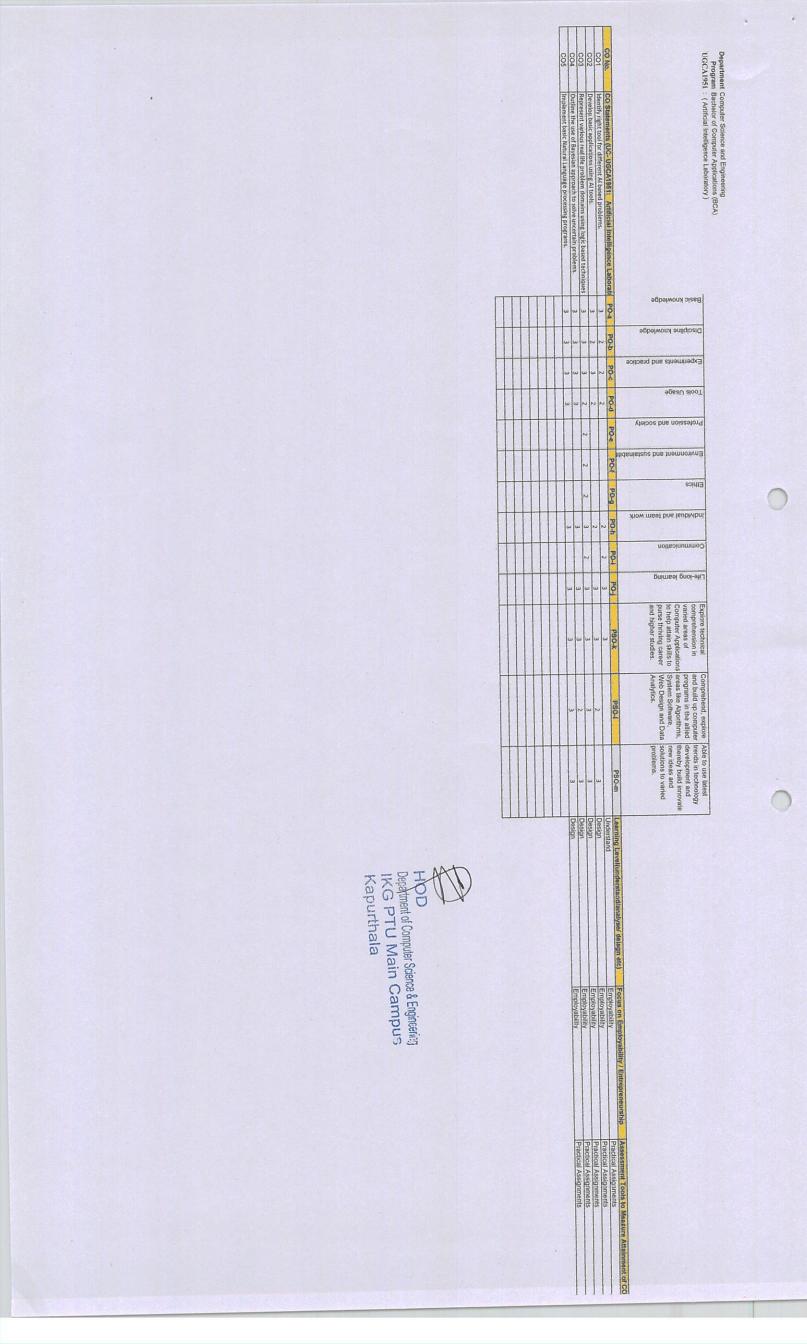
		•												
			,			3				2	2	3	Define enviography	CO5
	Understand	2	2 °	2	3	3				3	3	1	Evaluate the internation feedball	
Emolovability MSTs, ESE, Class/Quiz Tests	Cinterentine	~	2	3	2 3	3	2	2	2		3	W. 3	Outine the information security risks across de Internet and WWW.	
