

PROGRAMME STRUCTURE

SHARDA SCHOOL OF ENGINEERING & TECHNOLOGY

Department of Computer Science & Applications

Bachelor of Science Specialization in Computer Science

> Programme Code: SET0125 Batch: 2023-2026



	Sharda School of Engineering & Technology									
			Department of Computer Science & A	pplicat	ions					
			B. Sc. (Computer Science)							
			Batch: 2023-2026					SEMESTER: I		
								Type of Course		
								1. CC		
				Tea	ching L	oad		2. DSE		
S. No.	Course Code	Paper ID	Course				Credits	3. OE		
	Coue	ID ID						4. SEC		
					Т	Р		5. AECC		
				L	Т	Р		6. VAC-I		
			THEORY SUBJECTS							
1	BCO151		Problem Solving Using C	4	0	0	4	CC		
2	BCO153		Digital Electronics & Computer Organization	4	0	0	4	DSE		
2	BCO174		Introduction to Entrepreneurship Development	3	0	0	2	OF		
5	BCO176		Introduction to Computers & Technology	3	0	0	5	UE		
4	BCO041		Introduction to IoT	2	0	0	2	SEC		
5	ARP103		Communicative English-1	2	0	0	2	AECC		
6	BCO173		Ethics and Social Implications of AI	3	0	0	3	VAC-1		
			Practical/Viva-Voce/Jury							
7	BOL151		Problem Solving Using C Lab	0	0	2	1	CC		
8	BOL041		Introduction to IOT with hands-on lab Implementation	0	0	2	1	SEC		
	OTAL REDITS						20			



	Sharda School of Engineering & Technology											
			Department of Computer Science	& Applic	ations							
	B. Sc. (Computer Science)											
	Batch: 2023-2026 SEMESTER: II											
	Course Code							Type of Course				
			Course	Tea	ching Loa	ad		1. CC				
C N		Paper					Credit	2. OE				
5. NO.		ĪD					s	3. SEC				
								4. AECC				
				L	Т	Р		5. VAC-II				
			THEORY SUBJECTS									
1	BCO226		Data Structures Using C	4 0 0		4	CC					
2	BCO155		Operating System and Unix Shell Programing	3	0	0	3	CC				
3	BCO283		Introduction to Artificial Intelligence	3	0	0	3	OF				
5	BCO229		Mobile Application Development	5	0	0	5	OE				
4	VOC102		Design Thinking & Creative Learning	1	0	0	1	SEC				
5	ARP105		Communicative English -2	2	0	0	2	AECC				
6	EVS201		Environmental Studies	3	0	0	3	VAC-2				
			Practical/Viva-Voce/Jury									
8	BOL226		Data Structures using C Lab	0	0	2	1	CC				
9	BOL155		Operating System and Unix Shell Programing Lab	0	0	2	1	CC				
10	VOC102		Design Thinking & Creative Learning Lab	0	0	4	2	SEC				
TOTAL CREDITS							20					



			Sharda School of Engineeri	ing & Tecl	nnology				
			Department of Computer Sci	ence & A	pplicati	ons			
			B. Sc. (Computer	Science)			1		
	SEMESTER: III								
								Type of Course	
				Tea	aching L	oad		1. CC	
G N	Course	Paper	Course					2. DSE	
5. No.	Code	ÎD	Course		Г	Г	Credits	3. OE	
							-	4. SEC	
							-	5. AECC	
				L	Т	P		6. Audit Course	
THEORY SUBJECTS									
1	BCO156		Object Oriented Programming Using Java	4	0	0	4	CC	
2	BCO154		Principles of Data Base Management System	3	0	0	3	CC	
3	BCO222		Computational Methods	4	0	0	4	DSE	
4	BCO330		Introduction to Blockchain Technology	3	0	0	3	OF	
4	BCO331		Cyber Analytics	5	0	0	5	0E	
5	VOC201		Augmented Reality Applications Development	2	0	0	2	SEC	
6	ARP209		Logical Skills Building and Soft Skills	2	0	0	2	AECC	
			Practical/Viva-Voce/Jury						
8	BOL156		Object Oriented Programming Using Java Lab	0	0	2	1	CC	
9	BOL154		Principles of Data Base Management System Lab	0	0	2	1	CC	
10	VOC201		Augmented Reality Applications Development Lab	0	0	2	1	SEC	
11	RBL001		Research Based Learning-1	0	0	2	0	Audit Course	
T CR	OTAL REDITS						21		



	Sharda School of Engineering & Technology											
			Department of Computer Scien	ce & Ap	plicatio	ns						
	B. Sc. (Computer Science)											
Batch: 2023-2026 SEMESTER: IV												
								Type of Course				
				Tag	ahing I	aad		1. CC				
S. Course	Course	Paper			ichnig L	<i>.</i> 0au	Credita	2. DSE				
No.	Code	ID	Course				Creans	3. OE				
								4. AECC				
				L	Т	Р		5. Audit Course				
1	BCO224		Design and Analysis of Algorithm	4	0	0	4	CC				
2	BCO221		Computer Networks and Data Communication	4	0	0	4	CC				
3	BCO220		Application based Programming in Python	4	0	0	4	DSE				
1	BCO403		Social Media Analytics	3	0	0	3	OF				
4	BCO402		Data Warehousing and Data Mining	5	0	0	5	UL UL				
5	ARP210		Quantitative and Qualitative Aptitude Skill Building	2	0	0	2	AECC				
			Practical/Viva-Voce/Jury									
7	BOL224		Design and Analysis of Algorithm Lab	0	0	2	1	CC				
8	BOL220		Application based Programming in Python Lab	0	0	2	1	DSE				
9	RBL002		Research Based Learning-2	0	0	2	0	Audit Course				
T CR	OTAL REDITS						19					



	Sharda School of Engineering & Technology										
	Department of Computer Science & Applications										
	B. Sc. (Computer Science)										
	Batch: 2023-2026 SEMESTER: V										
	Course Code			Teaching Load				Type of Course			
G		D						1. CC			
S. No		Paper	Course					2. DSE			
110.				L	Т	Р		3. INTERNSHIP			
1	BCO321		Web Technologies	4	0	0	4	CC			
2	BCO225		Introduction to R	4	0	0	4	CC			
3	BCO322		Software Engineering and Quality Assurance	4	0	0	4	CC			
4	BRM002		Research Methodology	3	0	0	3	DSE			
			Practical/Viva-Voce/Jury								
6	BOL321		Web Technology Lab	0	0	2	1	CC			
7	BOL225		Introduction to R Lab	0	0	2	1	CC			
8	RBL003		Research Based Learning-3	0	0	4	2	DSE			
9	INC003		Industry Connect	0	0	2	1	INTERNSHIP			
TOTAL CREDITS							20				



	Sharda School of Engineering & Technology										
			Department of Computer Sc	ience &	Applic	ations					
	B. Sc. (Computer Science)										
	Batch: 2023-2026 SEMESTER: VI										
			Course	Teaching Load				Type of Course			
S.	Course Code	Paper					Condition	1. CC			
No.		ID					Creatts	2. OE			
								3. DSE			
				L	Т	Р		4. VAC			
	THEORY SUBJECTS										
1	BCO606	BCO606 DotNet framework using C#		4	0	0	4	CC			
2	BCO368		Machine Learning	4	0	0	4	CC			
3	BCO190		Cloud Computing Fundamentals	4	0	0	4	CC			
4	BCO604		Information Security and Cyber Laws	3	0	0	3	OF			
4	BCO605		Big Data Analytics	5	0	0	5	<u> </u>			
			Practical/Viva-Voce/Jury		-						
6	BOL606		DotNet framework using C# Lab	0	0	2	1	CC			
7	BOL368		Machine Learning Lab	0	0	2	1	CC			
8	RBL004		Research Based Learning-4	0	0	4	2	DSE			
9	CCU108		Community Connect	0	0	2	1	VAC			
TOTAL CREDITS							20				



Course Modules

TERM-I



Syllabus: Problem solving using C Programming

School	•	School of Engineering & Technology								
Depart	tment	Computer Science & Applications								
Progra	mme:	BSc CS Current Academic Year: 2023-24								
Batch:		2023-26								
Semest	ter:	Ι								
1	Course Code	BC0151								
2	Course Title	Problem solving using C Programming								
3	Credits	4								
4	Contact Hours	4-0-0								
	(L-T-P)									
	Course Status	Program core								
5	Course	To learn computer fundamentals and basic computer	er organisation.							
	Objective	Along with that the objective is to learn basic programming								
		constructs –data types, decision structures, control	structures in C							
		to apply knowledge in real life software building.								
6	Course	Students will be able to:								
	Outcomes	CO1: Enumerate core concept of C Programmin	ng							
		CO2: Discuss programs using Array and String								
		CO3: Develop Functions for any problem								
		CO4: Classify Union and Structure to write any	r program							
		COS: Implement concept of Pointers								
		CO6: Predict a real world problem with the he	lp of c							
-		programming								
1	Course	Programming for problem solving gives the Unders	standing of C							
0	Description	programming and implement code from flowchart	or algorithm							
8	Outline syllabus		CO Mapping							
	Unit I	Computer Fundamentals and Basic Computer	001,000							
	A	Computer Fundamentals: Introduction to								
	A	Computer Fundamentals. Infoduction to								
		of computers. Types and generations of								
		Computers, introduction to operating systems								
		Types of Software: Application software and								
		system software								
	В	Units of a computer, CPU, ALU, memory								
	2	hierarchy, registers, I/O devices, number system.								
	С	Techniques of Problem Solving: Flowchart								
		decision table, algorithms, Structured								
		programming concepts. Programming								
		methodologies viz. top-down and bottom-up								
		programming.								
	Unit 2	Introduction to C Programming	CO2, CO6							
	Α	Introduction to C programming language, Data	· · · · · · · · · · · · · · · · · · ·							
		types, Variables, Constants, Identifiers and								
		keywords, Storage classes								



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В	Operators and expressions, Types of Statements:	
	Assignment, Control, jumping, Control	
	statements: Decisions, Loops, break, continue	
С	Dynamic memory allocation (malloc, calloc,	
-	realloc free) recursion-definition Example-	
	Tower of Hanoi problem Tail Recursion	
Unit 3	Arrays and Functions	CO3 CO6
	Arrays and Functions	
A	Arrays. One dimensional and municipalities in a	
	arrays: Declaration, Initialization and array	
	manipulation	
B	Functions: Definition, Declaration/Prototyping	
	and Calling, Types of functions, Parameter	
	passing: Call by value, Call by reference.	
С	Passing and Returning Arrays from Functions,	
	Recursive Functions.	
Unit 4	Pre-processors and Pointers	CO4, CO6
A	Pre-processors: Types Directives Pre-processor	\$
1	Operators (# ## \)	5
В	Pointer: Introduction declaration of pointer	er -
	variables Operations on pointers. Pointe	r
	arithmetic Arrays and pointers. Dynamic memory	
	allocation	y
C	String Introduction prodefined string function	
C	String: Introduction, predefined string function	5,
	Manipulation of text data, Command Lin	e
	Arguments.	
Unit 5	User Defined Data Types and File Handling	CO5, CO6
Unit 5 A	User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration	CO5, CO6
Unit 5 A	User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, set	CO5, CO6
Unit 5 A	User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, self referential structure, Array of structures, Passing	CO5, CO6
Unit 5 A	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.	CO5, CO6
Unit 5 A B	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/0	CO5, CO6
Unit 5 A B	Arguments. User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, self referential structure, Array of structures, Passin structure in function. Files: Introduction, concept of record, I/0 Streaming and Buffering, Types of Files: Indexed	CO5, CO6
Unit 5 A B	Arguments. User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, self referential structure, Array of structures, Passing structure in function. Files: Introduction, concept of record, I/0 Streaming and Buffering, Types of Files: Indexed file, sequential file and random file, creating a data	CO5, CO6
Unit 5 A B	Arguments. User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, self referential structure, Array of structures, Passin structure in function. Files: Introduction, concept of record, I/0 Streaming and Buffering, Types of Files: Indexee file, sequential file and random file, creating a data file. Opening and closing a data file. Various I/0	CO5, CO6
Unit 5 A B	Arguments. User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, self referential structure, Array of structures, Passin structure in function. Files: Introduction, concept of record, I/ Streaming and Buffering, Types of Files: Indexe file, sequential file and random file, creating a data file, Opening and closing a data file, Various I/ operations on data files: Storing data or records it	CO5, CO6 1, 5- g D d a D n
Unit 5 A B	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/0Streaming and Buffering, Types of Files: Indexefile, sequential file and random file, creating a datfile, Opening and closing a data file, Various I/0operations on data files: Storing data or records infile adding records Retrieving and updatin	CO5, CO6 n, f g D d a D n g
Unit 5 A B	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/0Streaming and Buffering, Types of Files: Indexeefile, sequential file and random file, creating a datafile, Opening and closing a data file, Various I/0operations on data files: Storing data or records iffile, adding records, Retrieving, and updatinSequential file/random file	CO5, CO6 1, 5- g D d a D n g
Unit 5 A B	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/4Streaming and Buffering, Types of Files: Indexefile, sequential file and random file, creating a datafile, Opening and closing a data file, Various I/4operations on data files: Storing data or records iffile, adding records, Retrieving, and updatinSequential file/random file.Industry oriented Ouestion solving Expert tolly of	CO5, CO6 1, 5- g D d a D n g
Unit 5 A B C	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/0Streaming and Buffering, Types of Files: Indexefile, sequential file and random file, creating a datfile, Opening and closing a data file, Various I/0operations on data files: Storing data or records ifile, adding records, Retrieving, and updatinSequential file/random file.Industry oriented Question solving, Expert talk orCoding challenges	CO5, CO6 n, f- g D d a D n g n
Unit 5 A B C Mode of	Arguments. User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, self referential structure, Array of structures, Passin structure in function. Files: Introduction, concept of record, I/4 Streaming and Buffering, Types of Files: Indexed file, sequential file and random file, creating a data file, Opening and closing a data file, Various I/4 operations on data files: Storing data or records if file, adding records, Retrieving, and updatin Sequential file/random file. Industry oriented Question solving, Expert talk of Coding challenges.	CO5, CO6 ., ., ., ., ., ., ., ., ., ., ., ., .,
Unit 5 A B C Mode of examination	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/0Streaming and Buffering, Types of Files: Indexefile, sequential file and random file, creating a datfile, Opening and closing a data file, Various I/0operations on data files: Storing data or records ifile, adding records, Retrieving, and updatinSequential file/random file.Industry oriented Question solving, Expert talk ofCoding challenges.Practical	CO5, CO6 ., ., ., ., ., ., ., ., ., ., ., ., .,
Unit 5 A B C Mode of examination Weightage	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/OStreaming and Buffering, Types of Files: Indexefile, sequential file and random file, creating a datafile, Opening and closing a data file, Various I/Ooperations on data files: Storing data or records iffile, adding records, Retrieving, and updatinSequential file/random file.Industry oriented Question solving, Expert talk ofCoding challenges.Practical	CO5, CO6 ., ., ., ., ., ., ., ., ., ., ., ., .,
Unit 5 A B C Mode of examination Weightage Distribution	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/4Streaming and Buffering, Types of Files: Indexefile, sequential file and random file, creating a datafile, Opening and closing a data file, Various I/4operations on data files: Storing data or records iffile, adding records, Retrieving, and updatinSequential file/random file.Industry oriented Question solving, Expert talk ofCoding challenges.PracticalCAMTEETE25%50%	CO5, CO6 ., ., ., ., ., ., ., ., ., ., ., ., .,
Unit 5 A B C Mode of examination Weightage Distribution Text book/s*	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/0Streaming and Buffering, Types of Files: Indexefile, sequential file and random file, creating a datfile, Sequential file and random file, creating a datfile, Opening and closing a data file, Various I/0operations on data files: Storing data or records ifile, adding records, Retrieving, and updatinSequential file/random file.Industry oriented Question solving, Expert talk orCoding challenges.PracticalCAMTEETE25%25%Sitchie The	CO5, CO6
Unit 5 A B C Mode of examination Weightage Distribution Text book/s*	Arguments.User Defined Data Types and File HandlingStructure and Unions: Introduction, DeclarationDifference, Application, Nested structure, selfreferential structure, Array of structures, Passinstructure in function.Files: Introduction, concept of record, I/4Streaming and Buffering, Types of Files: Indexefile, sequential file and random file, creating a datafile, Sequential file and random file, creating a datafile, Opening and closing a data file, Various I/4operations on data files: Storing data or records iffile, adding records, Retrieving, and updatinSequential file/random file.Industry oriented Question solving, Expert talk orCoding challenges.PracticalCAMTEETE25%25%50%Kernighan, Brian, and Dennis Ritchie. TheProgramming Language	CO5, CO6
Unit 5 A B B C Mode of examination Weightage Distribution Text book/s* Other	Arguments. User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, self referential structure, Array of structures, Passin structure in function. Files: Introduction, concept of record, I/4 Streaming and Buffering, Types of Files: Indexee file, sequential file and random file, creating a data file, Opening and closing a data file, Various I/4 operations on data files: Storing data or records if file, adding records, Retrieving, and updatin Sequential file/random file. Industry oriented Question solving, Expert talk of Coding challenges. Practical CA MTE ETE 25% 25% Solve Solve Kernighan, Brian, and Dennis Ritchie. The Programming Language 1. B.S. Gottfried - Programming With C	CO5, CO6
Unit 5 A B B C Mode of examination Weightage Distribution Text book/s* Other References	Arguments. User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, self referential structure, Array of structures, Passin structure in function. Files: Introduction, concept of record, I/4 Streaming and Buffering, Types of Files: Indexee file, sequential file and random file, creating a data file, Opening and closing a data file, Various I/4 operations on data files: Storing data or records if file, adding records, Retrieving, and updatin Sequential file/random file. Industry oriented Question solving, Expert talk or Coding challenges. Practical CA MTE ETE 25% Softfried - Programming With C Schaum's Outline Series - Tata McGrav	C C C C C C C C C C C C C C C C C C C
Unit 5 A B B C Mode of examination Weightage Distribution Text book/s* Other References	Arguments. User Defined Data Types and File Handling Structure and Unions: Introduction, Declaration Difference, Application, Nested structure, self referential structure, Array of structures, Passing structure in function. Files: Introduction, concept of record, I/4 Streaming and Buffering, Types of Files: Indexed file, sequential file and random file, creating a data file, Opening and closing a data file, Various I/4 operations on data files: Storing data or records if file, adding records, Retrieving, and updation Sequential file/random file. Industry oriented Question solving, Expert talk of Coding challenges. Practical CA MTE ETE 25% 50% Kernighan, Brian, and Dennis Ritchie. The Programming Language 1. B.S. Gottfried - Programming With C Schaum's Outline Series - Tata McGram Hill 2nd Edition - 2004	CO5, CO6



	www.sharda.ac.in
2. E. Balagurusamy - Programming in ANSI	
C - Second Edition - Tata McGraw Hill-	
1999	

Course outline

This course implements array and pointer and Recursive applications. The course talks primarily about Array, string, functions, structure & union and Pointers etc.

Course Evaluation									
Attendance	None								
Any other	CA judged on the practicals conducted in the lab, weightage may be specified								
References									
Text book	Kernighan, Brian, and Dennis Ritchie. <i>The C Programming Language</i>								
Other References	 B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999 								
Software	Turbo C								



CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Enumerate core concept of C Programming	PO1,PO2,PO3, PO9, PSO1,PSO2
2.	CO2: Discuss programs using Array and String.	PO1,PO3, PO4, PO5, PO9, PO11,PSO1,PSO2
3.	CO3: Develop Functions for any problem	PO1,PO3,PO4, PO9, PSO2
4.	CO4: Classify Union and Structure to write any program	PO1,PO3,PO4, PO9, PSO2
5.	CO5: Implement concept of Pointers	PO1,PO3,PSO2
6	CO6: Predict a realworld problem with the help of c programming	PO1,PO2,PO3,PO4,PO9, PO11,PSO1 PSO2,PSO3



PO and PSO mapping with level of strength for Course Name- Problem solving using C Programming Lab (Course Code BCO151)

Course Code_ Course Name	CO' s	Р О 1	PO 2	P 0 3	PO 4	P 0 5	P 0 6	P O 7	P 0 8	P O 9	P O 10	PS O 1	PSO 2
	CO1	2	2	3	2	2	2	-	-	2	-	3	2
	CO2	3	2	3	2	2	2	-	-	3	-	3	3
	CO3	2	2	3	2	2	3	-	-	2	2	2	3
	CO4	1	1	2	1	1	2	-	2	2	1	2	2
g for problem solving	CO5	2	3	3	2	2	2	-	2	3	2	3	2
Lab	CO6	3	2	3	3	1	3	-	3	2	2	2	3

Average of non-zeros entry in following table (should be auto calculated).