Employability MSTs, ESE, ClassiQuiz Tests	Inderetand	2			-		+	-			2	3	Categorize various types of viruses.	CO2
Elliptoyability	Understand			3	+	2					3	3	Identify issues involved in the field of information security.	
	Understand				2 3	2			PU-0 PU-6	10-6 P	PO-D	PO-a	CO Statements (UC-UGCA1943: Information Security )	CO No.
Focus on Employability / Entrepreneurship Assessment Tools to Measure Attainment of CO	Learning Level(understand/analyse/ delsgn etc)	PSO-m	PSO-1	A-05d	80			unden	-					
		Comprehend, explore Able to use latest and build up computer trends in technology programs in the alled development and arreas like Algorithms, thereby build innovate system Software, new ideas and Web Design and Data solutions to varied Analytics.		Explore technical comprehension in varied areas of Computer Applications to help attain skills to purse thriving career and higher studies.	ହାଲନରା ହାରା-ର୍ମାଧ	Communication Individual and team work	Ethics	listeue bris triemnonivn∃	Profession and society	egesU alooT	Experiments and practic	Basic knowledge	Program Bachelor of Computer Applications (BCA) UGCA1948 : (Information Security.)	GCA1948

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				005	CO4	CO3	CO2	CO1	CO No.	
			[whole	Analyze the effects of intellectual property rights on society as a	Compare the different forms of intellectual property protection in terms of their key differences and similarities	Outline the primary forms of intellectual property rights.	Categorize case law and common law to current legal dilemmas in the technology field.	Identify tatutory, regulatory, constitutional, and organizational laws that affect the information technology professional	CO Statements (UC-UGCA1949: Cyber Laws & IPR )	
				3	£	3	3	ų	PO-a	Basic knowledge
				2	3	3	2	3	PO-b	Experiments and practice
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				2		2			PO-d PO-e	Profession and society
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				2	2	2			PO-I	Communication
				ω	3	3	3	3	PO-j	
				2	2	3	w	3	PSO-k	Explore technical comprehension in varied areas of Computer Application to help attain skills to purse thriving career and higher studies.
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Outline the use of bluetooth for connectivity of mobile application with 10T device	Entrepreneurship Entrenovoeurshin
CO4         Designing small IoT applications           CO5         Building interface of application with various devices	3       3       3       3       3       3       3       1
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	HOD Department of Computer Science & Engineeriation IKG PTU Main Campuro Kapurthala

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		urship Assessment Tools to Measure Attainment of CO Practical Assignments Practical Assignments Practical Assignments Practical Assignments Practical Assignments		

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			CO3		Department Program UGCA1941
		Execute commands related to grantinf and revoking user priviledges	Implement C programs using acc compiler Imperment virtualization	Prepare the envir	Department Computer Science and Engineering Program Bachelor of Computer Applications (BCA) UGCA 1941 : (Linux Operating System Laboratory)
		ids related to gra	grams using gcc	onment for insta	ce and Engineer puter Applicatio ing System Labo
		htinf and revokin	compiler	lation and use of	ratory)
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		3	3		Comprehend, e and build up co programs in the s areas like Ago System Softwa Web Design an Analytics. PBO-I
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HOD Department of Computer Science & Engineericity Department of Computer Science & Engineericity IKG PTU Main Campus Kapurthala					Learning Level(understand/analyse/ delsgn etc)
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		CO No.         CO Statements (UC-UGCA 1942: Cloud Computing Laboratory)           CO1         Identify major commercial projects in the field of cloud computing           CO2         Design basic cloud applications           CO3         Execute basic functionalities of open source tools like Open Stack.           CO4         Imperent virtualization           CO5         Define major services provided by cloud service provider.	Department Computer Science and Engineering Program Bachelor of Computer Applications (BCA) UGCA1942 : ( Cloud Computing Laboratory )
reprovement reprov	Here Regimenting	3         3         3         2         Pois           3         3         2         2         Pois           3         3         2         Pois         Pois           3         3         2         Pois         Pois           3         2         2         Pois         Pois           2         2         Pois         Pois         Pois	aðbajkkounki aulijdipsid aðbajkkounki aulijdipsid aðbajkkounki aulijdipsid aðbajkkounki aulijdipsid aðbajkkounki aulijdipsid aðbajkkounki aulijdipsid aðbajkkounki aulijdipsid aðbajkkounki aulijdipsid aðbajkkounki aðbajkounki aðbajkkounki aðbajkounki aðbajkkounki aðbajkounki aðbajkounki aðbajkounki aðbajkkounki aðbajkounki aðbajkounki aðbajkkounki aðbajko

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				Department Computer Science and Engineering Program Bachelor of Computer Applications (BCA) UGCA1943 : (Android Programming)
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CO1 CO2 CO3 CO4 CO5 Department Computer Science and Engineering Program Bachelor of Computer Applications (BCA) UGCA1944 : (Android Programming Laboratory) ICO Statemente (UCLUGCA1944. Arcticle Programming Laboratory) Pragne environment for working on Android OS. Program besic Android based applications. Hachitekt various security issues in Android platform. Implement database amplications. Design timorative User Interface and develop activity for android app. Basic ku 960 2 2 2 2 2 2 A esn s PO-e ~ PO-4 PO-g 2 2 3 hidual and team work w PO-I DI-ali 3 3 Eplore technical Comprehend, explore Able to use latest comprehension in and build up computer brends in technology varied areas of the programs in the alled development and Computer Applications areas like Algorithms. Thereby build innovate to help attim skills to System Schwarz, Web previous and purse thriving career. Design and Data problems. Analytics. PSO-k PSO-I PSO-m D Learning Levei(understand/anelyse/delson etc) Understand Delign Delign Delign Department of Computer Science & Engineering IKG PTU Main Campus HOD Kapurthala Focusi on Employability / Entrepreneuretitp Employability Employability Employability Employability Employability Assessment Tools to Measure Attainment of CO Protocal Assignments Practical Assignments Practical Assignments Practical Assignments

UGEA	Department C Program B CONO.	Department Computer Science and Engineering Program Bachelor of Computer Applications (BCA)         UGCA1945       : (Artificial Intelligence)         con       Hugikpit file significance and domains of Artificial Intelligence and Environment Computer representation         co1       Hugikpit file significance and disadvantages of Various search co2         co3       Identificanse Expert Systems and disadvantages of Various search co4         co4       Define the advantages and disadvantages of Various search etc.         co5       Seliet the righ AI tool for different AI based applications.	Discipline knowledge	Elhics Elhics	Communication Commun	ω ω ω ω α	Explore technical comprehension in varied areas of Computer Applications a to help attain skills to puss thriving arear w and higher studies. 3 3 3 3 3 3 3 3	Comprehend, explore and builty computer trends in technology programs in the Algorithms, areas like Algorithms, web Design and Data Analytics     Able to use latest development and new (desa and problems.       PSO-I     PSO-I       PSO-I     PSO-I       2     2       2     2       3     3	bble to use litrest evelopamer and nereby build innovarie outring to varied yobierns. PSO-m 2 2 2 3 3	ndersland Indersland Indersland Indersland Indersland	Focus on Employability / Entrepreneurship Employability Employability Employability Employability	Assessment Tools to Measure Attalement of CO MSTs, ESE, Class/Quiz Tests MSTs, ESE, Class/Quiz Tests MSTs, ESE, Class/Quiz Tests MSTs, ESE, Class/Quiz Tests
		Statements (UC-UGCA)945: Artificial intelligence and lightly the significance and domains of Artificial Intelligence and and a superstantian.			2	-	3				mployability	
		Juline the advtantages and disadvantages of várious search				-	3	2	2		mployability	MSTs, ESE, Class/Quiz Tests
		cchniques. dentify various Expert Systems and AI applications.	З		++	++	3	2			mployability	MSTs, ESE, Class/Quiz Tests
		Define the role of AI in different areas like NLP, Pattern Recognition	3				3	2		and	mployability	MSTs, ESE, Class/Quiz Tests
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Γ		select the righ Al tool for different Al based applications.	ω									
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Image: constraint of the basis of R programming Laguage.         PGU	MSTs, ESE, Class/Quiz Tests	Employability	Understand		2	ß	3	2	3			ω	w	ω	Outline the usage of data frames, lists, factors, tables and R structures.	