Cou rse Cod e	Course Name	P 0 1	P O2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	PS O 1	PS O 2
BCO 151	Problem Solving using C	2.1	2	2.8	2	1.6 7	2.3	_	2.3	2.3	1.7 5	2.5	2.5

Strength of Correlation

1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent

3. Addressed to Substantial (High=3) extent



Scł	nool:	School of Engineering & Technology		
De	partment	Computer Science & Applications		
Pro	gramme:	BSc CS Current Academic Year: 2023-24		
Ba	tch:	2023-26		
Sei	nester:	I		
1	Course Code	BCO153		
2	Course Title	Digital Electronics & Computer Organization		
3	Credits	4		
4	Contact Hours (L-T-P)	4-0-0		
	Course Status	UG		
5	Course Objective	To provide students with an overview of digital electronics that a digital computer. It will include the number system, binary log evaluating circuit designs within the context of digital and com- course is designed to introduce the organization of a com- components, namely ALU, Control, Memory, and Input/Output. A will be able to comprehend the design components of a digital su	for gic bin pu Ado bsy	ms the foundation of circuit and k-maps, ational circuits. This ter and its primary ditionally, the student /stem.
6	Course Outcomes	CO1: Define the basic logic operations and simplify expressions and/or Karnaugh mapping techniques, sum of products (SOP) and CO2: Illustrate combinational logic circuits and explain their oper CO3: Construct different types of sequential logic circuits using H CO4: Analyze the basic structure and functional units of a digital basic processing unit and organization of simple processor. CO5: Explain hierarchical memory systems including cach appropriate interfacing standards for I/O devices. CO6: Finding and highlighting the applications of digital ele organization in real life.	s us pr rat Flij co	sing Boolean algebra oduct of sums (POS). ion. o Flops. mputer & understand memories & select ronics and computer
7	Course Description	This course covers the core concepts of digital electronics th functions and integrated circuits, combinational and sequential lo also provides a study of Boolean algebra, binary and hexadecimal codes, and the analysis of the basic components and circuits switching. This course also discusses the basic structure of a dig for understanding the organization of various units such as contr Logical unit and Memory unit and I/O unit in a digital computer.	nat ogio nu uso gita rol	include logic gates c circuits. The course mber systems, binary ed in semiconductor l computer and used unit, Arithmetic and
8	Outline syllabus			CO Mapping
	Unit 1	Logic Gates & Boolean Algebra	_	
	А	AND, OR, NOT, NAND, NOR, XOR, XNOR, NAND & NOR as Universal Gates		CO1 CO6
	В	Theorems, Simplification of Boolean Expression using Boolean Algebra, SOP & POS Forms, Realization of Boolean Expression using Gates		CO1 CO6
	С	K-Maps, Simplification of Boolean Expression using K-Maps (upto 4- variables)		CO1 CO6
	Unit 2	Combinational Logic Circuits		
	А	Half Adder & Half Subtractor, Full Adder & Full Subtractor		CO2, CO6
	В	Multiplexers & Demultiplexers, Implementation of Boolean equations using Multiplexer and Demultiplexer		CO2, CO6
	С	Encoders & Decoders, Comparator, Basic Concepts of A/D and D/A converters		CO2, CO6
	Unit 3	Sequential Logic Circuits: Synchronous & Asynchronous		

Syllabus: Digital Electronics & Computer Organization



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А	Latch, F Conditio	lip Flops n, Remov	- R- ving	S, J-K, Master-Slave J-K Flip-Flop, Race Race Condition		CO3, CO6
В	D Flip-I Counters Counter,	Flop, T I s: Shift Ring cou	Flip- Re unter	Flop, Sequential Circuits: Registers and gisters, Ripple Counter, Synchronous		CO3, CO6
С	Asynchr Design p	onous Cir procedure	rcuit , Ra	s: Analysis procedure, circuit with latches, ce free state assignment, hazards		CO3, CO6
Unit 4	Basic Co	omputer	Org	anization and Design		
A	Digital obuses, B and men	computer us archite ory trans	: fui ectui sfer,	nctional units and their interconnections, re, types of buses and bus arbitration. Bus micro-operations		CO4, CO6
В	Control organiza	Unit: tion, stac	Pro k or	ocessor organization: general register ganization and addressing modes		CO4, CO6
С	Memory devices,	y Unit:] RAM me	Basi emor	c concept and hierarchy, semiconductor ies and types, ROM memories and types		CO4, CO5, CO6
Unit 5	Memory	y Manago	eme	nt & I/O Interfaces		
A	Virtual r design is techniqu	nemory v ssues, per es	vs Ca rfori	che memory, Cache memory: concept and nance, address mapping and replacement		CO5, CO6
В	Peripher interrupt initiated	al device s, modes I/O and I	s, I/ of Direo	O interface, I/O ports, interrupts, types of data transfer: programmed I/O, interrupt ct Memory Access		CO5, CO6
С	Memory	Manager	men	t	-	CO5, CO6
Mode of examination	Theory					
Weightage	CA	MTE		ETE	-	
Distribution	25%	25%		50%		
Text book/s*	 Moi Pub Carl "Co Rep Dav Org Inte 	ris Mano, lications, Hamach mputer O rint 2012 id A. Patt anization rface"	"Di 200 er, Z Organ terso and	gital Logic and Computer Design", PHI 2 Zvonko Vranesic, Safwat Zaky, nization", McGraw-Hill, Fifth Edition, on and John L. Hennessy, "Computer Design: The Hardware/Software		
Other References	 Dig Con A.S Pear 	ital Electr nputer Or .Tannenb rson	ronic gani aum	es (TMH) 1998: Malvino and Leach zation and Architecture: William Stallings : Structured Computer Organization,		



<u>CO</u> and **PO** Mapping

S. No.	Course Outcome (CO)	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Define the basic logic operations and simplify using Boolean algebra and/or Karnaugh mapping techniques, sum of products (SOP) and product of sums (POS).	PO1, PO2, PO3, PO4, PO8, PO9, PO10, PSO1
2.	CO2: Illustrate combinatorial logic circuits and explain their operation.	PO1, PO2, PO3, PO4, PO8, PO10
3.	CO3: Construct different types of sequential logic circuits using Flip Flops.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
4.	CO4: Analyze the basic structure and functional units of a digital computer & understand basic processing unit and organization of simple processor.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
5	CO5: Explain hierarchical memory systems including cache memories & select appropriate interfacing standards for I/O devices.	PO1, PO2, PO3, PO4, PO6, PO10
6	CO6: Finding and highlighting the applications of digital electronics and computer organization in real life.	PO1, PO2, PO3, PO4, PO5, PO6, PO8, PO9, PO10, PSO1



PO and PSO mapping with level of strength for Course Name: Digital Electronics & Computer Organization (Course Code: BCO153)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	-	3	-	-	-	2	2	3	3	-
CO2	3	3	3	3	-	-	-	3	-	2	3	-
CO3	3	3	3	3	-	-	-	3	-	3	2	-
CO4	3	3	3	3	-	-	-	3	-	3	3	-
CO5	2	2	2	3	-	2	-	-	-	2	-	-
CO6	2	3	3	3	2	2	-	3	3	3	3	-

Average of non-zeros entry in following table (should be auto calculated).

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
BCO153	2.67	2.83	2.80	3.00	2.00	2.00	-	2.80	2.50	2.67	2.80	-



Syllabus: Introduction to Entrepreneurship Development

Sch	ool:	School of Engineering & Technology	
Dep	artment	Computer Science & Applications	
Pro	gramme:	BSc CS Current Academic Year: 2023-24	
Bat	ch:	2023-26	
Sem	ester:	I	
1	Course Code	BC0174	
2	Course Title	Introduction to Entrepreneurship Development	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	CORE	
5	Course Objective	Entrepreneurship plays an influential role in the economic growth and dee the country. As the world economy is changing so is the dynamism of the bu The aim of this course is to instil and kindle the spirit of Entrepreneurs students. The idea of this course is to create "job providers rather than job s	velopment of siness world. ship amongst seekers".
6	Course Outcomes	 After successfully completion of this course students will be able to: CO1. To understand how start up entrepreneurship is supportive for business. CO2. Outline different ways of idea generation as innovator. CO3. Identify & utilize various Government policy for Small Scale Enter impact on Business. CO4. Analyze various financial schemes available to start up their enterp CO5. Assess the importance & significance of institutional support at vari determining the entrepreneurial climate. CO6. Develop the art of creativity and innovations in managing the enable of the start of the sta	or enhancing prises and its rise. ous levels for atrepreneurial
7	Outline syllabus	acaviaces circcavery.	CO Mapping
	Unit 1	Introduction to Entrepreneurship	CO1
	А	Meaning, Definition and concept of Enterprise, Entrepreneurship and Entrepreneurship Development, Evolution of Entrepreneurship	CO1
	В	Theories of Entrepreneurship. Characteristics of Entrepreneurship, Concepts of Intrapreneurship, Entrepreneur v/s Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager	CO1
	С	Role of Entrepreneurship in Economic Development, Factors affecting Entrepreneurship, Problems of Entrepreneurship	CO1
	Unit 2	Entrepreneurship Journey as Innovator	CO2
	А	Idea generation, Feasibility Study and opportunity assessment	CO2
	В	Business Plan: meaning, purpose and elements, Execution of Business Plan	CO2
	С	Entrepreneurs as problem solvers, Innovations and Entrepreneurial Ventures – Global and Indian,	CO2, CO6
	Unit 3	Setting Up Small Business Enterprises	CO3
	А	Identifying the business Opportunity – Business opportunity in various Sectors – Formalities for setting up a small Business Enterprise	CO3
	В	Benefits to Small Scale Enterprises: Tax Holiday, Rehabitation Allowance, Investment Allowance,	CO3
	С	Government policy for Small Scale Enterprises: New Small Enterprise Policy 1991, Micro Small & Medium Enterprises Development (MSMED) Act 2006	CO3, CO6
	Unit 4	Role of Government in promoting Entrepreneurship	CO4



A	MSME policy in Implementation: Dist Development Institute	India, Agencies for Period Industries Centres (of India (EDII),	olicy Formulation and DIC), Entrepreneurship	CO4, CO6
В	National Institute of (NIESBUD), National	Entrepreneurship & Small Entrepreneurship Develop	Business Development ment Board (NEDB),	CO4, CO6
С	Financial Support Sys Investment Institutions	stem: long term and shor s.	t-term financial support,	CO4, CO6
Unit 5	IPM & Institutional s	support for small business	ses in India	CO5
A	Intellectual Property N trademarks in small bu	Management, Importance of sinesses,	f innovation, patents &	CO5
В	Introduction to laws entrepreneurship devel	relating to IPR in India lopment	a, Support in areas of	CO5
В	Case Studies based on based on IPR & Patent	a Role of Industry 4.0 in in	novations, Case Studies	CO5, CO6
Mode of examination	Theory/Jury/Practical/	Viva		
Weightage	CA	CE (VIVA)	ESE	
Distribution	25%	25	50%	
Text book/s*	 Udyamita by Institute for I (NIESBUD), Entrepreneuri Company Ltd Entrepreneurs Poornima M Lall & Sahai: Creativity and 	Dr. MMP. Akhouri and S Entrepreneurship and Smal NSIC-PATC Campus, Okh ial Development by Dr S ship Development & Small Charantimath, Pearson. Entreprenurship (Excel Bo d Innovation (IPP, 1999)	S.P Mishra, By National l Business Development ila S Khanka, S Chand & Business Enterprises by oks 2 edition) Couger, C-	



CO and PO Mapping

S. No.	Cours	e Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1.	To understand how start up entrepreneurship is supportive for enhancing business.	PO1, PO5, PO9,
2.	CO2.	Outline different ways of idea generation as innovator.	PO1, PO2, PO3, PO4, PO5, PO6
3.	CO3.	Identify & utilize various Government policy for Small Scale Enterprises and its impact on Business.	PO10,
4.	CO4.	Analyze various financial schemes available to start up their enterprise.	PO8, PO10,
5.	CO5.	Assess the importance & significance of institutional support at various levels for determining the entrepreneurial climate.	PO4, PO7,
6.	CO6. Ithe ent	Develop the art of creativity and innovations in managing repreneurial activities effectively.	PO2, PO3, PO4, PO5,



PO and PSO mapping with level of strength for Course Name Introduction to Entrepreneurship Development (BOL451)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
	CO1	-	-	-	-	1	-	-	-	2	-	-	-
DOI 451	CO2	1	1	2	3	3	3	-	-	-	-	-	-
Introduction to	CO3	-	-	-	-	-	-	-	-	-	3	-	-
Entrepreneurship Development	CO4	-	-	-	-	-	-	-	-	-	1	-	-
	CO5	-	-	-	1	-	-	3	-	-	-	-	-
	CO6	-	1	3	2	1	-	-	-	-	-	-	-

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BOL451	Introduction to Entrepreneurshi p Development	1	1	2.5	2	1.67	3	3	0	2	2	0	0

Strength of Correlation

1. Addressed to Slight (Low=1) extent
2. Addressed to Moderate (Medium=2) extent
3. Addressed to Substantial (High=3) extent



Scł	nool.	School of Engineering & Technology	
Do	nortmont	Department of Computer Science & Applications	
De		Department of Computer Science & Applications	
Pro	ogramme:	BSC US Current Academic Year: 2023-24	
Ba	tch:	2023-26	
Ser	nester:	I	
1	Course Code	BCO283	
2	Course Title	Introduction to Artificial Intelligence	
3	Credits	4	
4	Contact Hours	4-0-0	
	(L-1-1) Course Status	Open Elective	
5	Course Objective	The objective of the course is to introduce basic fundamental concents	s in Artificial
5	course objective	Intelligence (AI) and Expert Systems with a practical approach in unders	tanding them
		To visualize the scope of AI and its role in futuristic development.	tunung them.
6	Course Outcomes	After the completion of this course, students will be able to:	
		CO1: Relate the goals of Artificial Intelligence and AI and non-AI solutio	n.
		CO2: Analyze and various AI uninformed and informed search algorithms	5.
		CO3: Extend knowledge representation, reasoning, and theorem proving t	echniques to
		real-world problems.	
		CO4: Make use of various learning techniques to understand AI problems	
		CO5: <i>Explain</i> about Expert system & discuss various case studies of it.	
		CO6 : <i>Develop</i> independent (or in a small group) research with help of A	I techniques
		and communicate it effectively.	
7	Course Description	In this course students will learn basic introduction of Artificial Intellige	ence, problem
0		solving agents, reasoning, learning and applications of artificial intelligenc	e.
8	Outline syllabus		CO
			Manning
	Unit 1	INTRODUCTION TO AI	Mapping
	Unit 1 A	INTRODUCTION TO AI Foundation of AL Goals of AL The AI Problems. Importance of AL AI	Mapping CO1
	Unit 1 A	INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success.	Mapping CO1
	Unit 1 A B	INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent	CO1 CO1
	Unit 1 A B C	INTRODUCTION TO AIFoundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success.Introduction to Intelligent Agents; Environment; Structure of AgentProblems, problem space and search: Defining the problem as a state	Mapping CO1 CO1 CO1 CO1, CO2
	Unit 1 A B C	INTRODUCTION TO AIFoundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success.Introduction to Intelligent Agents; Environment; Structure of AgentProblems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the	Mapping CO1 CO1 CO1 CO1
	Unit 1 A B C	INTRODUCTION TO AIFoundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success.Introduction to Intelligent Agents; Environment; Structure of AgentProblems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem.	Mapping CO1 CO1 CO1 CO1
	Unit 1 A B C Unit 2	INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS	Mapping CO1 CO1 CO1 CO1
	Unit 1 A B C Unit 2 A	INTRODUCTION TO AIFoundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success.Introduction to Intelligent Agents; Environment; Structure of AgentProblems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem.SEARCH METHODSProblem Characteristics Searching strategies –Uninformed search and	Mapping CO1 CO1 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A	INTRODUCTION TO AIFoundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success.Introduction to Intelligent Agents; Environment; Structure of AgentProblems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem.SEARCH METHODSProblem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search	Mapping CO1 CO1 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A	INTRODUCTION TO AIFoundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success.Introduction to Intelligent Agents; Environment; Structure of AgentProblems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem.SEARCH METHODSProblem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search techniques: Depth first search, Breadth first search, Bidirectional Search,	Mapping CO1 CO1 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A B	INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, Informed search; Heuristic function, Hill climbing search, Best first	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A B	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A B	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques Hill climbing– issues in hill climbing. Problem solving using Search Tachniques. 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A B	INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques; Constraint estimation problem;	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A B C	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques; Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search Alpha-beta pruping Games of chance 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A B C Unit 3	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques; Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance. 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A B C Unit 3 A	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques; Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance. KNOWLEDGE REPRESENTATION & REASONING Introduction to KR, Knowledge agent, Predicate logic, Inference rule & 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2
	Unit 1 A B C Unit 2 A B C Unit 3 A	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques; Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance. KNOWLEDGE REPRESENTATION & REASONING Introduction to KR, Knowledge agent, Predicate logic, Inference rule & theorem proving forward chaining, backward chaining. 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO3
	Unit 1 A B C Unit 2 A B C Unit 3 A	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques; Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance. KNOWLEDGE REPRESENTATION & REASONING Introduction to KR, Knowledge agent, Predicate logic, Inference rule & theorem proving forward chaining, backward chaining, 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO3 CO3
	Unit 1 A B C Unit 2 A B C Unit 3 A B	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques; Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance. KNOWLEDGE REPRESENTATION & REASONING Introduction to KR, Knowledge agent, Predicate logic, Inference rule & theorem proving forward chaining, backward chaining, Propositional knowledge, Boolean circuit agents; Rule Based Systems, Forward reasoning: Conflict resolution, 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO3 CO3
	Unit 1 A B C Unit 2 A B C Unit 3 A B C	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques Hill climbing– issues in hill climbing. Problem solving using Search Techniques; Constraint satisfaction problem; Game tree, Evaluation function, Mini- Max search, Alpha-beta pruning, Games of chance. KNOWLEDGE REPRESENTATION & REASONING Introduction to KR, Knowledge agent, Predicate logic, Inference rule & theorem proving forward chaining, backward chaining, Propositional knowledge, Boolean circuit agents; Rule Based Systems, Forward reasoning: Conflict resolution, 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO3 CO3 CO3
	Unit 1 A B C Unit 2 A B C Unit 3 A B C Unit 3 A D C Unit 4	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques; Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance. KNOWLEDGE REPRESENTATION & REASONING Introduction to KR, Knowledge agent, Predicate logic, Inference rule & theorem proving forward chaining, backward chaining, Propositional knowledge, Boolean circuit agents; Rule Based Systems, Forward reasoning: Conflict resolution, 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO3 CO3
	Unit 1 A B C Unit 2 A B C Unit 3 A B C Unit 3 A D C Unit 4 A	 INTRODUCTION TO AI Foundation of AI, Goals of AI, The AI Problems, Importance of AI, AI and its related field, AI techniques, Criteria for success. Introduction to Intelligent Agents; Environment; Structure of Agent Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. SEARCH METHODS Problem Characteristics Searching strategies –Uninformed search and Informed search strategies. State space search, Uniformed search, techniques: Depth first search, Breadth first search, Bidirectional Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Generate and Test, Heuristic Search Techniques Hill climbing– issues in hill climbing. Problem solving using Search Techniques; Constraint satisfaction problem; Game tree, Evaluation function, Mini- Max search, Alpha-beta pruning, Games of chance. KNOWLEDGE REPRESENTATION & REASONING Introduction to KR, Knowledge agent, Predicate logic, Inference rule & theorem proving forward chaining, backward chaining, Propositional knowledge, Boolean circuit agents; Rule Based Systems, Forward reasoning: Conflict resolution, Backward reasoning: Structured KR: Semantic Net - slots, inheritance LEARNING Common Sense Vs Learning; Components; Representations; Feedback 	Mapping CO1 CO1 CO1, CO2 CO1, CO2 CO1, CO2 CO1, CO2 CO3 CO3 CO3 CO3 CO3 CO3

Syllabus: Introduction to Artificial Intelligence



			www.shards.ac.in							
С	Rote learning, Learning by	Taking Adv	ice, Learning in Problem-solving,	CO3, CO4						
	Learning from example: in	earning from example: induction, Explanation-based learning.								
Unit 5	EXPERT SYSTEM	XPERT SYSTEM								
А	What is Expert system, Con	Vhat is Expert system, Components of Expert System, Representing and								
	using Domain Knowledge	, Reasoning	with knowledge, Expert System							
	Shells, Knowledge acquisit	hells, Knowledge acquisition examples								
В	Robotics – Hardware; Visi	on; Navigati	on based case studies;	CO5, CO6						
С	Case studies on Expert Sys	stem		CO5, CO6						
Mode of examination	Theory	Theory								
Weightage	CA	MTE	ETE							
Distribution	25%	25%	50%							
Text book/s*	1. Rich E & Knight	K, Artificia	I Intelligence, Tata McGraw							
	Hill, Edition 3.									
Reference Books	1. Russell S & Norvig P,	, Artificial In	ntelligence: A Modern Approach,							
	Prentice Hall.	Ŭ								
	2. Dan W. Patterson, Arti	Dan W. Patterson, Artificial Intelligence & Expert Systems, Pearson								
	Education with Prentic	e Hall India.	Indian Edition.							
	3. Artificial Intelligence	and Intellig	ent Systems by Padhy, Oxforfd							
	University Press	and intening	ene agreenie agreening, antorra							