Index space         Conjunction span         Conjunction span         C	MSTs, ESE, Class/Quiz Tests	Employability	Understand		2	З	ω	2	2			2	w	ω	Differentiate between vectors and arrays.	
Identify the key components of R programming Language:         No         O	MSTs, ESE, Class/Quiz Tests	Employability	Understand			a	3		2				3	3	Define the concept of data Science.	
COS statements (IOC-UGCA(1946): R-Pool         Pool	MSTs, ESE, Class/Quiz Tes	Employability	Understand			3	ω		2				2	ω	Identify the key componencts of R programming Language.	
eoplace transmission in and print actions areas the value of the print actions areas are print actions areas are print actions are print act		Focus on Employability / Entrepreneur	Learning Level(understand/analyse/ deisgn etc)		PSO-I	PSO-k						PO-c	PO-b	PO-a	CO Statements (UC-UGCA1946: R Programming )	
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	CO No.         CO Statements (UC-UGCA1928: Database Majaagement Systems Laboratory).           COI         Differentiale Edwaven DDL, DML and DCL commaids           CO2         Innement DDL, DML and DCL commaids           CO3         Write integrity constraints on a database           CO4         Design Databases and Tables in relational model for some project related to society welfare           CO5         Implement PL/SQL.	Department Computer Science and Engineering Program Bachelor of Computer Applications (BCA) UGCA1925 : (Database Management Systems Laboratory)
HOD Department of Computer Science & Engineering ING PTU Main Campus Kapurthala	Infre     J <thj< th="">     J     J</thj<>	aggework     Based branc       aggework     Based branc

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	CON       CO Statements (UC-UICCA1926: Operating Systems Laborator)         CO1       Implements (uc-UICCA1926: Operating Systems Laborator)         CO2       Write programs for different subsubling autorities of different operating         CO3       Evenue various of different subsubling autorities of different poprating in shedd programming         CO3       Evenue various of different subsubling autorities of different poprating in shedd programming         CO3       Evenue various of different subsubling autorities of differen
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								CO5 De		CO4 01	CO3 Ex	CO2 De	CO1 Cr	CO No. CO		Program Bachelor of Computer Applications UGCA1927 : (Web Designing)
								Design forms with special controls using HTML	and the second	Outline the key web designing concepts using java script	Explain how to link webpages through hypertext or images a links	Design webpages with multiple sections or frames	Create pages with simple tags in HTML	CO Statements (UC-UGCAT9Z/: Web Designing )		Program Bachelor of Computer Applications (BCA) UGCA1927 : (Web Designing )
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	and the second							з		3	ω	з	ω	TUN	BOD	Experiments and practice
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					and and and a state of the stat	and the second second		2		2	2				PSO-m	Able to use latest trends in technology development and thereby build innovate new ideas and solutions to varied problems.