PO and PSO mapping with level of strength for Course Name Introduction to Artificial Intelligence (BCO0283)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
	CO1	1	2	3	2	2	-	-	-	-	2	1	2
DC0292	CO2	2	3	3	2	3	-	-	-	-	2	2	3
Introduction to	CO3	3	3	3	3	2	1	1	-	-	1	3	3
Artificial Intelligence	CO4	3	3	3	3	2	2	1	-	-	2	3	3
	CO5	2	3	3	3	3	2	2	2	3	2	2	3
	CO6	2	3	3	3	3	2	2	2	3	2	2	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 11	PSO 2
BCO283	Introduction to Artificial Intelligence	2.2	2.8	3.0	2.7	2.5	1.8	1.5	2.0	3.0	1.8	2.2	2.8

Strength of Correlation

1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent

3. Addressed to Substantial (High=3) extent



Syllabus: Introduction to IoT

Scho	ol:	School of Engineering & Technology										
Depa	rtment	Computer Science & Applications										
Prog	ramme:	BSc CS Current Academic Year: 2023-24										
Batc	h:	2023-26										
Seme	ester:	Ι										
1	Course Code	BCO041										
2	Course Title	Introduction to IoT										
3	Credits	2										
4	Contact Hours (L-T-P)	2-0-0										
	Course Status											
5	Course Objective	In this course, student will explore various concepts of Internet of th enabling technologies, M2M to IoT and IoT architecture. In the end the identify the challenges in IoT and its various areas of application. SEN be used to test newly developed routing and application layer algorithm	ings such as things, y will also be able to SEnuts platform can ns.									
6	Course Outcomes	 CO1: Define the general concepts of Internet of Things. CO2: Recognize the basic M2M Ecosystem and change from M2M to IoT. CO3: Outline the concepts of SENSEnut platform CO4: Explain basic sensor functions available with SENSEnutsdevices CO5: Explain the challenges in IoT specific application. CO6: Discuss the various domains where IOT can be applied successfully 										
7	Course Description	This course introduces the concepts for internet of things and how we our daily lives for the development of life style. It will also help studer applications according to their problem statements.	can embed it into ts to understand the									
8	Outline syllabus		CO Mapping									
	Unit 1	Introduction to IoT										
	А	Defining IoT, History of IoT, Importance of IoT, IoT Basic Characteristics, Enabling Technologies of IoT	CO1									
	В	About the Internet in IoT, IoT Advantages and Disadvantages, M2M Overview, M2M Features	CO1									
	С	M2M Ecosystem, Comparison of the Main Characteristics of M2M and IoT, M2M Applications	CO1									
	Unit 2	IoT Architecture										
	А	Basic Building blocks of IoT system: Sensors, Processors, gateways, Applications	CO1, CO2									
	В	Physical design of IoT: Things in IOT, IoT Protocols, Logical design of IoT: IoT Functional Blocks, IoT Communication Models. IoT Communication API's	CO1, CO2									
	С	IoT Service Oriented Architecture (SOA), API Oriented Architecture.	CO1, CO2									
	Unit 3	Introduction toIoT Platform										
	А	IoT Working, Introduction to Arduino and Raspberry Pi	CO1, CO3									
	В	The SENSEnut Platform, Peripheral Hardware Specific Calls: DIO Functions, I ² C Functions	CO1, CO3									
	С	MAC functions: General Functions, Coordinator Functions, genMac Functions	CO1, CO3									
	Unit 4	Sensor Functions										
	A	Phy Layer Functions, Routing Functions	CO1, CO4, CO5									



				www.sharst.sc.n					
В	Sensor Functions Functions, Humi	: Light Sensor F dity Sensor Func	unctions, Temperature Sensor	CO1, CO4, CO5					
С	e CO1, CO4, CO5								
Unit 5	it 5 Domain specific applications of IoT								
А	Home automation	n concept and ca	se study	CO1, CO3, CO6					
В	Industry application	ions concept and	case study	CO1, CO3, CO6					
С	Surveillance ap applications	plications conc	ept and case study, Other I	oTCO1, CO3, CO6					
Mode of examination	Theory/Jury/Prac	tical/Viva							
Weightage	СА	MTE	ETE						
Distribution	25%	25%	50%						
Text book/s*	 The Internet HakimaChao Introduction Lectures Not Engineering, Reference fo Internet of T ArshdeepBal Hand-on App 3 (B) API REFERI 	of Things: Conn ouchi, Reference to Internet of Th es, Department of Indian Institute r Unit 2, 3 (c), 4 hings, Rajkumar nga and Vijay M proach", Univers	ecting Objects to the Web edited b for Unit-1. ings, Prof. SudipMisra, NPTEL of Computer Science and of Technology Kharagpur, Buyya, Reference for Unit 3 (c) adisetti, "Internet of Things – A sities press, 2015, Reference for Ur	y .it					
Other References	 Charalampos Arduino", Cr Dr.OvidiuVe From researc Publishers 20 Contiki : The 	Doukas, "Build eate space, Apr rmesan and Dr. h and innovation 014. e open source for	ing Internet of Things with the il 2002 Peter Friess, "Internet of Things: n to market deployment", River						



CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Understand the general concepts of Internet of Things.	PO1, PO2, PO3, PO6, PO7, PSO2
2.	CO2: Recognize the basic M2M Ecosystem and change from M2M to IoT.	PO1, PO2, PO3, PO6, PO7, PSO2
3.	CO3: Outline the concepts of SENSEnut platform	PO1, PO4, PO5, PO6, PO9, PO10, PSO2
4.	CO4: Explain basic sensor functions available with SENSEnuts devices	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO9, PO10, PSO2
5.	CO5: Explain the challenges in IoT specific application.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PSO2
6.	CO6: Discuss the various domains where IOT can be applied successfully.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO9, PSO2



Course Code_ Course Name	CO's	PO 1	РО 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2
	CO1	3	1	1	-	-	2	1	-	-	-	-	3
	CO2	2	2	1	-	-	1	3	-	-	-	-	3
Introduction to	CO3	2	2	2	2	3	2	2	-	2	2	-	3
ІоТ	CO4	2	3	2	2	3	2	2	-	2	2	-	3
	CO5	3	3	3	3	3	2	3	-	-	-	-	3
	CO6	2	2	2	2	3	2	3	-	-	-	-	3

PO and PSO mapping with level of strength for Course Name Introduction to IoT

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	Introduction to IoT	2.3	2.2	1.8	2.3	3.0	1.8	2.3	0.0	2.0	2.0	0.0	3.0

Strength of Correlation

- 1. Addressed to*Slight (Low=1) extent* 2. Addressed to*Moderate (Medium=2) extent*
- 3. Addressed to Substantial (High=3) extent



Syllabus: Communicative English-1

Schoo	ol:	School of Engineering & Technology
Depa	rtment	Computer Science & Applications
Prog	camme:	BSc CS Current Academic Year: 2023-24
Batch	1:	2023-26
Seme	ster:	Ι
1	Course Code	ARP103
2	Course Title	Communicative English-1
3	Credits	0
4	Contact Hours (L-T-P)	2-0-0
5	Course Objective	To minimize the linguistic barriers that emerges in varied socio- linguistic environments through the use of English. Help students to understand different accents and standardise their existing English. Guide the students to hone the basic communication skills - listening, speaking, reading and writing while also uplifting their perception of themselves, giving them self-confidence and building positive attitude.
6	Course Outcomes	 After completion of this course, students will be able to: CO1 Develop a better understanding of advanced grammar rules and write grammatically correct sentences CO2 Acquire wide vocabulary and punctuation rules and learn strategies for error-free communication. CO3 Interpret texts, pictures and improve both reading and writing skills which would help them in their academic as well as professional career CO4 Comprehend language and improve speaking skills in academic and social contexts CO5 Develop, share and maximise new ideas with the concept of brainstorming and the documentation of key critical thoughts articulated towards preparing for a career based on their potentials and availability of opportunities. CO6 Function effectively in multi-disciplinary teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality
7	Course Description	The course is designed to equip students, who are at a very basic level of language comprehension, to communicate and work with ease in varied workplace environment. The course begins with basic grammar structure and pronunciation patterns, leading up to apprehension of oneself through written and verbal expression as a first step towards greater employability.
8		Outline syllabus – ARP 103



	Unit A	Sentence Structure	CO Mappin g
	Tonic 1	Subject Verb Agreement	g
	Topic 2	Parts of speech	CO1
	Topic 3	Writing well-formed sentences	1
	Unit B	Vocabulary Building & Punctuation	
	Topic 1	Homonyms/ homophones, Synonyms/Antonyms	CO1,
	Topic 2	Punctuation/ Spellings (Prefixes-suffixes/Unjumbled Words)	CO1, CO2
	Topic 3	Conjunctions/Compound Sentences	CO1,
	Unit C	Writing Skills	002
	Tonia 1	Picture Description Student Group Activity	CO3
			005
	Topic 2	 Positive Thinking - Dead Poets Society-Full-length feature film Paragraph Writing inculcating the positive attitude of a learner through the movie SWOT Analysis – Know yourself 	CO3, CO2, CO3
	Topic 3	Story Completion Exercise –Building positive attitude - The Man from Earth (Watching a Full length Feature Film)	CO2, CO3
	Topic 4	Digital Literacy Effective Use of Social Media	CO3
	Unit D	Speaking Skill	
	Topic 1	Self-introduction/Greeting/Meeting people – Self branding	CO4
	Topic 2	Describing people and situations - To Sir With Love (Watching a Full length Feature Film)	CO4
	Topic 3	Dialogues/conversations (Situation based Role Plays)	CO4
	Unit 4	Professional Skills Career Skills	
	Topic 1	Exploring Career Opportunities	CO4, CO5
	Topic 2	Brainstorming Techniques & Models	CO4, CO5
	Topic 3	Social and Cultural Etiquettes	CO4, CO5
	Topic 4	Internal Communication	CO4, CO5
	Unit 5	Leadership and Management Skills	
	Topic 1	Managerial Skills	CO6
	Topic 2	Entrepreneurial Skills	CO6
9	Evaluations	Class Assignments/Free Speech Exercises / JAM Group Presentations/Problem Solving Scenarios/GD/Simulations (CA- 25% MTE-25% ETE-50%	N/A
10	Texts & References Library Links	 Blum, M. Rosen. <i>How to Build Better Vocabulary</i>. London: Bloomsbury Publication Comfort, Jeremy (et.al). <i>Speaking Effectively</i>. Cambridge University Press 	



COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	3	-	-
CO2	-	-	-	-	-	-	-	-	1	3	-	-
CO3	-	-	-	-	-	-	-	-	1	3	-	-
CO4	-	-	-	-	-	-	-	-	1	2	-	-
CO5	-	-	-	-	-	-	-	-	1	2	-	-
CO6	-	-	-	-	-	-	-	-	1	2	-	-



Schoo	l:	School of Engineering & Technology								
Depar	·tment	Computer Science & Applications								
Progr	amme:	BSc CS Current Academic Year: 2023-24								
Batch	•	2023-26								
Semes	ster:	Ι								
1	Course Code	BOL151								
2	Course Title	Problem solving using C Programming Lab								
3	Credits	2								
4	Contact	0-0-4								
	Hours									
	(L-T-P)									
	Course	Compulsory								
	Status									
5	Course	To learn computer fundamentals and basic compute	er organisation.							
	Objective	Along with that the objective is to learn basic progr	ramming							
		constructs -data types, decision structures, control	structures in C							
		to apply knowledge in real life software building.								
6	Course	Students will be able to:								
	Outcomes	CO1: Enumerate core concept of C Programmin	ng							
		CO2: Discuss programs using Array and String								
		CO3: Develop Functions for any problem								
		CO4: Classify Union and Structure to write any program CO5: Implement concept of Pointers								
		CO5: Implement concept of Pointers	0							
		CO6: Predict a realworld problem with the help	p of c							
7		programming								
/	Course	Programming for problem solving gives the Unders	standing of C							
0	Description	programming and implement code from flowchart of	or algorithm							
8	Unit 1		CO Mapping							
		Draw flowebert for finding loop your								
		Write a c Program to Add Two Integers								
		Write a creation of a create a coloulator								
	IImit 2	Introduction to C Programming								
		Write a a program to convert length mater to	CO2, CO0							
		while a c program to convert length meter to								
		Write a c program to convert temp								
		Write a c program to swap two numbers								
	Unit 3	Arrays and Functions	CO3, CO6							
		Write a c program to calculate the average using								
		arrays								
		the array								
	IInit 4	Ine array								
		Pre-processors and Pointers								
		write a c program to swap two values using								
		pointers								

Syllabus: Problem solving using C Programming Lab



					www.sharda.ac.in				
		Write a c program							
		array using pointer							
	Unit 5	User Defined Data	CO5, CO6						
		Write a c program							
		using structure							
		Write a c program							
		using union							
	Mode of	Practical							
	examination								
	Weightage	CA	CA CE ESE						
	Distribution	25%	25%	50%					
	Text book/s*	Kernighan, Brian							
		Programming Lan							
	Other	1. B.S. Gottfr	ried - Prog	ramming With C -					
	References	Schaum's (
		Hill 2nd Ed	Hill 2nd Edition - 2004.						
		2. E. Balagur	2. E. Balagurusamy - Programming in ANSI						
		C - Second							
		1999	1999						
G									
Cours	e outline	, 1 • ,	1	1	. 11				
This course implements		ts array and pointer a	ourse talks						
primar	<u>ily about Array,</u>	string, functions, st	ructure & ui	nion and Pointers etc.					
Cours	e Evaluation								
Attend	lance	None							
Any of	ther	CA judged on the practicals conducted in the lab, weightage							
		may be specified							
Refere	nces								
Text b	book	Kernighan, Brian, and Dennis Ritchie. The C Programming							
		Language							
Other	References	1. B.S. Gottfried - Programming With C - Schaum's Outline							
		Series -	Series - Tata McGraw Hill 2nd Edition - 2004.						
		2. E. Bala	2. E. Balagurusamy - Programming in ANSI C - Second						
		Edition - Tata McGraw Hill- 1999							

Turbo C

Software



CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Enumerate core concept of C Programming	PO1,PO2,PO3, PO9, PSO1,PSO2
2.	CO2: Discuss programs using Array and String.	PO1,PO3, PO4, PO5, PO9,PSO1,PSO2
3.	CO3: Develop Functions for any problem	PO1,PO3,PO4, PO9, PSO2
4.	CO4: Classify Union and Structure to write any program	PO1,PO3,PO4, PO9, PSO2
5.	CO5: Implement concept of Pointers	PO1,PO3,PSO2
6	CO6: Predict a realworld problem with the help of c programming	PO1,PO2,PO3,PO4,PO9,PSO1 PSO2



PO and PSO mapping with level of strength for Course Name- Problem solving using C Programming Lab (Course Code BCP151)

Course Code_ Course Name	CO 's	P 0 1	PO 2	P O 3	P O4	P O 5	P O 6	P O 7	P O 8	P O 9	P 0 1 0	PS O 1	PS O2
BCP151_Programming for	CO												
problem solving Lab	1	2	2	3	2	2	2	-	-	2	-	3	2
	CO												
	2	3	2	3	2	2	2	-	-	3	-	3	3
	CO 3	2	2	3	2	2	3	_	_	2	2	2	3
	CO 4	1	1	2	1	1	2	_	2	2	1	2	2
	CO 5	2	3	3	2	2	2	-	2	3	2	3	2
	CO 6	3	2	3	3	1	3	-	3	2	2	2	3

Average of non-zeros entry in following table (should be auto calculated).

Cour se Code	Course Name	P 0 1	P 0 2	P O 3	P 0 4	P O 5	P 0 6	P 0 7	P O 8	P 0 9	P O 10	PS O 1	PS O 2
BCP	Programming for problem	2.		2.		1.	2.		2.	2.	1.	2.5	2.5
181	solving Lab	17	2	83	2	67	33	-	33	33	75	0	0

Strength of Correlation

1. Addressed to Slight (Low=1) extent2. Addressed to Moderate (Medium=2) extent3. Addressed to Substantial (High=3) extent



Syl	labus: Introducti	on to IoT Lab												
School: Department Programme: Batch:		School of Engineering & Technology Computer Science & Applications BSc CS Current Academic Year: 2023-24 2023-26												
											Sem	ester:	I	
											Scho	ool:	School of Engineering & Technology	
											1	Course Code	BOL041	
2	Course Title	Introduction to IoT Lab												
3	Credits	1												
4	Contact Hours (L-T-P)	0-0-2												
	Course Status													
5	Course Objective	The objective of the course is to deploy a network for statistical a applications. This course can help in connecting thesensors to platform readings using extender.	nalysis or control n to get the desired											
6	Course Outcomes	 CO1: Understand the working of IoT Platforms. CO2:Recognize the various sensors and actuators. CO3: Outline the concepts of SENSEnut platform CO4: Demonstrate Blink application using SENSEnutsdevices CO5: Experiment with environment sensors onSENSEnuts GUI. CO6: Design embedded applications using SENSEnut Platform 												
7	Course Description	SENSEnuts platform can be used to test newly developed routing and applicatio layeralgorithms. It provides a flexible mac with around 9 parameters that can b controlled at mac and4 at physical giving user the kind of flexibility to control the network environment.												
8	Outline syllabus		CO Mapping											
	Unit 1	Introduction to IoT Platforms												
		Demonstrate Arduino andits pins.(Students have to prepare the Report for the same)	CO1											
		Demonstration of Setup & Working of Raspberry Pi. (Students have to prepare the Report for the same)	CO1,CO2											
	Unit 2	Study of Sensors and Actuators												
		PIR Motion Sensor, Moisture Sensor, Temperature Sensor, Touch Sensor	CO2											
		Infrared Sensor, Servo Motor, RFID Sensor	CO2											
	Unit 3	Sensenut Platform												
		Introduction to SENSEnuts Platform, the components that make up anSENSEnuts board and their functions.	CO3											
		Installing and working with SENSEnuts.	CO3											
	Unit 4	Working with SENSEnuts device												


	To develop a code	e for LED blink	s operation for SENS	SEnuts device.	CO3, CO4			
	To develop a code	e for RGB blink	s operation for SEN	SEnuts device.	CO3,CO4			
Unit 5	Working with En	nvironment Se	nsors					
To develop a code to read temperature and light sensor data from sensor module attached To develop a code to program the temperature and light sensor with threshold values, andcatch the interrupt generated by them when								
Weightage	CA N							
Distribution	25% 2	5%	50%					
Text book/s*	 The Internet of by HakimaCh Introduction t Lectures Note Engineering, 1 Reference for Internet of Th ArshdeepBah Hand-on App Unit 3 (B) API REFERENCE 	of Things: Conr aouchi, Refere o Internet of Thes, Department Indian Institute Unit 2, 3 (c), 4 ings, Rajkuman ga and Vijay M roach", Universe E GUIDE: SEN	ecting Objects to the nee for Unit-1. nings, Prof. SudipMis of Computer Science of Technology Khar Buyya, Reference for adisetti, "Internet of sities press, 2015, Re SEnuts WSN sensati	e Web edited sra, NPTEL e and agpur, or Unit 3 (c) Things – A eference for				
Other References	 Charalamposl Arduino", Cre Dr.OvidiuVer From research Publishers 20 Contiki : The oper 	Doukas, "Build eate space, App mesan and Dr. and innovatio 14. a source for IO'	ling Internet of Thing il 2002 Peter Friess, "Interna n to market deploym Γ, www.contiki-os.or	gs with the et of Things: ent", River rg				



Course Code_ Course Name	CO's	PO 1	PO2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO9	PO 10	PSO 1	PSO2
	CO1	2	2	2	-	3	1	1	-	2	2	-	1
BOL041 Introduction to	CO2	2	2	2	1	3	2	2	2	1	1	-	2
	CO3	2	2	2	1	3	2	2	2	3	3	-	2
IoT Lab	CO4	2	2	2	2	3	2	2	2	3	3	-	2
	CO5	3	2	2	3	3	2	2	2	3	3	-	2
	CO6	3	3	3	3	3	3	3	3	3	3	-	3

PO and PSO mapping with level of strength for Course Name: Introduction to IoT Lab (BOL041)

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PO10	PSO1	PSO 2
BOL0 41	Introduc tion to IoT Lab	2.3	2.2	2.2	2.0	3.0	2.0	2.0	2.2	2.5	2.5	0.0	2.0

Strength of Correlation

- 1. Addressed to *Slight (Low=1)extent* 2. Addressed to *Moderate (Medium=2) extent*
- 3. Addressed to Substantial (High=3) extent



TERM-II



Syllabus: Data Structures Using C

Sc	chool:		School of Engineering & Technology								
D	epartment		Computer Science & Applications								
Pr	ogramme:		BSc CS Current Academic Year: 2023-24	4							
Ba	atch:		2023-26								
Se	emester:		Ι								
1	Course Code		BCO226 Course Name: Data Structures Using C								
2	Course Title		Data Structures Using C								
3	Credits		4								
4	Contact Hours	(L-T-P)	4-0-0								
	Course Status		Compulsory								
5	Course Objectiv	ve	This course provides programming concepts fo Computer Science, as well as developing the sk practical problems.	r subsequent study in ills necessary to solve							
6	Course Outcom	ies	 Atter the completion of this course, students will be able to: CO-1. Apply the basic operations on arrays. CO-2. Construct complex programs like matrix implementations on arrays. CO-3. Apply the concept of stacks and queues in real life problem solving. CO-4. Apply the concepts of data structure, like linked list to solve complex problems. CO-5. Solving the real-life problems based on trees. CO-6 Implementing the graphs and apply graph concept in computer networks. 								
7	Course Descrip	tion	The purpose of this course is to understand and use backbone of computer science. A basic understandin is fundamental for work in computer science. In this taking form arrays to stacks, queues, linked list, tre searching and sorting.	e data structures that are g of data structure topics course we will discover es and graphs including							
8	Outline syllabu	s		CO Mapping							
	Unit 1	Arrays and	d Strings								
	A	Arrays: Ini	ualization – Declaration – One dimensional Simple	CO1, CO6							
	В	and two-din Arrays.	mensional arrays. String-: String operations - String	CO1, CO6							
	С	sorting- se subtraction	arching – matrix operations like matrix addition, and multiplication	CO1, CO6							
	Unit 2	Stacks and	Queues								
	A	Abstract d Difference Structures.	ata Types, Data Structure and Structured Types, between Abstract Data Types, Data Types and Data	CO2, CO6							
	В	Data Types data type, r Big OH no	s, Linear data type, Non-Linear data type, Primitive non-primitive data type, Introduction to Complexity, tation, Time and Space trade-offs.								