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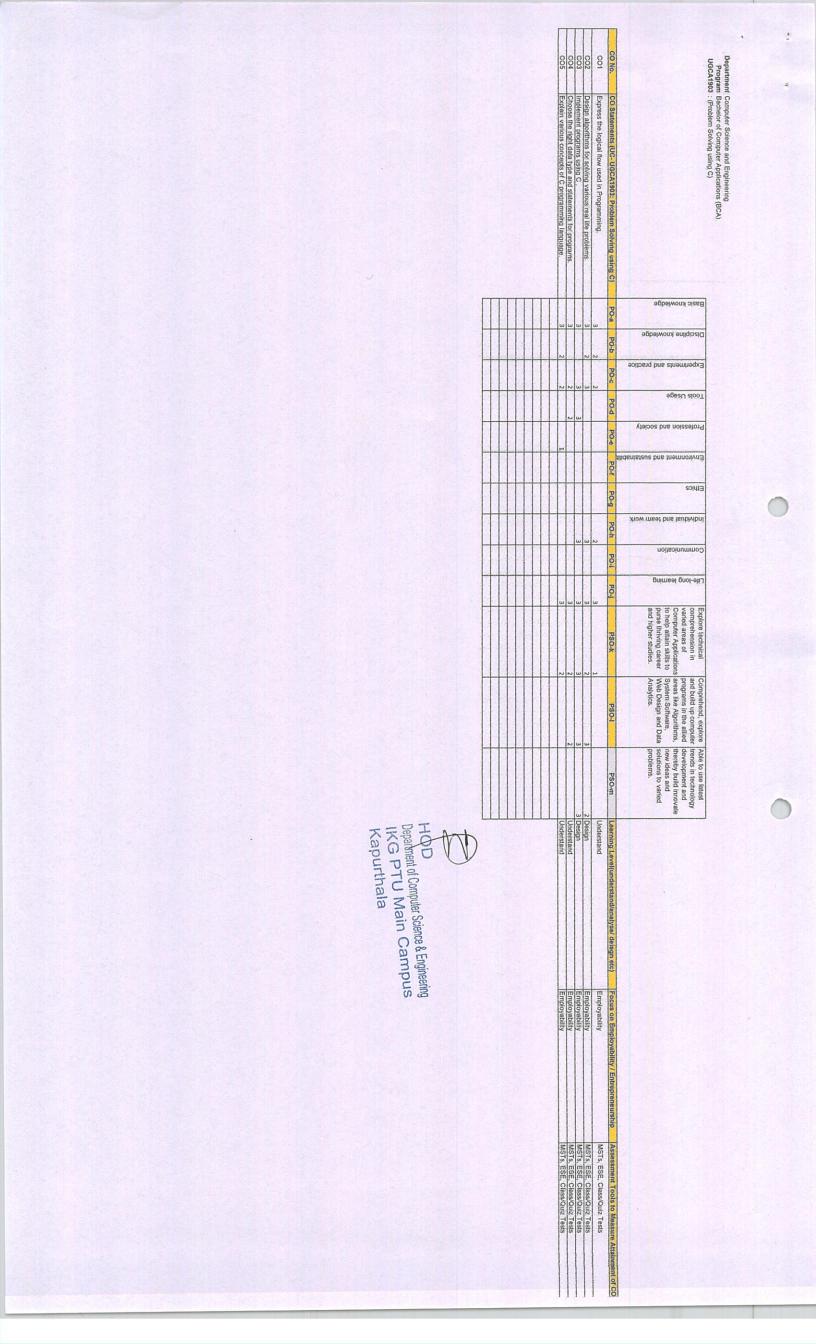
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CO No.	CO Statements (UC-UGCA1930: Programming in PHP Laboratory)	PO-a	РО-Ь	PO-0	PO-d	PO-e	PO4	PO-q	PO-h	PO4	-	PSO-k	Pose	PSO-m	Learning Level(understand/analyse/ deisgn etc)	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of C
CO1	Write scripts for basic web page designs	3	з	3	2				2	2			3		Design	Entrepreneurship	Practical Assignments
CO2	Design the work flow of web page with the help of various control statements	3	u	3	2			Service of	2	ω	w.	3	G		Design	Entrepreneurship	Practical Assignments
CO3	Differentiate between client side and server side scripting	3	3	3	ы				3	3	8	3	3	3	Design	Entrepreneurship	Practical Assignments
C04	Illustrate the concept of static and dynamic websites	3	3	3	ω				3	2	5	3	3	2	Design	Entrepreneurship	Practical Assignments
C05	Implement the database concepts in PHP	3	3	3	з				3	2	3		8	3	Design	Entrepreneurship	Practical Assignments
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	CO No.         CO Statements (UC-UGCAY931: Data Warehouse and Mining)           CO1         Hishkieft the need of Deat Warehousine & Mining           CO2         Differentiate between the Transactional and Analytica           CO3         Identify the real file applications where data mining can be applied           CO4         Apply different data mining alcordings where data mining can be applied           CO5         Explain the role of visualization in data representation and analysis	Department Computer Science and Engineering Program Bachelor of Computer Applications (BCA) UGCA1931 : (Date Warehouse and Mining)	
HOD Department of Computer Science & Engineering IXCS PTU Main Campus Kapurthala	Que         PO-4         PO-9         PO-9 <thp< th=""><th>range of the solution of the s</th><th></th></thp<>	range of the solution of the s	

COL         COL <th>MSTs, ESE, Class/Quiz Tests</th> <th>Employability</th> <th>Understand</th> <th>ω</th> <th>3</th> <th>ω</th> <th></th> <th>1</th> <th>ω</th> <th>2</th> <th>2</th> <th>2</th> <th>ω</th> <th>ω</th> <th>es.</th> <th>and other issu</th> <th>legally, and</th> <th>Highlight the Internet safety, legally, and and other issues.</th> <th>Highlight the</th> <th>005</th>	MSTs, ESE, Class/Quiz Tests	Employability	Understand	ω	3	ω		1	ω	2	2	2	ω	ω	es.	and other issu	legally, and	Highlight the Internet safety, legally, and and other issues.	Highlight the	005