С	Representation of stacks & queues using linked, sequential and their applications. Making a program that implement Stack and Queue.	CO2, CO6
Unit 3	Linked list sorting and searching	
А	Linked list, singly linked list and doubly linked list, representation of linked list in memory	CO1,CO3, CO6
В	Algorithms like insertion, deletion at beginning, middle and at the end of the linked list	CO1,CO3, CO6
С	Various types of sorting like bubble sort, selection sort, insertion sort, heap sort, quick sort and searching like linear and binary search algorithms	CO1,CO3, CO6
Unit 4	Introduction to Trees	
А	Trees: Definition, Binary tree, Binary tree traversal: pre-order, in-order and post-order, Binary search tree.	CO4,CO5
В	Binary search trees and operation like insertion deletion on binary search trees, AVL search trees with insertion deletion and rotation.	CO4,CO5
С	M-way search trees, B-Trees and B+ Trees	CO4,CO5
Unit 5	Trees and Graph Theory.	
А	Graphs: Definition and terminology, Representation of graphs	CO4,CO5
В	Minimum spanning trees by Prims Algorithms and Krushkal's Algorithm	CO4,CO5
С	Multi graphs, Bipartite graphs, Planar graphs, Isomorphism and	
	Homeomorphism of graphs, Euler and Hamiltonian paths,	CO4.CO5. CO6
	Graph colouring.	, ,
Mode of	Theory/Jury/Practical/Viva	
 Weightage		
Distribution	25% 25% 50%	
Text book/s*	1 A Common Sense Guide to Data Structures and	
ICAL DOOK/S	Algorithms Second Edition: Level Up Vour Core	
	Programming Skills and Edition	
	Programming Skins 2nd Edución	
	2. Data Structures Inrough C (A Practical	
	Approach) Paperback – 1 January 2016	
 0.1	by G.S. Baluja	
Other	3. Aaron M. Tenenbaum, Yedidyah Langsam and	
References	Moshe J. Augenstein "Data Structures Using C and	
	C++", PHI	
	4. Horowitz and Sahani, "Fundamentals of Data	
	Structures", Galgotia Publication	



S.	Course C	Jutcome	Program Outcomes (PO)
No.			
1.	CO-1.	Apply the basic operations on	PO1,PO2,PO3,PO4,PO7,PO10,PSO1,PSO2
		arrays.	
2.	CO-2.	Construct complex programs	PO1,PO2,PO3,PO4,PO7,PO10,PSO1,PSO2
		like matrix implementations	
		on arrays.	
3.	CO-3.	Apply the concept of stacks	PO1,PO2,PO3,PO4,PO7,PO10,PSO1,PSO2
		and queues in real life problem	
		solving.	
4.	CO-4.	Apply the concepts of data	P01,P02,P03,P04,P05,P07,P010,PS01,PS02
		structure, like linked list to solve	
		complex problems.	
5.	CO-5.	Solving the real-life problems	P01,P02,P03,P04,P05,P07,P010,PS01,PS02
		based on trees.	
6.	CO-6.	Implementing the graphs and	P01,P02,P03,P04,P05,P07,P010,PS01,PS02
		apply graph concept in computer	
		networks.	



COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	1	1	1	-	-	2		-	1	1	1
CO2	2	2	2	1	-	-	2	-	-	1	1	2
СОЗ	2	2	2	1	-	-	2	-	-	1	2	2
CO4	2	1	2	3	2	-	2	-	-	1	1	1
CO5	2	2	3	2	2	-	2	-	-	1	2	2
CO6	3	3	3	2	2	-	2	-	-	1	2	2
Avg. PO attained	2.16	1.8	2.16	1.67	2		2			1	1.5	1.67

PO and PSO mapping with level of strength for Course Name: Data Structures Using C



Syllabus: Operating Systems and Unix Shell Programming

Sche	ool:	School of Engineering & Technology									
Dep	artment	Computer Science & Applications									
Pro	gramme:	BSc CS Current Academic Year: 2023-24									
Bate	ch:	2023-26									
Sem	ester:	T									
1	Course Code	BC0155									
2	Course Title	Operating Systems and Unix shell Programming									
3	Credits	3									
4	Contact Hours	3-0-0									
	(L-T-P)										
5	Course Status	Core									
5	Course Objective	 Includes different design principles and algorithms Evaluation of algorithms proposed. Implementation of algorithms and utilities. 									
6 Course Outcomes CO1: Define role, responsibilities, features, and design of operating system. CO2: Demonstrate the Process Management and Scheduling techniques CO3: Implement tools and utility of operating systems. CO4: Apply various memory management techniques to understand file and d management and analyze it. CO5: Understand the concepts of Unix and shell programming. CO6: Design and develop solutions to real world problem using Unix											
7	Course Description	This course introduces the design principles of operating systems, re- management, identifying challenges and applying respective algorithms course will also provide the basics of unix and shell programming.									
8	Outline syllabus		CO Mapping								
	Unit 1	Introduction to Operating System Concepts									
	A	Operating System Concepts and functions, Components of Computer System, Need of Operating system,	CO1, CO2								
	В	Types of Operating Systems- Batch, Multiprogramming, Multi-Tasking, Multiprocessing, Distributed, Clustered, Embedded and Real Time Operating System.	CO1, CO2								
	С	User Mode Vs Kernel Mode, Threading, Comparisor between Process and Thread	nCO1, CO2								
	Unit 2	Process Management and Scheduling									
	А	Process Concepts- PCB, Process States, Process Operations.	.CO1, CO2								
	В	CPU Scheduling: Concept , Types of schedulers- (Short term, Long term, Middle term), Dispatcher,	CO1, CO2, CO4								
	С	Performance Criteria CPU Scheduling Algorithms (FCFS, SJF, Priority, Round Robin, Multilevel Queue, Multilevel feedback Queue)	CO1,CO2,CO4								
	Unit 3	Deadlock Handling									
	А	Race condition, Critical sections, Mutual exclusion,	CO1,CO2								
	В	Deadlock concepts & Handling Techniques: Avoidance, Prevention	CO1,CO3								
L	С	Deadlock Detection & Recovery	CO4								
	Unit 4	Memory Management and File Management									
	Α	Memory Hierarchy, Memory Management Unit, Paging, Segmentation	,CO1, CO5								



В	Virtual memory concept, demand paging, Page replacement algorithms(FCFS, Optimal, LRU),	CO3, CO5
С	File Concept ,File operations, File Directories, Case study of Windows Operating System, Disk structure , Disk scheduling(FCFS,SSTF, SCAN, LOOK,C-SCAN, C- LOOK)	CO2,CO3, CO5
Unit 5	Unix and Shell Scripting	
A	Unix file system, Commands related to Process and File Handling.	CO1, CO2,CO3
В	System Calls (File related, Device related, Information related, Process Control Related and Communication related)	CO1, CO4,CO6
С	Fork System Call, Creating a Parent - Child Process	CO1, CO4,CO6
Mode of examination	Theory/Jury/Practical/Viva	
Weightage Distribution	CA MTE ESE	
	25% 25% 50%	
Text book/s*	1. Silberschatz G, Operating System Concepts, Wiley	
Other References	 W. Stalling, "Operating System", Maxwell Macmillan Tannenbaum A S, Operating System Design and Implementation, Prentice Hall India Milenkovic M, Operating System Concepts, McGraw Hill 	



S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Define role, responsibilities, features, and design of operating system.	PO1,PO2,PO3,PO4,PSO1
2.	CO2: Demonstrate the Process Management and Scheduling techniques	PO1, PO3, PO4, PSO2
3.	CO3: Implement tools and utility of operating systems.	PO1,PO2,PO3,PO4
4.	CO4: Apply various memory management techniques to understand file and disk management and analyze it.	PO9, PO10,PO11
5.	CO5: Understand the concepts of Unix and shell programming.	PO1,PO2,PO8,PO9,PO10,PSO1
6.	CO6: Design and develop solutions to real world problem using Linux	PO1,PO2,PO10,PSO1,PSO2



PO and PSO mapping with level of strength for Course Name: Operating Systems and Unix shell Programming (Course Code BCO155)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
	CO1	3	3	3	3				2	2	1	3	2
	CO2	3	2	3	3				2	2	2	2	3
	СОЗ	3	3	3	3				1	1	1	3	2
		2	2	2	2	1			2	3	3	2	2
BCO155 OS &	CO4												
Shell Programm	CO5	2	2	2					3	3	1	3	
ing	CO6	3	2								2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	OS & shell Programmin g	2.83	2.67	1.67	1.67	1.00	1.00	1.00	2.00	1.00	2.67		2.50

Strength of Correlation

1. Addressed to Slight (Low=1) extent
2. Addressed to Moderate (Medium=2) extent
3. Addressed to Substantial (High=3) extent



	Jindo dot Etimeo											
Scr	1001:	School of Engineering & Technology										
De	partment	Computer Science & Applications										
Pro	ogramme:	BSc CS Current Academic Year: 2023-24										
Bat	tch:	2023-26										
Sor	nostori	I										
1	Course Code											
1		BC01/5										
2	Course Title	Ethics and Social Implications of Al										
3	Credits	3										
4	Contact Hours	3-0-0										
	(L-I-P)	OF										
5	Course Status	UE The chiestive of the servers "Ethics and Social Implications of AI" is to provide	atu dan ta with									
5	Objective	a comprehensive understanding of the ethical considerations and broader societal implications										
	Objective	a comprehensive understanding of the cuncar considerations and broader societa associated with artificial intelligence (AI) technologies	in implications									
6	Course	After the completion of this course, students will be able to:										
Ŭ	Outcomes	CO1: <i>Relate</i> and explain the ethical considerations in the development and depl	ovment of									
		AI.	-)									
		CO2: Analyze and evaluate the social and ethical impacts of AI on various stake	holders and									
		society as a whole.										
		CO3: Extend propose ethical decision-making models relevant to AI application	ns.									
		CO4: Make use of the implications of AI on privacy, data protection, bias, fairn	ess,									
		transparency, and accountability.										
	CO5: Explain and address ethical challenges in AI research, development, and go											
	CO6: Develop and discuss the ethical responsibilities of AI practitioners, policymakers, and											
		organizations.										
7	Course	The course "Ethics and Social Implications of AI" is designed to explore the ethic	al dimensions									
	Description	and social implications of AI technologies. It provides an in-depth examination	of the ethical									
		considerations that arise in the development, deployment, and use of AI systems	·									
8	Outline syllabus		CO									
	TI	Introduction to Ethics and Social Implications of AI	Mapping									
		Introduction to Ethics and Social Implications of AI	CO1									
	A	athics Ethical theories and frameworks. Ethical decision making models	COI									
	P	Impact of AL on society Ethical considerations in AL development and	CO1									
	D	deployment Privacy and data protection in AI	COI									
	C	Bias fairness and accountability in AI Transparency and explainability in AI	CO1 CO2									
	C	systems Ethical challenges in AI research	001,002									
	Unit 2	Ethical Issues in AI Governance and Policy										
	A	AI governance frameworks and initiatives. Ethical considerations in AI	CO1. CO2									
		regulation and policy-making. Intellectual property and AI, Ethical	,									
		implications of AI patents										
	В	Ethical issues in AI transparency and auditability, Algorithmic accountability	CO1, CO2									
		and responsibility, Ethical considerations in AI procurement and use by										
		governments										
	С	AI ethics committees and their role, Ethical challenges in AI governance and	CO1, CO2									
		policy, International perspectives on AI ethics and regulation										
	Unit 3	AI and Human Rights										
	А	AI and privacy rights, Ethical considerations in AI surveillance technologies,	CO3									
		Al and freedom of expression										
	В	Ethical implications of AI in law enforcement and criminal justice, AI and	CO3									
	~	discrimination in employment and hiring, AI and social inequality										
	C	Ethical issues in Al-powered decision-making systems, Al and the right to	CO3									
		access information, Ethical considerations in AI-mediated communication, AI										
	TI :4 4	and the right to a fair trial										
1	Unit 4	AI and workforce lines										

Syllabus: Ethics and social Implications of AI



				www.sharda.ac.in							
А	AI and	the future of work, Ethic	al implicatio	ns of AI in job displacement and	CO3, CO4						
	automa	tion, AI and job creation									
В	Ethical	considerations in AI-bas	ed hiring an	d recruitment, AI and workplace	CO3, CO4						
	surveill	ance, Bias and discrimina	ation in AI-ba	ased employment systems							
С	Ethical	challenges in AI-driven	skill assessm	nent and training, AI and worker	CO3, CO4						
	well-be	ing, AI and ethical implic	ations for pro	ofessional responsibilities, AI and							
	labor ri	ghts	_	_							
Unit 5	Ethical	AI Development and D	eployment								
А	Ethical	considerations in AI syste	em design and	d development, Ethical use of data	CO5, CO6						
	in AI, r	esponsible AI research ar	d innovation	 L							
В	Ethical	implications of AI in heat	lthcare, AI ar	nd autonomous systems ethics, AI	CO5, CO6						
	and env	d environmental sustainability, Ethical considerations in AI for social good									
С	AI and	I and the ethical challenges in autonomous vehicles, AI and ethical									
	implica	tions in education, AI and	the future of	f humanity							
Mode of	Theory										
examination											
Weightage	CA		MTE	ETE							
Distribution	25%		25%	50%							
Text book/s*	1.	Paula Boddington, -	Towards a	Code of Ethics for Artificial							
		Intelligencel, Springer,	2017								
	2.	Markus D. Dubber, I	Frank Pasqu	ale, Sunit Das, -The Oxford							
		Handbook of Ethics of	f AII, Oxfor	d University Press Edited book,							
		2020.									
Reference	3.	Wallach, W., & Allen,	C, —Moral	machines: ceaching robots right							
Books		from wrongl, Oxford U	niversity Pre	ss, 2008.							
	4.	Bostrom and E. Yudkov	vsky. —The	ethics of artificial intelligencel. In							
		W. M. Ramsey and K. F	Frankish, edit	ors, The Cambridge Handbook of							
		Artificial Intelligence, Q	Cambridge U	niversity Press, Cambridge, 2014.							



PO and PSO mapping with level of strength for	Course Name:	Ethics and Social	Implications of
AI(BCO173)			

Course Code_ Course Name	CO's	PO 1	PO2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO9	PO 10	PSO 1	PSO2
	CO1	1	2	3	2	2	-	-	-	-	2	3	2
BCO173	CO2	2	3	3	2	3	-	-	-	-	2	3	3
Ethics and	CO3	3	3	3	3	2	1	1	-	-	1	3	2
Social Implications of	CO4	3	3	3	3	2	2	1	-	-	2	3	2
· AI	CO5	2	3	3	3	3	2	2	2	3	2	3	3
	CO6	2	3	3	3	3	2	2	2	3	2	3	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PO10	PSO1	PSO 2
BCO173	Ethics and Social Implications of AI	2.2	2.8	3.0	2.7	2.5	1.8	1.5	2.0	3.0	1.8	3.0	2.5

Strength of Correlation

1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent

3. Addressed to Substantial (High=3) extent



Syllabus: Design Thinking and Creative Learning

Sc	chool:		School of Engineering & Technology								
D	epartment		Computer Science & Applications								
Pr	ogramme:		BSc CS Current Academic Year: 2023-24								
Ba	atch:		2023-26								
Se	emester:		II								
1	Course Code		VOC102 Course Name: Design Thinking an	nd Creative Learning							
2	Course Title		Design Thinking and Creative Learning								
3	Credits		1								
4	Contact Hours ((L-T-P)	1-0-0								
	Course Status		Compulsory								
5	Course Objectiv	ve	 To familiarize students with Design Thinking concepts and principles. To familiarize students with Architecture of a product and its financial Analysis Development of a new product, new service or the radical innovation of processes Apply Design Thinking approach to various examples and real life applications 								
6	Course Outcom	nes	After the completion of this course, students will be ab	ble to:							
			CO1: Explain the basics concepts of Design Thinking								
			CO2: Design solutions as per needs and Translate customer needs into product specifications								
			CO3: To apply product development concepts to the service environment.								
			CO4: Learning to Design the Architecture of a product.								
			CO5: To apply environmental design concepts to the life cycle of a product.								
			CO6: To apply Design Thinking approach to various examples and real life applications.								
7	Course Descrip	tion	This course introduces Design Thinking methodologies, processes and tools that can be used to make the world a better place. Students explore Design thinking theories and how they can be applied to practical situations relevant to various academic disciplines and organizational roles. Among the topics covered are ideation, prototyping, iteration and innovation. Through personal reflection, students will also examine how they can harness the power of design thinking for leading the creation of value for businesses, organizations and society.								
8	Outline syllabu	S		CO Mapping							
	Unit I	Skills in	Design Thinking								
	A	Learn ho existing p	w to use critical design thinking skills to improve an CO1 product or create a new one.								
	В	As a first	step toward user innovation, learn to identify consumer	CO1, CO6							
		requirem	ents and write customer needs statements.	· · · · · · · · · · · · · · · · · · ·							
	Unit 2	Product	Specifications and Applying Creativity								



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	А	Learn how to statistically translate customer needs into product	CO2
		specifications and how product metrics can aid in the definition	
		of those specs.	
	В	Learn how to design needs solutions using creativity,	CO2, CO6
		brainstorming, and concept generation.	, ,
	Unit 3	Prototyping and Services-oriented design	
	А	Investigate prototyping techniques, tactics, and real-world	
		examples of how they were used to generate a design that reflects	CO3,CO4
		client wants and product specifications.	
	В	Learn how to recognise the potential for innovation in service	
		design and how to apply product development concepts to the	CO5,CO6
		service environment.	
	Unit 4	Architecture of a Product and Financial Analysis	
	А	Learn how to determine the building blocks of a product using	CO4
		modular and integral product architectures.	
	В	Learn how to run a financial analysis on your project idea to see	CO1,CO3, CO6
		if it has a solid business case (Worth-It).	
	Unit 5	Environmental Design and Processes of Product	
		Development	
	А	Learn how to apply environmental design concepts to the life	
		cycle of a product.	
	В	Learn how to choose and implement a product development	
	2	approach that's right for your project (staged, spiral, or agile).	
		upprouen unit s right for your project (stuged, spirul, or ugite).	CO5, CO6
	Mode of	Practical	
	examination		
	Weightage	CA CE ETE	
	Distribution	(Viva)	
		25% 25% 50%	
	Text book/s*	Design Thinking: A Guide to Creative Problem Solving for	
		Everyone by Andrew Pressman	
	Other	1. Design thinking the guidebook	
1	References	2. Change by Design by Tim Brown's	
		3. Design Thinking For Dummies by Christian Muller-	
1		Deterbane	



S.	Course Outcome	Programme Outcomes (PO)
No.		
1.	CO1: Explain the basics concepts of Design	PO1,PO2,PO3,PO4,PO7,PO9,PSO1,PSO2
	Thinking	
2.	CO2: Design solutions as per needs and	PO1,PO2,PO3,PO4,PO7,PO9,PSO1,PSO2
	Translate customer needs into product	
	specifications	
3.	CO3: To apply product development concepts	PO1,PO2,PO3,PO4,PO7,PO9,PSO1,PSO2
	to the service environment.	
4.	CO4: Design the Architecture of a product.	PO1,PO2,PO3,PO4,PO6,PO7,PO9,PSO1,PSO2
5.	CO5: To apply environmental design concepts	PO1,PO2,PO3,PO4,PO6,PO7,PO9,PSO1,PSO2
	to the life cycle of a product.	
6.	CO6: To apply Design Thinking approach to	PO1,PO2,PO3,PO4,PO6,PO7,PO9,PSO1,PSO2
	various examples and real life applications.	



Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	1	1	1	-	-	2		1	-	1	1
CO2	2	2	2	1	-	-	2		1	-	1	2
CO3	2	2	2	1	-	-	2		1	-	2	2
CO4	2	1	2	3	-	2	2		1	-	1	1
CO5	2	2	3	2	-	2	2		1	-	2	2
CO6	3	3	3	2	-	2	2		1	-	2	2
Avg. PC attained	2.16	1.8	2.16	1.67		2	2		1		1.5	1.67

PO and PSO mapping with level of strength for Course Name: Design Thinking and Creative Learning (VOC102)



Syllabus: Communicative English-2

Sch	ool:	School of Engineering & Technology							
Dep	artment	Computer Science & Applications							
Prog	gramme:	BSc CS Current Academic Year: 2023-24							
Bate	ch:	2023-26							
Sem	ester:	II							
1	Course Code	ARP105							
2	Course Title	Communicative English -2							
3	Credits	2							
4	Contact Hours (L-T-P)	2-0-0							
5	Course Objective	To Develop LSRW skills through audio-visual language acquirement, creative writing, advanced speech et al and MTI Reduction with the aid of certain tools like texts, movies, long and short essays.							
		After completion of this course, students will be able to:							
		CO1 Acquire Vision, Goals and Strategies through Audio-visual Language Texts							
		CO2 Synthesize complex concepts and present them in creative writing							
6	Course Outcomes	CO3 Develop MTI Reduction/Neutral Accent through Classroom Sessions & Practice							
0		CO4 Determine their role in achieving team success through defining strategies for effective communication with different people							
		CO5 Realize their potentials as human beings and conduct themselves properly in the ways of world.							
		CO6 Acquire satisfactory competency in use of Quantitative aptitude and Logical Reasoning							
7	Course Description	The course takes the learnings from the previous semester to an advanced level of language learning and self-comprehension through the introduction of audio-visual aids as language enablers. It also leads learners to an advanced level of writing, reading, listening and speaking abilities, while							
		employability chances.							
8									
	Unit 1	Acquiring Vision, Goals and Strategies through Audio-visual Language Texts	CO Mapping						
	Topic 1	Pursuit of Happiness / Goal Setting & Value Proposition in life							
	Topic 2	12 Angry Men / Ethics & Principles	CO1						
	Topic 3	in Life							
	I Init 9	Creative Writing							
	Topic 1	Story Reconstruction - Positive Thinking							
	Topic 2	Theme based Story Writing Desitive attitude	CO^{2}						
	Topic 2	Learning Diary Learning Log – Self-introspection	202						
	Topic 5	Louning Diary Douring Log Son introspection							



	Unit C	Writing Skills 1	
	Topic 1	Precis	
	Topic 2	Paraphrasing	CO2
	Topic 3	Essays (Simple essays)	
	Unit 3	MTI Reduction/Neutral Accent through Classroom Sessions & Practice	
	Topic 1	Vowel, Consonant, sound correction, speech sounds, Monothongs, Dipthongs and Tripthongs	
	Topic 2	Vowel Sound drills , Consonant Sound drills, Affricates and Fricative Sounds	CO3
	Topic 3	Speech Sounds Speech Music Tone Volume Diction Syntax Intonation Syllable Stress	
	Unit A	Cauging MTI Reduction Effectiveness through Free Speech	
	Topic 1	Jam sessions	
	Topic 2	Extempore	CO3
	Topic 3	Situation-based Role Play	
	Unit 5	Leadership and Management Skills	
	Topic 1	Innovative Leadership and Design Thinking	CO4
	Topic 2	Ethics and Integrity	CO4
	Unit 5	Universal Human Values	
	Topic 1	Love & Compassion, Non-Violence & Truth	CO5
	Topic 2	Righteousness, Peace	CO5
	Topic 3	Service, Renunciation (Sacrifice)	CO5
	Unit G	Introduction to Quantitative aptitude & Logical Reasoning	
	Topic 1	Analytical Reasoning & Puzzle Solving	CO6
	Topic 2	Number Systems and its Application in Solving Problems	CO6
9	Evaluations	Practical Basis - Class Assignments/Free Speech Exercises / JAM Group Presentations/Problem Solving Scenarios/GD/Simulations (CA, CE and ESE component) and NO MSE CA-25%; CE-25%; ESE-50%	N/A
10	Texts & References Library Links	 Wren, P.C.&Martin H. <i>High English Grammar and Composition</i>, S.Chand& Company Ltd, New Delhi. Blum, M. Rosen. <i>How to Build Better Vocabulary</i>. London: Bloomsbury Publication Comfort, Jeremy(et.al). <i>Speaking Effectively</i>. Cambridge University Press. The Luncheon by W.Somerset Maugham - <u>http://mistera.co.nf/files/sm luncheon.pdf</u> 	



COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	3	-	-
CO2	-	-	-	-	-	-	-	-	1	3	-	-
CO3	-	-	-	-	-	-	-	-	1	3	-	-
CO4	-	-	-	-	-	-	-	-	1	2	-	-
CO5	-	-	-	-	-	-	-	-	1	2	-	-
CO6	1	-	-	-	-	-	-	-	1	2	-	-

PO and PSO mapping with level of strength for Communicative English-2(ARP105)



Syllabus: Data Structures Using C Lab

School:		School of E	School of Engineering & Technology										
Dep	partment	Computer Science & Applications											
Pro	gramme:	BSc CS Cu	BSc CS Current Academic Year: 2023-24										
Bat	ch:	2023-26											
Sen	nester:	Π											
1	Course Code	BOL226											
2	Course Title	Data Structure	Using C Lab										
3	Credits	1	6										
4	Contact Hours (L-T-P)	0-0-2	-0-2										
	Course Status	Compulsory											
5	Course Objective	To DeTo writePerformed	 To Develop arrays-based program to implement matrix To write program to implement stacks and queues Perform operation on various data structures like trees and graphs 										
6	Course Outcomes	By the end of t CO-1 Apply the CO-2 Construct	his course, the e basic operatio t complex prog	student will be able to: ns on arrays (K2) rams like matrix implementation	ns on arrays								
		 CO-3 Apply the concept of stacks and queues in real life problem solving (K3) CO-4. Apply the concepts of data structure, like linked list to solve complex problems (K4) CO-5. Solving the real-life problems based on trees (K5) CO-6 Implementing the graphs and apply graph concept in computer networks (K6) 											
7	Course Description	An introductio various program linked list like s graphs.	n design and in n in lab like pro singly linked lis	plement data structures. Design grams on stacks and queues, pr and doubly linked list, program	n and develop ogram on m on trees and								
8	Outline syllabu	8			CO Mapping								
	Unit 1	Programs base	ed on arrays										
		Write programs	s to implement	the matrix operations	CO1, CO6								
	Unit 2	Programs base	ed on stacks an	d queues									
		Programs to im	plement the sta	cks and queues operations	CO2, CO6								
	Unit 3	Programs base	ed on linked lis	t, searching and sorting									
		Programs to im	plement the lin	ked list, searching and sorting	CO3, CO6								
	Unit 4	Programs base	ed on Trees										
	Program to implement the trees like insertion, deletion of a node including tree traversal CO4, C												
	Unit 5	Programs based on Graphs											
		Program to implement the graphs like Dijkstra algorithm,CO5, CO6Prims algorithm and Kruskal's algorithmCO5, CO6											
	Mode of examination	Jury/Practical/V	ry/Practical/Viva										
	Weightage	CA	CE (Viva)	ESE									
	Distribution	25%	25% 25% 50%										



Text book/s*	1. A Common-Sense Guide to Data Structures and
	Algorithms, Second Edition: Level Up Your Core
	Programming Skills 2nd Edition
	2. Data Structures Through C (A Practical
	Approach) Paperback – 1 January 2016 by G.S. Baluja
Other	1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe
References	J. Augenstein "Data Structures Using C and C++", PHI
	2. Horowitz and Sahani, "Fundamentals of Data
	Structures", Galgotia Publication



S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO-1 Apply the basic operations on arrays (K2)	PO1, PO3, PO4, PO8, PO9, PO10, PSO1
2.	CO-2 Construct complex programs like matrix implementations on arrays (K2)	PO1, PO2, PO3, PO4, PO8, PO9, PO10
3.	CO-3 Apply the concept of stacks and queues in real life problem solving (K3)	PO1, PO2, PO3, PO4, PO8, PO9, PO10
4.	CO-4. Apply the concepts of data structure, like linked list to solve complex problems (K4)	PO1, PO2, PO3, PO4, PO8, PO9, PO10, PSO1
5	CO-5. Solving the real-life problems based on trees (K5)	PO1, PO2, PO3, PO4, PO8, PO9, PO10, PSO1
6	CO-6 Implementing the graphs and apply graph concept in computer networks (K6)	PO1, PO2, PO3, PO4, PO5, PO7, PO8, PO9, PO10, PSO1



PO and PSO mapping with level of strength for Course Name Data Structure Using	C lab
(BOL226)	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	-	3	2	-	-	-	2	2	2	1	-
CO2	3	3	3	2	-	-	-	3	2	2	-	-
CO3	3	3	3	2	-	-	-	3	2	2	-	-
CO4	3	3	3	3	-	-	-	3	2	2	2	-
CO5	3	3	3	2	-	-	-	3	2	2	2	-
CO6	3	3	3	2	2	-	2	3	2	2	3	-

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO 1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2
DS lab	3	3	3	2.2	2	-	2	2.8	2	2	2	-

Strength of Correlation

1. Addressed to *Slight (Low=1) extent* 2. Addressed to *Moderate (Medium=2) extent*

3. Addressed to Substantial (High=3) extent



Sch	ool:	School of Engineering & Technology							
Dep	artment	Computer Science & Applications							
Pro	gramme:	BSc CS Current Academic Year: 2023-24							
Bat	ch:	2023-26							
Sem	ester:	II							
1	Course Code	BOL155							
2	Course Title	Operating Systems and Unix shell Programming Lab							
3	Credits 1								
4	Contact Hours (L-T-P)	0-0-2							
	Course Status Core								
5	Course Objective Introduces the UNIX operating system, including: task scheduling and management, memory management, input/output processing, internal and external commands, shell configuration, and shell customization. Explores the use of operating system utilities such as text editors, electronic mail, file management, scripting, and C/C++ compilers								
6	Course OutcomesOn completion of this course the student should be able to: CO1: To Identify and use UNIX utilities to create and manage simple file processing operations, organize directory structures with appropriate 								
7	Course This courses introduces Unix Operating System								
8	Outline syllabus CO Mapping								

Syllabus: Operating Systems and Unix Shell Programming Lab



Unit 1	Practical based on Basic Unix Commands	
А	Introduction to Unix, Unix architecture	CO1, CO2, CO4
В	Features of Unix, Internal & External Commands	CO1, CO2, CO4
С	Basic unix commands: pwd, cd, mkdir, rmdir, ls, help, man, whatis	CO1, CO2, CO4
Unit 2	Practical based on File Management	
А	Unix file system	CO1, CO2. CO3, CO4
В	File Permission	CO1, CO2. CO3, CO4
С	File Handling Commands	CO1, CO2. CO3, CO4
Unit 3	Practical based on process Management	
А	Process basics	CO2, CO3, CO4
В	Process and Threads	CO2, CO3, CO4
С	Process States, PID, PPID and other commands	CO2, CO3, CO4
Unit 4	Practical Based on Filters	
А	Simple filters	CO2, CO3, CO4
В	pr, head, tail, tr, grep commands	CO2, CO3, CO4
С	cut, paste, sort, nl commands	CO2, CO3, CO4
Unit 5	Practical Based on Shell Scripting	
A	Shell script	CO1, CO2, CO3, CO4, CO6
В	Execution of shell scripts.	CO1, CO2, CO3, CO4, CO6



-							WWKSIESERCH
		С	Using comma	nd line argume	nts, loops , condition	CO1, CO2, CO3, CO4, CO6	
		Mode of examination	Jury/Practical	/Viva			
	Weightage		CA	CE (Viva)	ETE		
		Distribution	25%	25%	50%		
		Text book/s*	1. Sumitabha Tata McGraw	Das, "Unix Cor Hill.			
		Other References	1. Unix Shell Patric Wood 2. Unix and sh	programming b			
			Demouz A. 10	nouzali			



Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
	CO1	3	3	3	3				2	2	1	3	2
	CO2	3	2	3	3				2	2	2	2	3
BOL155_OS &	CO3	3	3	3	3				1	1	1	3	2
Programming lab	CO4	2	2	2	2	2			2	3	3	2	2
	CO5	2	2	2	2	2			2	3	3	2	2
	CO6	2	2	2	2	2			2	3	3	2	2

PO and PSO mapping with level of strength for Course Name Operating Systems Using unix shell programming Lab (Course Code: BOL155)

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BOL155	OS & shell Programmin g lab	2.5	2.33	2.5	2.5	1.0			1.8	2.3	2.1	2.3	2.1

Strength of Correlation

1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent

3. Addressed to Substantial (High=3) extent



Sc	hool:	,	School of Engi	neering & Technology					
De	epartment	(Computer Scie	ence & Applications					
Pr	ogramme:]	BSc CS Curre	nt Academic Year: 2023-24					
Ba	atch:		2023-26						
Se	mester:]	II						
1	Course Code	1	VOC102	Course Name: Design Thinking ar	nd Creative Learning Lab				
2	Course Title	1	Design Thinking a	nd Creative Learning Lab					
				-					
3	Credits		2						
4	Contact Hours ((L-T-P) (0-0-4						
		` ´							
	Course Status	(Compulsory						
5	Course Objectiv	ve			. 1 1				
			1. 10 familia 2 To familia	arize students with Design Thinking	concepts and principles.				
			Analysis	anze students with Arcintecture of	a product and its infancial				
			3. Developm	nent of a new product, new service of	or the radical innovation of				
			processes						
			4. Apply De	esign Thinking approach to variou	is examples and real life				
6	Course Outcom	ies 4	After the completion	on of this course, students will be ab	ole to:				
			CO1: Explain the basics concepts of Design Thinking						
			CO2: Design solutions as per needs and Translate systemar people into product						
		s	specifications						
		•	CO3: To apply product development concepts to the service environment.						
		•	CO4: Learning to Design the Architecture of a product.						
		•	CO5: To apply environmental design concepts to the life cycle of a product.						
			CO6: To apply Design Thinking approach to various examples and real life applications.						
7	Cause Decaria	tion 7	This second interval	Design Thinking weathed alogic					
/	Course Descrip	uon .	an be used to mal	ke the world a better place. Student	s, processes and tools that s explore Design thinking				
		t	theories and how t	they can be applied to practical situ	ations relevant to various				
		8	academic disciplin	es and organizational roles. Amor	ng the topics covered are				
		i	ideation, prototyp	ing, iteration and innovation. Thr	ough personal reflection,				
			students will also e	examine how they can harness the po	ower of design thinking for				
8	Outline syllabu	1	leading the creation	if of value for businesses, organizati	CO Mapping				
0	Unit 1	Skills in D	esign Thinking						
			0 0						
	Δ	Learn how	to use critical de	sign thinking skills to improve an	C01				
	A	existing pro	oduct or create a ne	ew one.					
		B PIC							

Syllabus: Design Thinking and Creative Learning Lab



	www.shata.cin							
В	As a first step toward use	CO1, CO6						
	requirements and write c							
Unit 2	Product Specifications							
A	Learn how to statistically	CO2						
	specifications and how p	product me	etrics can aid in the definition					
2	of those specs.			GOD GO (
В	Learn how to design	CO2, CO6						
	brainstorming, and conce							
Unit 3	Prototyping and Servic							
А	Investigate prototyping	techniqu	ies, tactics, and real-world					
	examples of how they we	CO3,CO4						
	client wants and product	specificat	tions.					
В	Learn how to recognise	the poten	tial for innovation in service					
	design and how to apply	CO5,CO6						
	service environment.							
Unit 4	Architecture of a Produ	uct and F	inancial Analysis					
А	Learn how to determine	the build	ing blocks of a product using	CO4				
D	modular and integral pro	itectures.	CO1 CO2 CO2					
В	Learn now to run a finan	sis on your project idea to see	01,003,006					
Unit 5	Fnvironmental Desig							
Olit 5	Development							
А	Learn how to apply env							
	cycle of a product.							
В	Learn how to choose a							
	approach that's right for							
 Moda of	Practical	005, 006						
examination	Flactical							
Weightage	CA	CE	FTF					
Distribution	CA	(Viva)						
2150100000	25%	25%	50%					
Text book/s*	Design Thinking: A G							
	Everyone by Andrew Pro	6						
Other	1. Design thinking							
References	2. Change by Desi							
	3. Design Thinkir	ng For Du	immies by Christian Muller-					
	Roterberg.							



S.	Course Outcome	Programme Outcomes (PO)
No.		
1.	CO1: Explain the basics concepts of Design	PO1,PO2,PO3,PO4,PO7,PO9,PSO1,PSO2
	Thinking	
2.	CO2: Design solutions as per needs and	PO1,PO2,PO3,PO4,PO7,PO9,PSO1,PSO2
	Translate customer needs into product	
	specifications	
3.	CO3: To apply product development concepts	PO1,PO2,PO3,PO4,PO7,PO9,PSO1,PSO2
	to the service environment.	
4.	CO4: Design the Architecture of a product.	PO1,PO2,PO3,PO4,PO6,PO7,PO9,PSO1,PSO2
5.	CO5: To apply environmental design concepts	PO1,PO2,PO3,PO4,PO6,PO7,PO9,PSO1,PSO2
	to the life cycle of a product.	
6.	CO6: To apply Design Thinking approach to	PO1,PO2,PO3,PO4,PO6,PO7,PO9,PSO1,PSO2
	various examples and real life applications.	



COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	1	1	1	-	-	2		1	-	1	1
CO2	2	2	2	1	-	-	2		1	-	1	2
СОЗ	2	2	2	1	-	-	2		1	-	2	2
CO4	2	1	2	3	-	2	2		1	-	1	1
CO5	2	2	3	2	-	2	2		1	-	2	2
CO6	3	3	3	2	-	2	2		1	-	2	2
Avg. PO attained	2.16	1.8	2.16	1.67		2	2		1		1.5	1.67

PO and PSO mapping with level of strength for Course Name: Design Thinking and Creative Learning Lab (VOC102)



TERM-III



School:		School of Engineering & Technology						
Department		Computer Science & Applications						
Programme:		BSc CS Current Academic Year: 2023-24						
Batch:		2023-26						
Semester:		TTT						
1	Course Code	BCO156						
2	Course Title	Object Oriented Programming Using Java						
3	Credits	4						
4	Contact Hours (L-T-P)	4-0-0						
	Course Status	Core						
5	Course Objective	Understand the fundamentals of object-oriented concept in Java, defining classes, objects, invoking methods inheritance, interfaces and exception handling mechanisms. To develop skills in analyzing the usability of a web and understand the fundamentals of web design and its technologies.						
6	Course Outcomes	After successfully completion of this course students will be able to: CO1: Compare and contrast different features of java with other programming paradigms. CO2: Describe the fundamental of object-oriented concepts in java. CO3: Explain the concept of inheritance, polymorphism, interfaces and multithreading. CO4: Analyze Exception and Error in java programs. CO5: Design web pages by using HTML & CSS.						
7	Course Description	Basic Object-Oriented Programming (OOP) concepts, including objects, classes, methods, parameter passing, information hiding, inheritance and polymorphism are introduced and their implementations using Java are discussed. HTML and CSS are discussed to give basic understanding and its implementation to design the web pages.						
8	Outline syllabus		CO Mapping					
	Unit 1	Introduction to Object-Oriented Paradigm						
	A	Procedural Languages, object-based languages, object-oriented languages, difference between programming paradigms, advantages of OOPs.	CO1, CO2					
	В	Object-oriented programming features: Abstraction, class, object, Encapsulation, data hiding, polymorphism, inheritance.	CO1, CO2					
	С	Java virtual machine, Byte Code, Architecture of JVM, Class Loader, Execution Engine, Garbage collection.	CO1, CO2					
Unit 2		Introduction to Java with class and object						
	А	Java development Kit (JDK), Introduction to IDE for java development, setting java environment (steps for path and CLASSPATH setting)	CO1, CO2					
	В	Constants, Variables, Data Types, Type conversion & casting, Operators, Expressions, Decision Making, Branching, Loops, command line argument, Input from keyboard.	CO1, CO2					
	С	Classes, Objects, Methods, Constructors, Constructor's overloading, static keyword, Introducing Access Control.	CO2, CO6					
Unit 3 Inheritance, Polymo		Inheritance, Polymorphism, Interface, Array & String						
	A	Types of inheritance, Concept of multiple inheritances, use of this and super, Implementing Interface	CO3, <u>CO6</u>					
	В	Polymorphism, Compile Time Polymorphism, Run Time Polymorphism, Method overloading, Overriding methods	CO3, CO6					
	С	Final class, method and variable, Abstract class and method, Introduction to, Arrays and String handling.	CO3, CO6					

Syllabus: Object Oriented Programming Using Java



Unit 4	Exception and Multithreading							
А	Exception Handling, Introduction to	CO4, CO6						
В	Checked and Unchecked exceptions,	CO4, CO6						
С	Introduction to Multithreading: mul thread using Runnable interface and	CO3, CO6						
Unit 5	Html & Style sheets							
А	Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images,							
В	forms, XHTML, frames and frame se	forms, XHTML, frames and frame sets, Overview and features of HTML 5.						
С	Need for CSS, introduction to CSS, I background images, colors and prop- margins, padding lists, positioning us CSS3.	CO5, CO6						
Mode of examination	Theory							
Weightage	CA M	TE	ETE					
Distribution	25% 25	5%	50%					
Text book/s*	1.Schildt H, "The Complete Referen 2. Douglas Comer "The Internet Boo							
Reference Books	 Balagurusamy E, "Programming i Professional Java Programming: E Douglas E. Comer "Internetworking" HTML 5, Black Book, Dreamtech 							


Sl. No.	Course Outcome (CO)	Programme Outcome (PO) and Programme Specific Objectives(PSO)
1.	CO1: Compare and contrast different features of java with other programming paradigms.	PO1, PO2
2.	CO2: Describe the fundamental of object-oriented concepts in java.	PO1, PO2, PO4
3.	CO3: Explain the concept of inheritance, polymorphism, interfaces and multithreading.	P01, PO2, PO3, PO4, PO10, PSO1
4.	CO4: Analyze Exception and Error in java programs.	PO1, PO2, PO3, PO10
5.	CO5: Design web pages by using HTML & CSS.	PO2, PO3, PO4, PO10
6.	CO6: Develop real world related problems using object- oriented concepts of java.	PO1, PO2, PO3, PO4, PO5, PO6, PO8, PO10, PSO1, PSO2



PO and PSO mapping with level of strength for Course Name Object Oriented Programming Using Java and Web Designing (Course Code BCO156)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
BCO 156	CO1	3	2	-	-	-	-	-	-	-	2	-	-
Object Oriented	CO2	2	3	-	2	-	-	-	-	-	-	-	-
Programming	CO3	2	3	2	3	-	-	-	-	-	2	2	-
Using Java	CO4	2	3	2	-	-	-	-	-	-	2	-	-
	CO5	-	2	2	3	-	-	-	-	-	2	2	1
	CO6	2	3	2	3	3	2	-	2	-	2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	РО 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BCO156	Object Oriented Programming Using Java	2.2	2.67	2	2.75	3	2	0	2	0	2	2	1.5



Syllabus: Principles of Database Management Systems

Sc	hool:	School of Engineering & Technology							
D	epartment	Computer Science & Applications							
Pr	ogramme:	BSc CS Current Academic Year: 2023-24	BSc CS Current Academic Year: 2023-24						
R	atch	2023-26							
So	mostor:								
1	Course Code	III PCO154							
2	Course Code	BC0154							
2	Course Thie	2 2							
3	Contact	300							
4	Hours	5-0-0							
	(L-T-P)								
	Course Status	Core							
5	Course	The objective of this course is to:							
5	Objective	1. To learn about basic concepts of databases, terms	h.						
		2. Introduce students to build database management	2. Introduce students to build database management systems						
		3. Apply DBMS concepts to various examples and r	eal life applications						
6	Course	At the end of the course student will be able to:	* *						
	Outcomes	CO1: Explain the basics concepts of database & design	O1: Explain the basics concepts of database & design an ER model for a given example						
		om real world description.(K2,K6)							
		CO2: Design & Solve the given problem using Relation	O2: Design & Solve the given problem using Relational Algebra, Relational Calculus,						
		SQL and PL/SQL.(K6,K3)							
		CO3: Apply normalization techniques to reduce redund	ancy from the database.(K3)						
		CO4: Appraise the basic issues of Transaction processin	g, Serializability & deadlock.(K5)						
		CO5: Determine the roles of concurrency control techniques in database design.(K5)							
-	G	CO6: Design & develop database system for real life problems.(k6)							
1	Course	This course introduces developing and managing efficier	it and effective database applications						
	Description that requires understanding the fundamentals of database management systems, technique								
0	Outling gullaby	1 for the design of databases, and principles of database ac	CO Monning						
0	Unit 1	INTRODUCTION TO DATABASES & ENTITY							
	Unit I	RELATIONSHID (FR) MODEL							
		Overview of DBMS. Database System vs File System							
	А	Data Independence Database languages: DDL DML							
	11	Data independence Database languages. DDL, DiviL, Database Users, Database Administrator	001, 000						
	В	Data Models, Hierarchical, Network Data Modeling,							
	2	Database System Architecture. Overall Database							
		Structure, Relational data model concepts, ER Model	CO1, CO6						
		Concepts, Notation for ER Diagram							
	С	Keys, Concept of keys, Weak Entity Types,							
		Generalization, Aggregation, Converting ER diagrams	CO1, CO6						
		to relational tables.							
	Unit 2	RELATIONAL DATA MODEL & CONCEPTS OF							
		SQL							
		Relational Data Model Concepts, Integrity Constraints,							
	Α	Entity Integrity, Referential Integrity, Keys	CO1, CO2, CO6						
	D	Constraints, Domain Constraints							
	B Relational Algebra, Relational Calculus, Unary								
	CO1, CO2, CO6								
		Relational Argeora Operations: IOIN and DIVISION							
	C	Introduction on SOL: Characteristics of SOL							
	C	Advantage of SOL Views and Indexes Ousries and							
		Subqueries Joins Cursors Triggers Procedures in	CO1, CO2, CO6						
		SOL/PL SOL							
	Unit 3	RELATIONAL DATABASE DESIGN &							
		NORMALIZATION							



			in the second second						
А	Functional Dependency, Different anomalies designing a Database, loss less join decompositions	in s	CO3, CO6						
В	Normal Forms: First, Second, Third normal forms Boyce Codd normal form (BCNF), Multival dependencies, fourth normal forms	and alued	CO3, CO6						
С	Case Study based on Relational Database Design Normalization	3n &	CO3, CO6						
Unit 4	TRANSACTION PROCESSING CONCEPTS								
А	Introduction to Transaction processing; ACID properties of Serializability, Serializability of Schedu	erty, iles,	CO4						
В	Conflict & View Serializable, Sched Recoverability, Recovery from Transaction Failu Log Based Recovery, Checkpoints, Deadlock,	CO4							
С	Case Study based on Transaction Processing System	em	CO4						
Unit 5	CONCURRENCY CONTROL TECHNIQUES	CONCURRENCY CONTROL TECHNIQUES							
А	Concurrency Control, Two-Phase Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control,								
В	Validation Based Protocol, Multiple Granularity, N Version Schemes,	Multi	CO5						
С	Case Study based on Oracle		CO5						
Mode of examination	Theory								
Weightage	CA N	MTE	ETE						
 Distribution	25% 2	25%	50%						
Text book/s*	 Korth , Silberschatz& Sudarshan, Data ba Elmasri, Navathe, Fundamentals of Datab 	ase Co base Sy	oncepts, Tata McGraw-Hill /stems, Pearson Education Inc.						
Other References	1. Thomas Connolly, Carolyn Begg, Datal design, Implementation and Management,	ibase , Pears	Systems: A Practical Approach to son Education, Latest Edition.						
	 Jeffrey D. Ullman, Jennifer Windon, A f Education. 	first co	ourse in Database Systems, Pearson						
	 Date C.J., An Introduction to Database Sy Richard T. Watson, Data Management: database Sy 	ystems atabase	, Addison Wesley.						



S.	Course Outcome (CO)	Programme Outcomes (PO) &
No.		Programme Specific Outcomes (PSO)
1.	Explain the basics concepts of database & design an ER model for a given example from real world description.	PO1, PO4, PO8, PO9, PO10
2.	Design & Solve the given problem using Relational Algebra, Relational Calculus, SQL and PL/SQL.	PO1, PO2, PO4, PO8, PO10
3.	Apply normalization techniques to reduce redundancy from the database.	PO1, PO2, PO3, PO4, PO8, PO10
4.	To appraise the basic issues of Transaction processing, Serializability & deadlock.	PO1, PO2, PO3, PO4, PO8
5	Determine the roles of concurrency control techniques in database design.	PO1, PO2, PO3, PO4, PO10
6	Design & develop database system for real life problems	PO1, PO2, PO3, PO4, PO5, PO6, PO9, PO10, PSO1, PSO2



PO and PSO mapping with level of strength for Course Name: Database Management System	ns
(Course Code: BCO154)	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	-	-	3	-	-	-	2	2	3	-	-
CO2	3	3	-	3	-	-	-	3	-	2	-	-
CO3	3	3	3	3	-	-	-	3	-	2	-	-
CO4	2	2	2	3	-	-	-	2	-		-	-
CO5	2	2	2	3	-	-	-	-	-	2	-	-
CO6	2	3	3	3	2	2	2	3	3	3	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
BCO154/ DBMS	2.5	2.6	2.5	3	2	2	2	2.6	2.5	2.4	2	2

Strength of Correlation: 1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent

School:		School of Engineering & Technology							
Dep	oartment	Computer Science & Applications							
Pro	gramme:	BSc CS Current Academic Year: 2023-24							
Bat	ch:	2023-26							
Sen	nester:	ш							
1	Course Code	BCO222							
2	Course Title	Computational Methods							
3	Credits	4							
2 4	Contact Hours	4-0-0							
-	(L-T-P)	-0-0							
	Course Status	Compulsory							
5	Course Objective	The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.							
6	Course Outcomes	 CO1: Explain the concept of differential calculus, illustrate the curvature and Maxima, minima and saddle point. (K2, K3, K4) CO2: Explain the basic concepts matrices and determinate, evaluate system of inear equation by using rank and inverse method. (K2, K3, K5) CO3: Explain the basic concept of sets, relation, functions, groups Rings and Field. (K2, K4) CO4: Discuss the basic of Vector spaces. (K1, K3) CO5: Describe and use the linear transformation and evaluate nullity and kernel. K1, K2, K3, K5) CO6:Explain the concept of Eigen values and Eigen vectors; evaluate the diagonalization of matrices, explain the basic introduction of Inner product spaces.(K2, K3, K4, K5) 							
7	Course Description	This course is an introduction to the fundamental of Mathematics. T objective of the course is to develop the basic understanding of different integral calculus, linear Algebra and Abstract Algebra.	The primary erential and						
8	Outline syllab	us: Computational Methods	CO						
			Mapping						
	Unit 1	Differential Calculus:							
	A	Successive differentiation, Leibritiz Theorem, Taylors theorem with Lagranges forms of remainders,	CO1						
	В	Expansion of a function of one variable in Taylors and Meclanrin's infinite series. Maxima and Minima of one variable, partial Derivatives, Euler's theorem, change of variables, total differentiation,	CO1						
	С	Errors and approximation. Taylors series in two variables. Maxima and Minima of two or more variables	CO1,CO2						
	Unit 2	Integral Calculus:							
	A	Definite integral and its application for area, length and volume.	CO2						
	B Multiple integrals. Change of order of integration. CO2								
	C Transformation of integral from Cartesian to polar. Applications CO2								
	in areas, volume and surfaces.								
	Unit 3	Differential Equation:	~~~						
	A	First degree and first order Differential equation	CO3						
	B	Higher order differential equation with constant coefficients.	CO3						
	C	Linear partial differential equation of first order P.D.E. of higher with constant coefficients.	CO3,CO5						

Syllabus: Computational Methods

Unit 4	LINEAR ALGEB	RA:						
А	Spaces and Subsp	aces, Basic and	Dimension of Vector Spaces,	CO4				
В	Linear Transforma	ation,		CO4				
С	Their Nullity and	Rank.		CO4				
Unit 5	MATRIX ALGER	BRA:						
А	Elementary Trans Operation, Rank,	CO5						
В	Solution of a Syste Methods,	em of Linear S	imultaneous Equation by Matrix	CO5				
С	Eigen Values and	CO5, CO6						
Mode of examination	Theory	Theory						
Weightage	CA	MTE	ETE					
Distribution	25%	25%	50%					
Text book/s*	1. G.B. Thomas an 9th Edition, Pearse 2. Erwin Kreyszig Edition, John Wild	nd R.L. Finney on, Reprint, 20 , Advanced En ey & Sons, 200	, Calculus and Analytic geometry. 02. gineering Mathematics, 9th 6.	,				
Other References	 D. Poole, Linea Brooks/Cole, 2003 Veerarajan T., I McGraw-Hill, Neg Ramana B.V., Hill New Delhi, 1 V. Krishnamurt to Linear Algebra. 	7						

S. No.	Course Outcome (CO)	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	Explain the concept of differential calculus, illustrate the curvature and Maxima, minima and saddle point.	PO1,PO4PO8,PO9,PO10
2.	Explain the basic concepts matrices and determinant, evaluate system of linear equation by using rank and inverse method.	PO1,PO2,PO4,PO8,PO10
3.	Explain the basic concept of sets, relation, functions, groups Rings and Field.	PO1,PO2,PO3,PO4,PO9,PO10,PSO1, PSO2
4.	Discuss the basic of Vector spaces.	PO1,PO2,PO3,PO4,PO8,PO10
5	Describe and use the linear transformation and evaluate nullity and kernel.	PO1,PO2, PO3,PO4,PO10
6	Explain the concept of Eigen values and Eigen vectors; evaluate the diagonalization of matrices, explain the basic introduction of Inner product spaces	PO1, PO2,PO3,PO5,PO6,PO,PSO1, PSO2

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	-	-	3	-	-	-	2	2	3	-	-
CO2	3	3	-	3	-	-	-	3	-	2	-	-
CO3	3	3	3	3	-	-	-	3	-	2	-	-
CO4	2	2	2	3	-	-	-	2	-	-	-	-
CO5	2	2	2	3	-	-	-	-	-	2	-	-
CO6	2	3	3		2	2	2				2	3

PO and PSO mapping with level of strength for Course Name Computational Methods(BCO0222)

Average of non-zeros entry in the following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BCO222	Computational Methods	2.5	2.6	2.5	3	2	2	2	2.5	2	2.2	2	3

Strength of Correlation

1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent

3. Addressed to Substantial (High=3) extent

Scl	nool:	School of Engineering & Technology								
De	partment	Computer Science & Applications								
Pre	ogramme:	BSc CS Current Academic Year: 2023-24								
Ba	tch:	2023-26								
Sei	nester:	III								
1	Course Code	BCO330								
2	Course Title	Introduction to Blockchain Technology								
3	Credits	3								
4	Contact Hours (L-T-P)	3 0	0							
Co	urse Status	Core								
5	Course Objective	 By the end of the course, students will be able to: 1. Understand how blockchain systems work, 2. To securely interact with them, 3. Design, build, and deploy smart contracts and distribut 4. Integrate ideas from blockchain technology into their or 	 By the end of the course, students will be able to: Understand how blockchain systems work, To securely interact with them, Design, build, and deploy smart contracts and distributed applications, Integrate ideas from blockchain technology into their own projects 							
7	Course Outcomes Course Description	At the end of this course, students will be able to: CO1: Define principles of Blockchain networks, distributed led architecture of blockchain CO2: Demonstrate an understanding of key terms related to cry CO3: Evaluate the differences among key consensus algorithm CO4: Evaluate the Ethereum and Hyperledger Fabric blockcha their applications in enterprise contexts CO5: Apply the knowledge of smart contracts to design a programs using the Solidity programming language and Remix CO6: Evaluate the benefits and challenges of using blockch various domains and identify potential use cases Decentralized blockchain-based systems, such as Bitcoin a successful beyond all expectations. Although still in their infam revolutionize how we think of financial, information, and ot This course covers the technical aspects of public distributed systems, cryptocurrencies, and smart contracts. Students wi systems are built, how to interact with them, how to design distributed applications	ger, and the layered yptocurrencies s ain frameworks and nd develop simple i IDE hain technology in and Ethereum, are icy, they promise to her infrastructures. ledgers, blockchain ll learn how these n and build secure							
8	Outline syllabus		CO Mapping							
	Unit 1	Introduction								
	A	Introduction to Blockchain networks, distributed ledger, layered architecture of blockchain	CO1 , CO2							
	В	Blockchain principles: Decentralization, immutability, transparency, hashing and digital signature	CO1 , CO2							
	С	Types of Blockchain: Public, private and consortium. Permissionless and permissioned	CO1 , CO2							
	Unit 2	Cryptocurrency								
	А	Definition, Types, Benefits, Limitations	CO1, CO3							
1	В	Different Cryptocurrencies: Bitcoin, Ethereum, Altcoins.	CO1, CO3							
	С	Crypto Wallets, Mining, Initial Coin Offering, Merkle Tree	CO1, CO3							

Syllabus: Introduction to Blockchain Technology

Unit 3	Consensus Algorithms					
А	Proof of Work(PoW), Proof of Stake(PoS), Proof of Elapsed Time (PoET)	CO3, CO4				
В	Practical Byzantine Fault Tolerance: Definition, Working, Limitations	CO3, CO4				
С	Delegated Byzantine Fault Tolerance, Directed Acyclic Graphs,	CO3, CO4				
Unit 4	Ethereum and Hyperledger					
А	Ethereum blockchain, Ethereum Virtual Machine (EVM), Ether and Gas	CO4,CO5				
В	Smart Contracts: Definition, Features, Working of Smart Contracts, Benefits and Limitations, Basic programming concepts of Solidity, Introduction to Remix IDE	CO3,CO5				
С	Hyperledger Project, Hyperledger Fabric, Working and Consensus algorithm	CO3,CO5				
Unit 5	Application and future of Blockchain					
А	Blockchain in Finance, Blockchain in Governance, Blockchain CO5, CO6 in smart energy					
В	Blockchain in supply chain management, Blockchain and CO5, CO6 Artificial Intelligence, Blockchain and Internet of Things					
С	Applications: Electronic Health Record Management System, CO5, CO6 Land Record Management, Blockchain based traceability systems, Hashgraphs					
Mode of examination	Theory					
Weightage	CA MTE ETE					
Distribution	25% 25% 50%					
Text book/s*	Blockchain Technology and Applications, Manoj Kumar M. V. Sourav Kanti Addya, Niranjana Murthy M., Annappa B. CRC I	, Likewin Thomas, Press, 2022				
Other References	 Joseph Bonneau et al, SoK: Research perspectives and char and cryptocurrency, IEEE Symposium on security and Priva available for free download) { curtain raiser kind of generic seasoned experts and pioneers}. J.A.Garay et al, The bitcoin backbone protocol - analysi EUROCRYPT 2015 LNCS VOI 9057, (VOLII), pp 281-310. eprint.iacr.org/2016/1048) . (serious beginning of discussions models for bitcoin protocols). R. Pass et al, Analysis of Blockchain protocol in Async EUROCRYPT 2017, (eprint.iacr.org/2016/454) . A signific consolidation of several principles). R.Pass et al, Fruitchain, a fair blockchain, eprint.iacr.org/2016/916). 	llenges for Bitcoin acy, 2015 (article article, written by s and applications (Also available at s related to formal hronous networks, cant progress and PODC 2017 (

S. No	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1	Define principles of Blockchain networks, distributed ledger, and the layered architecture of blockchain	PO1,PO2,PO3, PO4, PO10, PSO1, PSO2
2	Demonstrate an understanding of key terms related to cryptocurrencies	PO1,PO2,PO3, PO4, PO10, PSO1, PSO2
3	Evaluate the differences among key consensus algorithms	PO1,PO2,PO3, PO4, PO10, PSO1, PSO2
4	Evaluate the Ethereum and Hyperledger Fabric blockchain frameworks and their applications in enterprise contexts	PO1,PO2,PO3, PO4, PO10, PSO1, PSO2
5	Apply the knowledge of smart contracts to design and develop simple programs using the Solidity programming language and Remix IDE	PO1,PO2,PO3, PO4, PO8, PO10, PSO1, PSO2
6	Evaluate the benefits and challenges of using blockchain technology in various domains and identify potential use cases	PO1,PO2,PO3, PO4, PO5, PO6, PO7, PO8, PO10, PSO1, PSO2