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				trends in technology development and thereby build innovate new idees and solutions to varied problems.	Complehend, explore and build up computer programs in the allied sartes like Algorithms, System Software, Web Design and Data Analytics.	Explore technical comprehension in varied areas of Computer Application to help attain skills to purse thriving career and higher studies.	ប្រាក់ពានទាំ ពួក០៤-ទាំដ		A State		Profession and society	9 <u>8</u> s2U slooT	Experiments and practice		рязіс киоміедде					

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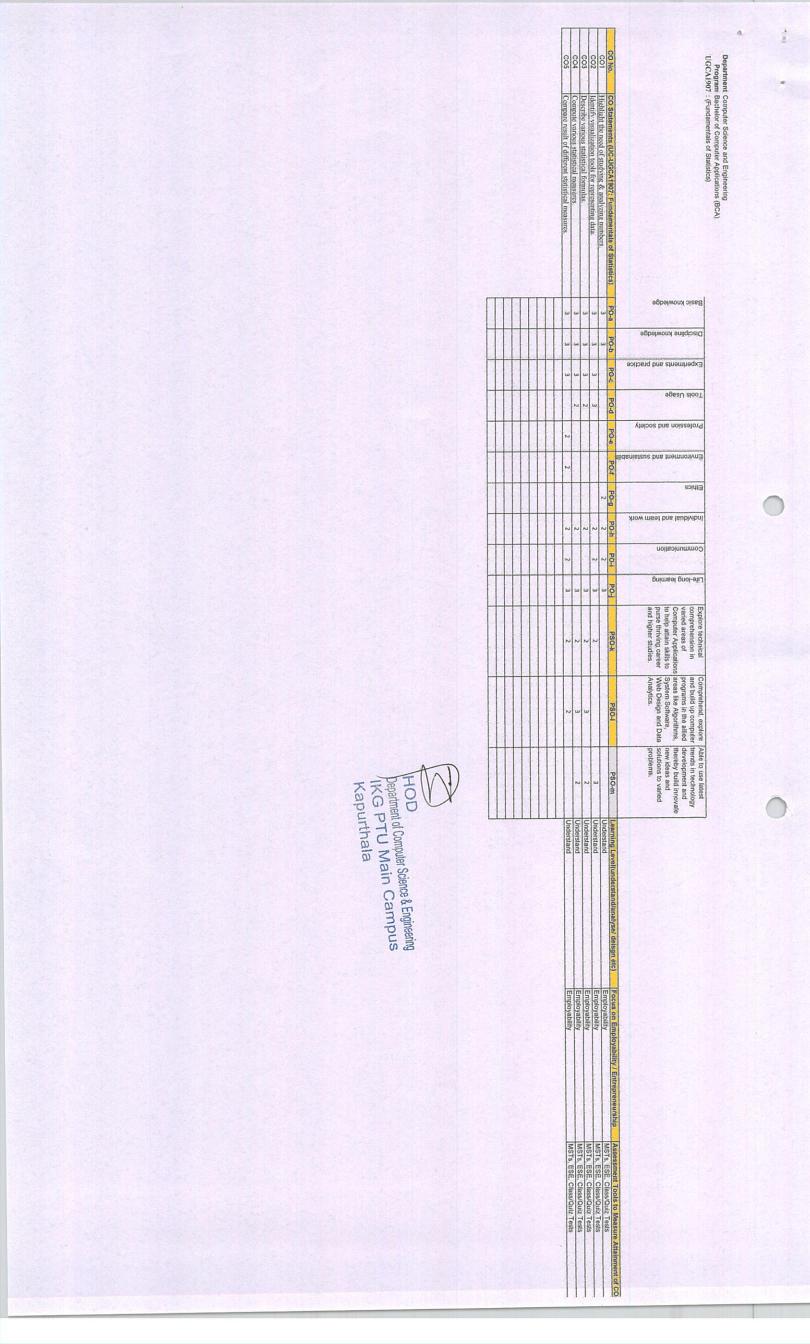


tment ogram A1904	Life-iong teaming Communication Individual and team work Emilice Environment and sustainabilit Profession and society Profession and society Profesion and society Pro
CO1     Outline the characteristics of desktop publishing tools.       CO2     Identify the right componels for designing documents.       CO3     Analyt knowledge in designing 'unious documents.       CO4     Prepare different types of traphic related documents.       CO5     Everess the messages through graphical content	Four-International system     Four-International system     Employability       2     2     Understand & Design     Entrepreneutship       2     3     Understand & Design     Entrepreneutship       3     Understand & Design     Entrepreneutship       4
	<text></text>

	CO No.         CO Statements: (IC-UGCAY1965: Piroblem Solving using C Laboratory)           CO1         Select the right statement for the record           CO2         Experiment with different input values           CO3         Test the output with boundary conditions.           CO4         Distinguish between virtuals control statements and data types.           CO5         Implement programs for various problems.	A1905	-
Hor           Martination Comparison States & Englanding           Martination           Martination      <	PO-A       PO-C       PO-C		

	CO No.         CO Statements (UC-UGCA1906: Fundamentals of Computer, and IT kaboratory)           COI         Highlight the features of word processing, spreadsheet and presentation looks           Co2         Identify the right composed for its documents on oblicr, spread sheet and presentation           CO3         Isrgaire documents and apply formatting.           CO4         steles the right composed for frameting.           CO4         steles the right composed for frameting.           CO5         Apply various operations.	Program Bachalor of Computer Selence and Engineering Program Bachalor of Computer Applications (BCA) UCCA1906 : (Fundamentals of Computer and IT Laboratory)