Course Code_ Р PO PO PO СО PO PO PO PO PO 0 PO PSO PSO Course Name 's 4 9 10 1 2 3 5 6 7 8 1 2 CO 2 3 3 2 3 2 3 1 -----CO 2 3 3 2 3 2 3 2 _ _ _ _ _ CO 3 2 3 3 2 3 2 3 Introductio -----СО n to Blockchain 4 3 3 3 3 3 3 3 --_ -_ СО Technology 3 3 2 3 3 3 3 3 5 ----СО 3 2 3 2 2 2 2 2 3 3 3 6 -AV 2.5 2.3 2.0 2.0 3.0 2.8 2.0 2.0 3.0 G 0 3 0 3 0 0 0 0 0 2.50 3.00 _

PO and PSO mapping with level of strength for Introduction to Blockchain Technology(BCO330)

Strength of Correlation

1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent

3. Addressed to Substantial (High=3) extent

Syllabus: Cyber Analytics

Scł	nool:	School of Engineering & Technology								
De	partment	Computer Science & Applications								
Pro	oramme.	BSc CS Current Academic Vear: 2023-24								
Rot	toh.	2023.26								
1 1	Course Code	2023-20 DCO221								
1	Course Coue									
2	Course Title	Cyber Analytics								
3	Credits Contact Hours	3								
4	(L-T-P)	3-0-0								
	Course Status	Core								
5	Course Objective	The objective of this course is to to provide knowledge to secure corrupted syste personal data, and secure computer networks in an organization. Additionally, to with an expertise in academics to design and implement security solutions.	ems, protect o practice							
6	Course Outcomes	 After the completion of this course, students will be able to: <i>CO1: Explain</i> the broad set of technical, social & political aspects of Computer Security. <i>CO2: Describe</i> the operational and psychology security Aspects. <i>CO3: Explain</i> Authentication Methods and Intrusion detection system. <i>CO4: Describe</i> the Cyber Crime Strategy analysis. <i>CO5: Apply</i> the Concepts of Cyber Crime and Digital Forensics in Real Time S CO6: <i>Develop</i> and Utilize cyber analytics data to inform and support strategic data to infor	Scenarios. lecision-							
		making in online marketing campaigns.								
7	Course Description	The course provides a foundational platform for Cyber Security Aspirants by pro- Security Awareness and Training that heighten the chances of catching a scam o it is fully enacted, minimizing damage to the resources and ensuring the protection Science assets.	oviding Cyber r attack before n of Computer							
8	Outline syllabus		CO Mapping							
	Unit 1	INTRODUCTION TO CYBER FORENSICS								
	А	Introduction to Cyber Forensics - Cyber Threats and Vulnerabilities	CO1							
	В	Concept of Cyber Security, Cyber Crimes and Cyber-attack.	CO1							
	С	CurrentThreats and Trends – Confidentiality – Cyber Hate Crimes.	CO1, CO2							
	Unit 2	CYBER CRIME								
	А	National Security Strategy – Organized Crime Strategy – Cyber Crime Strategy	CO1, CO2							
	В	Policy Cyber Crime – International Response – National Cyber Security Structure	CO1, CO2							
	С	Strategic Policy Requirements – Police and Crime Commissioners.	CO1, CO2							
	Unit 3	CYBER SECURITY AND THREATS								
	А	User, Group, and Role Management - Password Policies - Single Sign-On -	CO3							
	B	Security Controls and Permissions - Preventing Data Loss or Theft	CO3							
	0	IDSs -								
	Unit 4	CYBER SECURITY								
	А	Security Policies, Security Procedures, Standards, and Guidelines	CO3, CO4							
	В	Security Awareness and Training - Interoperability Agreements - The Security Perimeter, Physical Security	CO3, CO4							
	С	Environmental Issues - Wireless - Electromagnetic Eavesdropping - People— A Security Problem - People as	CO3, CO4							
-	Unit 5	SECURITY SPACE								
	A	Intrusion Detection System (IDS) and Intrusion Protection System (IPS).	CO5, CO6							
	В	Web Based Automated System for Cyber Analytics	CO5, CO6							
	С	Collection of Links, Scraping of Information, Structuring Information, Analysis of Data.	CO5, CO6							

Mode of examination	Theory						
Weightage	CA		MTE	ETE			
Distribution	25%		25%	50%			
Text book/s*	1. 2.	 Francois Chollet, Deep Learning with Python, Manning publications, Shelter Island, New York, 2018. Tom M. Mitchell, —Machine Learningl, McGraw-Hill Education (India) Private Limited, 2013. 					
Reference	1.	Navin Kumar Manaswi	i, Deep Learn	ing with Applications using			
Books	Python, Apress, New York, 2018.						
	2.	Ethem Alpaydin, Introd MIT Press, 2014.	luction to Ma	chine Learning, 3rd Edition,			

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	3	3				2	2	1	3	2
CO2	3	2	3	3				2	2	2	2	3
CO3	3	3	3	3				1	1	1	3	2
CO4	2	2	2	2	1			2	3	3	2	2
CO5	3	2	3	3	1	-	1	3	2	2	2	2
CO6	2	2	3		3		3		2	3	3	3

PO and PSO mapping with level of strength for Course Name Cyber Analytics (BCO331)

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO 2	P 0 3	P 0 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	PS O 1	PSO 2
	Cyber Analytics	2.6	2.3	2.8	2.8	1.6		2	2	2	2	2.5	2.3

Strength of Correlation

1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent

3. Addressed to Substantial (High=3) extent

Scho	ol:	School of Engineering & Technology						
Depa	artment	Computer Science & Applications						
Prog	gramme:	BSc CS Current Academic Year: 2023-24						
Batc	h:	2023-26						
Sem	ester:	III						
1	Course Code	VOC201						
2	Course Title	Augmented Reality Application Development						
3	Credits	2						
4	Contact Hours (L-T-P)	2-0-0						
	Course Status	Compulsory						
5	Course Objective	The objective of this course is to provide a foundation to the fast-growing field of AR and make the students aware of the various AR devices						
6	Course Outcomes	es after studying this course student will be able to: CO1: <i>Describe</i> the basic concepts and different applications of Augmented Reality. CO2: <i>Explain</i> how AR systems work and list the applications of AR. CO3: <i>Apply</i> the concept of AR in unity game engine to develop various application CO4: <i>Compare</i> and understand the working of various state of the art AR devices CO5: <i>Assess</i> different AR techniques for application development CO6: <i>Plan</i> future challenge and opportunity of augmented reality						
7	Course Description	This Course introduce the concept of augmented reality and its utilization to develop various applications using unity engine. The future utilization of this course will be to merge with computer vision.						
8	Outline syllabus		CO Mapping					
	Unit 1	Augmented Reality: Introduction						
	А	What Is Augmented Reality, Applications of Augmented Reality, Components of Augmented Reality, History of AR,	CO1					
	В	Concept of Displays and Tracking (Tracking, Calibration and Registration), AR architecture	CO2					
	С	How Does Augmented Reality Work, Trends in Augmented Reality, Mobile Augmented Reality	CO2					
	Unit 2	Augmented Reality Hardware						
	A	Augmented Reality Hardware – Displays – Audio Displays, Haptic Displays, Visual Displays, Other sensory displays,	CO2, CO4					
	В	Visual Perception, Requirements and Characteristics, Spatial Display Model. Processors – Role of Processors, Processor System Architecture, Processor Specifications.	CO2, CO4					
	С	Tracking & Sensors - Tracking, Calibration, and Registration, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors, Optical Tracking, Sensor Fusion.	CO2, CO4					
	Unit 3	Introduction to Unity						
	А	Engine Concepts: Development Tools, Introducing Unity, IDE Basics, Unity Concepts	CO3					
	B Sprites: Introduction to Scripting, C# Language Concepts, Creating CO3 Scripts, C# Coding Fundamentals, Game Loops and Functions, Simple Movement, and Input: Simple Movement, Simple Rotation and Scaling, Easy Input Handling in Unity							
	С	2D and 3D Physics Concepts: Rigidbody Components, Unity Colliders, Physics Materials, Scripting Collision Events, Organizing Game Objects, Parent-Child Objects, Sorting Layers, Tagging Game Objects, Collision Layers	CO3					
	Unit 4	AR Techniques- Marker based & Marker less tracking						

A	Marker-based ap types of markers tracking	proach- Introduc , marker camera	tion to marker-based tracking, pose and identification, visual	CO5					
В	mathematical rep Template marker	presentation of m rs, 2D barcode m	atrix multiplication Marker types- arkers, imperceptible markers.	CO4, CO5					
С	Marker-less appr examples Tracki tracking, hybrid	oach- Localization ng methods- Visu tracking, and init	on based augmentation, real world ual tracking, feature based ialization and recovery	CO5					
Unit 5	Augmented Rea	Augmented Reality Challenges and Future							
А	Human Factor C Physical Side Ef	CO6							
В	Legal and Social Moral and Ethica	CO6							
С	Today's challeng Future of Augme	ges for AR, Curre ented Reality	ent State of Augmented Reality,	CO6					
Mode of examination	Theory/Jury/Prac	ctical/Viva							
Weightage	CA	MTE	ETE						
Distribution	25%	25%	50%						
Text book/s*	1.Augmented Hu by Helen Papagi 2. Picnic Comma Laurence Scott 3. The Fourth Tr								
Other References	1.Augmented Re	ality: Where We	Will All Live by Jon Peddie						

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	CO1: <i>Describe</i> the basic concepts and different applications of Augmented Reality.	PO1, PO2, PO5, PO8, PSO1, POS2
2.	CO2: <i>Explain</i> how AR systems work and list the applications of AR.	PO1, PO2, PO3, PO4, PO8, PSO1, PSO2
3.	CO3: <i>Apply</i> the concept of AR in unity game engine to develop various applications.	PO1, PO3, PO4, PO6, PO7, PO8, PO9, PO10, PSO1, PSO2
4.	CO4: <i>Compare</i> and understand the working of various state of the art AR devices	PO1, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PSO1, PSO2
5.	CO5: Assess different AR techniques for application development	PO1, PO2, PO3, PO4, PO5, PO6, PO10, PSO1, PSO2
6.	CO6: <i>Plan</i> future challenge and opportunity of augmented reality	PO1,PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PSO1, PSO2

Course Code_	CO's	PO	PO	PO								PSO	
Course Name		1	2	3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	1	PSO2
	CO1	3	3			2			2			3	3
	CO2	3	3	2	2				2			3	3
	CO3	3		3	3		2	2	2		2	3	3
VOC 201_Augmente	CO4	2		2	2	1	1	1	2	2		2	2
d Reality	CO5	2	2	2	2	1	1				2	2	2
Development	CO6	3	3	2	2	2	2	1	1	1	1	2	2

PO and PSO mapping with level of strength for Augmented Reality Application Development(VOC201)

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
VOC201	Augmented Reality Application												
	Developmen t	2.67	2.75	2.20	2.20	1.50	1.50	1.33	1.80	1.50	1.67	2.50	2.50

Strength of Correlation

- 1. Addressed to *Slight (Low=1) extent* 2. Addressed to *Moderate (Medium=2) extent*
- 3. Addressed to Substantial (High=3) extent

Syllabus: Logical Skills Building and Soft Skills

	School:	School of Engineering & Technology									
]	Department	Computer Science & Applications									
I	Programme:	BSc CS Current Academic Year: 2023-24									
	Batch:	2023-26									
	Semester:	III									
1	Course Code	ARP209									
2	Course Title	Logical Skills Building and Soft Skills									
3	Credits	2									
4	Contact Hours (L-T-P)	2-0-0									
	Course Status	Compulsory									
5	Course Objective	To enhance holistic development of students and improve their employability skills. To provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To step up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a student will have entered the threshold of his/her 1 st phase of employability enhancement and skill building activity exercise.									
		After completion of this course, students will be able to:									
		CO1: Ascertain a competency level through Building Essential Language and Life Skills CO2: Build positive emotional competence in self and learn GOAL Setting and SMART									
6	Course Outcomes	CO3: Apply positive thinking, goal setting and success-focused attitudes, time Management, which would help them in their academic as well as professional career									
		CO4: Acquire satisfactory competency in use of aptitude, logical and analytical reasoning									
		CO5: Develop strategic thinking and diverse mathematical concepts through building number puzzles									
		CO6: Demonstrate an ability to apply various quantitative aptitude tools for making business decisions									
7	Course Description	This Level 1 blended training approach equips the students for Industry employment readiness and combines elements of soft skills and numerical abilities to achieve this purpose.									
8		Outline syllabus									
	Unit 1	BELLS (Building Essential Language and Life Skills)	CO Mapping								
	А	<i>Know Yourself</i> : Core Competence. A very unique and interactive approach through an engaging questionnaire to ascertain a student's current skill level to design, architect and expose a student to the right syllabus as also to identify the correct TNI/TNA levels of the student.	CO1								
	В	Techniques of Self Awareness Self Esteem & Effectiveness Building Positive Attitude Building Emotional Competence	CO1, CO2								

	Positive Thinking & Attitude Building Goal Setting and SMART Goals – Milestone	
С	Mapping Enhancing L S R W G and P (Listening Speaking Reading Writing Grammar	CO1,
	and Pronunciation)	CO2,CO3
Unit 2	Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical	
А	Syllogism Letter Series Coding, Decoding , Ranking & Their Comparison Level-1	CO4
В	Number Puzzles	CO5
С	Selection Based On Given Conditions	CO5
Unit 3	Quantitative Aptitude	
А	Number Systems Level 1 Vedic Maths Level-1	CO6
В	Percentage ,Ratio & Proportion Mensuration - Area & Volume Algebra	CO6
Unit 4	Verbal Abilities - 1	
А	Reading Comprehension	CO1
В	Spotting the Errors	CO2
Unit 5	Time & Priority Management	
А	Steven Covey Time Management Matrix	CO3
В	Creating Self Time Management Tracker	CO3
Evaluation Weightage Distribution	Practical Basis - Class Assignment/Free Speech Exercises / JAM Group Presentations/Mock Interviews/GD/ Reasoning, Quantitative Aptitude and Logical Reasoning (CA,CE and ESE component) and NO MSE CA-25%; CE-25%; ESE-50%	
Text book/s*	Wiley's Quantitative Aptitude-P Anand Quantum CAT – Arihant Publications Quicker Maths- M. Tyra Power of Positive Action (English, Paperback, Napoleon Hill) Streets of Attitude (English, Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self- esteem and awareness – Nathaniel Brandon Goal Setting (English, Paperback, Wilson Dobson	

PO and PSO mapping with level of strength for Logical Skills Building and Soft Skills (APR209) $\,$

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	1	-	-	-	1	3	-	-
CO2	-	-	-	-	1	-	-	-	1	3	-	-
CO3	-	-	-	-	1	-	-	-	1	3	-	-
CO4	-	-	-	-	-	-	-	-	1	2	-	-
CO5	1	-	-	-	-	-	-	-	1	2	-	-
CO6	1	-	-	-	-	-	-	-	1	2	-	-

Scho	ol:	School of E	ngineering &	Technology								
Depa	rtment	Computer S	Science & App	olications								
Prog	ramme:	BSc CS Cu	rent Academ	ic Year: 2023-24								
Batc	h:	2023-26										
Seme	ester:	III										
1	Course Code	BOL156										
2	Course Title	Object Orjented	Programming Us	sing Java Lab								
3	Credits	1										
4	Contact Hours (L-T-P)	0-0-2										
	Course Status	Compulsory/Ele	ective									
5	Course Objective	To implement Ja objects, inherita	o implement Java language syntax and semantics and concepts such as classes ojects, inheritance, polymorphism, packages and multithreading.									
6	Course Outcomes (must be 6 COs, following verbs given in Bloom's Taxonomy)	CO1: Demonstrate Java environment and executing Java Programs CO2: Understand and formulate the problems in basic programming constructs CO3: Applying OOP concepts to solve real world problems CO4: Implement inheritance and polymorphism features of Java CO5: Implementing multithreading to enhance efficiency and handle run time errors CO6: Develop Java programs for software development										
7	Course Description	Apply features of parameter passing	s, classes, methods, nism are discussed.									
8	Outline syllabus		CO Mapping									
	Unit 1	Jdk, IDE instal	lation and progr	am execution								
		Installing jdk, se Java programs, j systems, .class f	COI									
	Unit 2	Programming										
		Programs on dif narrowing & typ operators,Progra while, do whil Programs using keyboard, Array	CO2, CO3									
	Unit 3	class , object ar	nd constructor									
		Programs to def function, create objects, Program variables, metho	ine classes, defini objects, accessing ns to define const od overloading, co	ing data members & member g members of a class through ructors, initializing instance onstructor overloading.	CO2, CO3, CO6							
	Unit 4	Inheritance, pa	ckage and Inter	face								
		Programs on dif achieving multij interfaces, priva	ferent types of in ple inheritance the te, protected and	heritance, method overriding, rough interfaces, inheritance in public mode	CO3, CO4, CO6							
	Unit 5	I/O, Exception	and Multithread	ling								
		Programs to use user defined exce rethrowing exce synchronize mu implementing R	try catch finall reptions, uses of t ptions, Programs ltiple threads by e unnable interface	ly for exception handling, throw hrows, nested try catch, to define Thread, run and extending Thread class and	CO3, CO5, CO6							
	Mode of examination	Jury/Practical/V										
	Weightage Distribution	CA 25%	CE (Viva) 25%	ETE 50%								

Syllabus: Object Oriented Programming Using Java Lab

Text book/s*	1. Schildt H, "The Complete Reference JAVA2", TMH	
Other References	1. Balagurusamy E, "Programming in JAVA", TMH	
	Professional Java Programming: BrettSpell, WROX Publication	

PO and PSO mapping with level of strength for Course Name Introduction to OOP using Java Lab (Course CodE BOL156)

	CO'r		PO	PO							PO	PSO		
	COS	PO 1	2	3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	10	1	PSO2	
	CO1	1			2	2					2	1	1	
	CO2	2			2	2					2	2	2	
	CO3	2	3	3	3	2					2	2	3	
BOL156_	CO4	3			3	2					2	2	2	
Introduction	CO5	3			3	2					2	2	2	
Java Lab	CO6	3	3	3	3	2					2	3	3	

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BOL156	Introduction to OOP using Java Lab	2.3	3	3	2.5	3					2	2	2

Strength of Correlation

1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent

3. Addressed to Substantial (High=3) extent

List of Experiments

1. WAP in Java to print Hello and explore the difference between print() and println()

2. WAP in Java with two classes create an object of first class and call into another class (having main method)

- 3. WAP in Java to find product of two numbers.
- 4. WAP in Java product of two numbers (Input by the user)
- 5. WAP in Java to illustrate the concept of local, instance and static variable
- 6. WAP in Java to count the total number of vowels and consonants in a string.
- 7. WAP in Java input a string and check whether it is palindrome or not.
- 8. WAP in Java to implement implicit and explicit type casting
- 9. WAP in Java to implement various operators in java
- 10. WAP in Java to check whether the given number is prime or not.
- 11. WAP in Java for constructor overloading
- 12. WAP in Java for method overloading
- 13. WAP in Java for method overriding
- 14. WAP in Java to find the factorial of a given number.
- 15. WAP in Java to show run time polymorphism (up casting)
- 16. WAP in Java for access specifiers (all four)
- 17. WAP in Java to implement the single dimension array
- 18. WAP in Java to copy the elements from one array to another array
- 19. WAP in Java to perform the addition and multiplication in 2-D array

- 20. WAP in Java to print the duplicate elements of an array.
- 21. WAP in Java to find the sum of each row and each column of a matrix
- 22. WAP in Java to sort the elements of an array in ascending/ descending order using Bubble Sort and Insertion sort.
- 23. WAP in Java for simple inheritance
- 24. WAP in Java for Final keyword
- 25. WAP in Java for super keyword
- 26. WAP in Java to create package (user defined)
- 27. WAP in Java for abstract method, class
- 28. WAP in Java for interface
- 29. WAP in Java multiple inheritance
- 30. WAP in Java for exception handling by using try, catch and finally
- 31. WAP in Java for throw and throws exception
- 32. WAP in Java to throw your own exceptions
- 33. WAP in Java to reading and writing through console class.
- 34. WAP in Java how to create thread using Thread Class.
- 35. WAP in Java how to create thread using runnable interface.
- 36. WAP in Java to implement the multithreading.
- 37. WAP in Java to implement the concept of Priorities in threads.