HOD Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala	PO-4         PO-5         PO-4         PO-4 <th< th=""><th>Image: Section Sectio</th></th<>	Image: Section Sectio

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Comment on the design of Combinational & Sequential circuits     S	CO2 Categorize different number system. 3 3 2 CO3 Outline the sola of sectors of commuter system 3 3	CO1 Identify the various internal and peripheral components of computer system 3 3 2	CO No. CO Statements (UC-UGCA1908: Computer System Architecture) PO-a PO-b PO-c	egbelwonki citesed egbelwonki citesed egbelw
2		N W W W	m-DO-4 PO-4 P-09 H-09 H-09 H-09 H-09 H-09 H-09 H-09 H	eßesn stoot
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HOD Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala

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	CO No.         CO Statements (UC-UGCA1902: Object Oriented Programming using C++)           CO?         Outline the role of mournaming for solving real world problems.           CO2         Explain Object oriented approach for finding Solutions to various problems with the help           CO3         Implammage.           CO4         Select the right Object Oriented Concept for optimal solution           CO5         Review different solutions for a common problem.	Department Computer Vollect Oriented Programming using C++)
HOD by partment of Computer Science & Engineering NGC PTU Main Campurs Kapurthala	Image: Second	agbaalwornd aniildpaild       and µbha. arrend aniildpaildpaildpaildpaildpaildpaildpaildp
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			nce & Engineering	HOD HOD Repartment of Computer Science & Engineering NKG PTU Main Campus Kapurthala							
n Employab Sility Sility Sility Sility Sility	Assessment Tools to Measure Attainment of Practical Assignments Practical Assignments Practical Assignments Practical Assignments Practical Assignments	Learning Lovel(understandanalyse) (delsgn etc.)         Focus on Employability/ Employability         Focus on Employability           Delsgn         Employability         Employability	PSO-m Jamma Learning Level 3 Joelgn Deelgn Deelgn Deelgn	ω ω ω ω ω υ ο ο ο ο ο ο ο ο ο ο ο ο ο ο	N         N	904 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	00 5 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	s	CO Statements (UC-UGCA1910: Object Oriented Programming using C++ Laboratory) Desta the classes. Instruct the concept of memory representation for objects Implement programs using OOP concepts for various problems. Implement file handling in C++ Select the right data types to represent class properties.		C0 C0 C0 C0 C0 C0 C0 C0 C0 C0 C0 C0 C0 C
			Able to use latest trends in technology development and thereby build innovate mew ideas and solutions to varied problems.	omprehend, explore d build up computer regrams in the algorithms, year Blee Algorithms, year Design and Data unalytics.	P M M M M M M M M M M M M M M M M M M M	Ethics Environment and sustains Profession and society	Tools Usage Experiments and practice Discipline trrowledge Basic knowledge		Engineering upplications (BCA) ramming using C++ Laboratory)	Department Computer Science and Engineering Program Bachelor of Computer Applications (BCA) UGCA1910 : (Object Oriented Programming using C++ Laboratory)	UCP

								CO5	CO4	003	CO2	001	CO No.	
								Write solutions for Object Oriented Programming Concepts.	Design user defined functions, modules, files, and packages and exception handling methods.	Outline the use of control structures and numerous native data types with their methods.	Compare Python with other programming languages.	Explain environment, data types, operators used in Python.	CO Statements (UC-UGCA1914: Programming in Python)	
			16.00 March 10	a la				3	33	ω	3	3	PO-a	Basic knowledge
The second second	and the second s	-	and the second second	1		-	-	3	U.	w	3	2	PO-b	Experiments and practice
		-	10000			-	-	3	ω	ω	3	ω	PO-c	Tools Usage
1000	State of the state		2					2	ω	w	3	2	PO-d	Profession and society
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	Compare the key properties of different types of Operating Sysytems,	Analyze the performance of different algorithms used in design of operating system components.	Describe the architecture in terms of functions performed by different types of operating systems.	Explain different resource managements performed by operating system.	Discuss the evaluation of operating systems.	UGCA1923 : ( Operating Systems )
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Kapu	ω 	3 2	3 2	2	2	Explore technical Comprehend, explore technical and build up computer tends in technology varied areas of programs in the allied development and Computer Applications areas like Algorithms, thereby build innovation to hop attain skills to System Software, new ideas and purse thriving career Web Design and Data solutions to varied and higher studies. Analytics.
HOD Department of Computer Science & Engineering IKG PTU Main Campus Kapurthala	3	~	~			Able to use latest trends in technology development and thereby build innovate new ideas and solutions to varied problems.
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