Sc	chool:	School of Engineering & Technology									
D	epartment	Computer Science & Applications									
Pı	ogramme:	BSc CS Current Academic Year: 2023-24									
Ba	atch:	2023-26									
Se	emester:	III									
1	Course Code	BOL 154									
2	Course Title	Principles of Database Management System Lab									
3	Credits	1									
4	Contact Hours (L-T-P)	0-0-2									
	Course Status	Compulsory									
5	Course Objective	 To Develop efficient SQL programs to access Oracle databases Build database using Data Definition Language Statements Perform operations using Data Manipulation Language statements like Insert, Update and Delete 									
6	Course Outcomes	By the end of this course, the student will be able to: CO1: Understand the basic concept of SQL commands in DBMS. (K2) CO2: Demonstrate various DDL Commands used to create and alter a table. (K2) CO3: Experiment with operations using Data Manipulation Language statements like Insert, Update and Delete. (K3) CO4: Examine data to apply various grouping clauses and aggregate functions. (K4) CO5: Evaluate the queries using the concepts like sub-queries, JOINS, Views, Cursors, Triggers. (K5)									
7	Course Description	An introduction to the design and creation of relational databases. Create database-level applications and tuning robust business applications. Lab sessions reinforce the learning objectives and provide participants the opportunity to gain practical hands-on experience.									
8	Outline syllabus	CO Mapping									
	Unit 1	Practical based Data types									
	TT T I (A	Classification SQL, Data types of SQL/Oracles CO1, CO6									
	Unit 2	Practical based on DDL commands									
	11	Create table, Alter table and Drop table CO2, CO6									
	Unit 3	Introduction about the INSERT, SELECT, UPDATE & CO3, CO6 DELETE commands.									
	Unit 4	Practical based on Grouping Clauses GROUP BY, ORDER BY, HAVING & Aggregate Functions									
		Briefly explain Group by, order by, having clauses with examples. Aggregate function: sum, avg, count, max, min									
	Unit 5	Practical based on Sub- queries, JOINS, Views									
		Related example of Sub- queries, Joins and related CO5, CO6									
	Mode of examination	Jury/Practical/Viva									
<u> </u>	Weightage	CA CE (Viva) ESE									
	Distribution	25% 25% 50%									
	Text book/s*	1. Korth, Silberschatz & Sudarshan, Database Concepts, Tata McGraw-Hill									
	Other References	 Elmasri, Navathe, Fundamentals of Database Systems, Pearson Education Inc. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to design, Implementation and Management, Pearson Education, Latest Edition. 									

Syllabus: Principles of Database Management System Lab

S.	Course Outcome	Programme outcomes (PO) &
No.		Programme Specific outcomes (PSO)
1.	CO1: Understand the basic concept of SQL commands in	PO1, PO3, PO4, PO8, PO9, PO10,
	DBMS.	PSO1
2.	CO2: Demonstrate various DDL Commands used to create and	PO1, PO2, PO3, PO4, PO8, PO9,
	alter a table.	PO10
3.	CO3: Experiment with operations using Data Manipulation	PO1, PO2, PO3, PO4, PO8, PO9,
	Language statements like Insert, Update and Delete.	PO10
4.	CO4: Examine data to apply various grouping clauses and	PO1, PO2, PO3, PO4, PO8, PO9,
	aggregate functions.	PO10, PSO1
5	CO5: Evaluate the queries using the concepts like sub-queries,	PO1, PO2, PO3, PO4, PO8, PO9,
	JOINS, Views, Cursors, Triggers.	PO10, PSO1
6	CO6: Develop project based on various SQL commands.	PO1, PO2, PO3, PO4, PO5, PO7,
		PO8, PO9, PO10, PSO1

PO and PSO mapping with level of strength for Course Name Database Management System lab (Course Code: BOL154)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	-	3	2	-	-	-	2	2	2	1	-
CO2	3	3	3	2	-	-	-	3	2	2	-	-
CO3	3	3	3	2	-	-	-	3	2	2	-	-
CO4	3	3	3	3	-	-	-	3	2	2	2	-
CO5	3	3	3	2	_	_	_	3	2	2	2	-
CO6	3	3	3	2	2	-	2	3	2	2	3	-

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO 1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2
BOL154 DBMS lab	3	3	3	2.2	2	-	2	2.8	2	2	2	-

Strength of Correlation

- 1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent
- 3. Addressed to Substantial (High=3) extent

School:		School of Engineering & Technology									
Department		Computer Science & Applications									
Programme:		BSc CS Current Academic Year: 2023-24									
Bat	ch:	2023-26									
Sen	nester:	III	III								
1	Course Code	VOC201									
2	Course Title	Augmented Reality Application Development Lab									
3	Credits	1									
4	Contact Hours (L-T-P)	0-0-2									
	Course Status	Compulsory									
5	Course Objective	The objective of this course is to provide a foundation to the fast-gro and make the students aware of the various AR devices	owing field of AR								
6 Course Outcomes after studying this course student will be able to: CO1: Develop an AR Book application that will detect multiple image targets. CO2: Create an interactive business card using AR Virtual Buttons. CO3: Develop an application based on 3D object tracking and superimposing CO4: Learn and implement tracking of cylindrical objects, marker based and n marker-based AR Applications CO5: Assess different AR techniques for application development CO6: Plan future challenge and opportunity of augmented reality application development											
7	Course Description	This Course introduce the concept of augmented reality and its utiliz various applications using unity engine. The future utilization of this merge with computer vision.	cation to develop s course will be to								
8	Outline syllabus		CO Mapping								
0	Unit 1	Augmented Reality Book Application	e e mapping								
		о <i>и</i> п									
		1. Set-up a license key and introduction of AR environment	CO1								
		2. Customizing – HOUSE image, Sun Images, Ship Image Aero Plane target, face detection etc	CO2								
		3. Building the APK files of AR Book App.	CO2								
	Unit 2	Virtual Button & Augmented Reality Business Card									
		1. Create multiple virtual buttons, which show case – CV, Achievement, Participation, experience.	CO2, CO4								
		2. Setting Up License Key for AR Virtual Button and building the apk file for AR Virtual Button app	CO2, CO4								
	3. Registering multiple Virtual Buttons and CO building the apk file for AR Business Card application										
	Unit 3	Superimposition Based Augmented Reality & Object Tracking									
		1. Creating Interactive and animated car features.	CO3								
		2. Generating License Key Creating a Superimposing a CAR 3D Model on top of a Real Toy Car.	CO3								
		3. Building the AR Object Tracking app.	CO3								

Unit 4	Cylindrical	Cylindrical Object Tracking							
	1. Creating a	1. Creating a Cylinder Target Database							
	2. Projecting	2. Projecting Plane 3D Models surrounding the Cylinder Target							
	3. Projecting	3. Projecting Cloud 3D Models							
Unit 5	Cylindrical	Cylindrical Object Tracking							
	1. Adding Ea	1. Adding Earth & Terrain Model Isand							
	2. Animating	2. Animating the Game Objects							
	3. Building t	3. Building the AR Cylindrical Target Project.							
Mode of examination	Theory/Jury/	Practical/Viva							
Weightage	CA	MTE	ETE						
Distribution	30%	NA	70%						
Text book/s*	1.Augmented by Helen Pa 2. Picnic Co Laurence Sc 3. The Fourt	 Augmented Human: How Technology Is Shaping the New Reality by Helen Papagiannis Picnic Comma Lightning: In Search of a New Reality by Laurence Scott The Fourth Transformation by Robert Scoble and Shel Israel 							
Other Reference	ces 1.Augmente	d Reality: Whe	re We Will All Liv	e by Jon Peddie					

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	CO1: <i>Develop</i> an AR Book application that will detect multiple image targets.	PO1, PO2, PO5, PO8, PSO1, POS2
2.	CO2: <i>Create</i> an interactive business card using AR Virtual Buttons.	PO1, PO2, PO3, PO4, PO8, PSO1, PSO2
3.	CO3: <i>Develop</i> an application based on 3D object tracking and superimposing	PO1, PO3, PO4, PO6, PO7, PO8, PO9, PO10, PSO1, PSO2
4.	CO4: <i>Learn</i> and implement tracking of cylindrical objects, marker based and non-marker-based AR Applications	PO1, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PSO1, PSO2
5.	CO5: Assess different AR techniques for application development	PO1, PO2, PO3, PO4, PO5, PO6, PO10, PSO1, PSO2
6.	CO6: <i>Plan</i> future challenge and opportunity of augmented reality application development	PO1,PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Augmented Reality Application Development Lab(VOC201)

Course Code_ Course Name	CO's	PO 1	PO 2	РО 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
VOC 201_	CO1	3	3			2			2			3	3
	CO2	3	3	2	2				2			3	3
Augmented Reality	CO3	3		3	3		2	2	2		2	3	3
Application Development	CO4	2		2	2	1	1	1	2	2		2	2
Lab	CO5	2	2	2	2	1	1				2	2	2
	CO6	3	3	2	2	2	2	1	1	1	1	2	2

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	Augmented	2.67	2.75	2.20	2.20	1.50	1.50	1.33	1.80	1.50	1.67	2.50	2.50
	Reality												
VOC201	Application												
	Developmen												
	t Lab												

Strength of Correlation

- 1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent
- 3. Addressed to Substantial (High=3) extent

S	chool:		School of Engineering & Technology							
D	epartment		Computer Science & Applications							
Р	rogramme:		BSc CS Current Academic Year: 2023-24							
B	atch:		2023-26							
S	emester:		III							
1	Course Code		RBL001	Cou	Irse Name: F	Research Based Learning -	1			
2	Course Title		Research Based	Learni	ng -1					
3	Credits		0 (Audit Course))						
4	Contact Hours (L-T-P)		0-0-2							
	Course Status		Compulsory (Au	idit Co	urse)					
5 6	Course Objective	5	 To align student's skill and interests with a realistic Problem or Research Gap To understand the significance of problem and its scope Students will find the rational solution with correct methodology 							
			 CO1: Identify and formulate problem statement with systematic approach. CO2: Develop teamwork and problem-solving skills, along with the ability to perform literature revie with others. CO3: Plan the solution of problem as per the problem statement framed. CO4: Classify and understand basic methodology for hypothesis verification and validation of Research successfully. CO5: Implement the solution by using different aspects of programming language/other tools and techniques. CO6: Develop a glory of the need to engage in life-long learning. 							
7 Course Description			In RBL-1, the students will learn how to define the problem for developing Research scope, identifying the skills required for developing the Research based on given a set of specifications and all subjects of that Semester.							
	Mode of examination	Practical	/Viva	1		-				
	Weight age	CA			CE (Viva)	ETE				
	Distribution	25%	25% 50%							

Syllabus: Research Based Learning-1

S. No.	Course Outcome	Programme outcomes (PO)										
1.	CO1: Identify and formulate problem statement with systematic	PO1, PO2,										
2.	approach. CO2: Develop teamwork and problem-solving skills, along with	PO2,PO8,PO10										
2	the ability to perform literature revie with others.	DO2 DO4										
з.	framed.	P03,P04										
4.	CO4: Classify and understand basic methodology for hypothesis verification and validation of Research successfully.	PO2,PO3,PO7,										
5.	CO5: Implement the solution by using different aspects of programming language/other tools and techniques.	PO2,PO4										
6.	CO6: Develop a glory of the need to engage in life-long learning	PO10										
					· ·			/				
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Cos		Programme Outcomes(POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	3	-	2	-	-
CO3	-		2	2	-	-	-	-	-	-	-	-
CO4	-	2	2	-	-	-	2	-	-	-	-	-
CO5	-	2		2	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	2	-	-

PO and PSO mapping with level of strength for Course Name Research Based Learning -1 (Course Code RBL001)

3-Strong, 2-Medium, 1-Low

TERM-IV

C,	ellahuer	Docian	and Anal	veic of	Algorithm
0	ynabus.	Design	anu Ana	Y 515 UI	Algorium

School:		School of Engineering & Technology						
De	epartment	Computer Science & Applications						
Pr	ogramme:	BSc CS Current Academic Year: 2023-24						
Ba	atch:	2023-26						
Se	emester:	IV						
1	Course Code	BCO224						
2	Course Title	Design and Analysis of Algorithm						
3	Credits	4						
4	Contact Hours (L-T-P)	4-0-0						
	Course Status	Core						
5	Course Objective	The objective of this course is to teach student about the techniques for design algorithms and provide an ability to compare and analyze various algorithms.						
6Course OutcomesAfter completion of this course, the student shall be able to : CO1:Analyze the asymptotic performance of algorithms CO2: Describe the dynamic-programming and Greedy paradigm and explain w algorithmic design situation calls for it. CO3: Demonstrate a familiarity with major algorithms and data structures CO4:Apply important algorithmic design paradigms and methods of analysis 								
7	Course Description	This course introduces concepts related to the design and analysis of algorithm Specifically, it discusses recurrence relations, and illustrates their role in asymptotic an probabilistic analysis of algorithms. It covers in detail study of greedy strategies, divi- and conquer techniques, dynamic programming paradigms for designing algorithm and illustrates them using a number of well-known problems and applications. It al covers advanced concepts in data structures for solving newer problems. To programming assignments can be coded in C/Python/Java.						
8	Outline syllabus	3	CO Mapping					
	Unit 1	Introduction						
	A	Algorithm design paradigms-Explanation of all 5 paradigms, motivation for algorithm design, concept of algorithmic efficiency with examples. Run time analysis of algorithms-should be computer independent, dependency upon input size, Growth of Functions- definition and examples, Asymptotic Notations- definition of all three notations (Ω , Θ , O), examples.	CO1, CO6					

В	Divide and conquer: Structure of divide-and-conquer algorithms: examples-Binary search-Algorithm, Calculation of Complexity and numerical examples, Algorithm, Calculation of Complexity and numerical examples (Insertion Sort, Merge sort, Quick sort).	CO1, CO6			
С	Recurrence relations -Definitions, Examples, solution of recurrence relations using Master Method, Recurrence Tree Method and Iteration Method.	CO1, CO6			
Unit 2	Greedy Methods				
A	A Overview of the Greedy paradigm, Analysis and examples of exact optimization solution with examples. Minimum cost spanning tree- Definition, Kruskal's and Prim's algorithm, calculation of complexity, numerical example.				
В	B Fractional Knapsack problem-Problem definition, algorithm, calculation of complexity, numerical example, differences with 0/1 knapsack problem.				
С	Single source shortest paths-Problem definition, examples, Dijkastra's and Bellman Ford algorithm, calculation of complexity. Task Scheduling Problem-Problem definition, examples, algorithm, Calculation of complexity	CO1, CO2, CO3			
Unit 3	Unit 3 Dynamic Programming				
А	Overview, Difference between dynamic programming and divide and conquer with some examples. Difference between Dynamic programming and Greedy approach.	CO3			
В	Matrix Chain Multiplication- Problem definition, solution by dynamic programming method, algorithm, calculation of complexity, numerical example. Longest Common sequence- Problem definition, complexity of dynamic programming method, examples, algorithm, calculation of complexity-solution, 0/1 Knapsack Problem- Problem definition, complexity of solution by dynamic programming method, examples, algorithm, calculation of complexity.	CO3			
С	Applications and analysis: All-pairs Shortest path in graphs- Algorithm, Calculation of Complexity and numerical examples, Similarity between all pair's shortest path and matrix multiplication algorithms.	CO3			
Unit 4	Advanced Data Structure				
A	Height Balanced Trees: Red-Black Trees-Definition, Applications, Insertion and deletion of elements in RB-Tree.	CO1,CO2,CO3,			
В	B B-Tree : Definition and Applications, Insertion and deletion of keys in B-Tree.				
С	C Graph Algorithms: Breadth First Search and Depth First Search – applications and analysis.				

Unit 5	Selected Topic	Selected Topics							
A	String Matchin complexity, Ro Spurious Hits, a	CO1, CO2, CO3, CO4							
В	NP Complete related to c Algorithms- Re and Algorithm, complexity.	NP Complete and NP Hard Problems- Definitions, Examples related to computer science problems. Approximation Algorithms- Requirement, Approximate Vertex Cover Problem and Algorithm, Set Covering Problem and Algorithm with its complexity.							
С	Industry orient challenges.	CO4, CO5, CO6							
Mode of examination	Theory								
Weightage	CA	MTE	ETE						
Distribution	25%	25%	50%						
Text book/s*	Thomas H. Cor Clifford Stein. '	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. "Introduction to Algorithms", 3/e, TMH							
Other References	 Sahni et a Galgotia Pu Hopcroft Algorithms 								

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1Analyze the asymptotic performance of algorithms	PO1, PO2, PO3, PO4, PO9, PSO1, PSO2
2.	CO2Describe the dynamic-programming and Greedy paradigm and explain when an algorithmic design situation calls for it.	PO1, PO2, PO3, PO4, PO9, PSO1, PSO2
3.	CO3: Demonstrate a familiarity with major algorithms and data structures	PO1, PO2, PO3, PO9, PSO1, PSO2
4.	CO4: Apply important algorithmic design paradigms and methods of analysis	PO1, PO2, PO3, PO4, PO9, PSO1, PSO2
5.	CO5: Discuss NP-complete problems and develop algorithms to solve the problems.	PO1, PO2, PO3, PO4, PO9, PSO1, PSO2
6	CO6: Choose appropriate algorithm design techniques for solving problems.	PO1, PO2, PO3, PO4, PO5, PO9, PSO1, PSO2

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	1	2	-			-	2	-	3	2
CO2	2	2	2	2	-			-	3	-	2	3
CO3	2	1	2	-	-			-	1	-	3	2
CO4	1	2	2	3	-			-	2	-	2	2
CO5	3	3	1	3	-	-	-	-	3	-	2	1
CO6	2	2	3	2	2	-	-		2	-	3	2

PO and PSO mapping with level of strength for Course Name: Design and Analysis of Algorithm (Course Code: BCO224)

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BCO224	Design and Analysis of Algorithm	2	2.17	1.83	2.4	2	-	-	-	2.2	-	2.5	2

Strength of Correlation

1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent 2. Addressed to Substantial (High=2) extent

3. Addressed to Substantial (High=3) extent

School:		School of Engineering & Technology							
De	partment	Computer Science & Applications							
Pro	ogramme:	BSc CS Current Academic Year: 2023-24							
Ba	tch:	2023-26							
Ser	nester:	IV							
1	Course Code	BCO221							
2	Course Title	Computer Networks and Data Communication							
3	Credits	4							
4	Contact Hours (L-T-P)	4-0-0							
	Course Status	Compulsory							
5	Course Objective	The students will be introduced to the basic fundamentals of computer networks along with individual layers of OSI reference model.							
6	Course Outcomes	 Students will be able to: CO1: Classify the basic network infrastructure to learn the overall function of networking systems and transmission mediums. CO2: Demonstrate analog and digital transmission techniques. CO3: Apply knowledge of switching and error detection and correction. CO4: Illustrate the network layer and transport layer including IP Addressing, routing, TCP and UDP services. CO5: Explain the functionality of application layer. CO6: Outline the cryptography and network security. 							
7	Course Description	This course provides detailed concepts of computer Familiarize the student with the basic taxonomy an of the computer networking area.	networking. d terminology						
8	Outline syllabu	S	CO Mapping						
	Unit 1	Introduction:							
	А	Overview of networks in daily life, Network Topologies- Bus, Star, Ring, Mesh, Hybrid.	CO1						
	В	Connecting devices-Hub, Repeater, Router, Switch, Gateway, Modem, Multiplexers Transmission Media- Coaxial cables, twisted pair cables-Unshielded, shielded	CO1						
	С	Modes of Transmission-Simplex, half duplex and Full duplex, Network Architecture and structure, Types of networks- LAN, MAN, WAN, Broadcast, Point to Point, Peer to peer Networks	CO1, CO2						
	Unit 2	Digital Transmission and Analog Transmission							

Syllabus: Computer Networks and Data Communication

А	Digital Conversio	Transmis n, Analog-to	sion: Digital-to-Digital o-Digital Conversion	CO2, CO6	
В	Analog Conversio Conversio	Transmis n, ASK,FS n,	sion: Digital-to-Analog SK,PSK, Analog-to-Analog	CO2, CO6	
С	Modulatio Delta Mod	n Techniqu lulation.	es, Pulse Code Modulation,	CO2, CO6	
Unit 3	Switching	; & Data Li	nk Layer		
A	Switching networks, modems, I	: Circuit swi Virtual circu DSL.	itched networks, Datagram uit networks, Dial up	CO3, CO6	
В	Framing , Error-Sing	Errors in co gle Bit error,	mmunication, Types of Burst error	CO3, CO6	
С	Flow Cont Wait proto	trol- simples ocol, Randoi	x protocol and stop and m Access- Aloha, CSMA	CO3, CO6	
Unit 4	Network 1	Layer & T	ransport Layer		
А	Network I and Heade	Layer Servicer format	ces. IPV4 addressing basics	CO4, CO6	
В	IP Addre netting, M RARP, characteris	ssing: IPv4 MASK. Rou ICMP, IC stics.	l, IPv6 subnetting, super- uting Protocols: IP, ARP, GMP functionalities and	CO4, CO6	
С	Transport delivery, T services, f	layer Basics ICP services eatures, hea	s, Process to Process s and header format UDP: der format	CO4, CO6	
Unit 5	Applicatio	on Layer			
A	DNS name in internet	espace, distr , resolution	ribution of namespace, DNS	CO5, CO6	
В	Email Arc Network S Asymmetr	hitecture, se Security: De ric Cryptogr	ervices and Features finition of -symmetric, aphy	CO5, CO6	
С	Digital sig	nature, Mes	sage Digest	CO5, CO6	
Mode of examination	Theory				
Weightage	CA	MTE	ETE		
Distribution	25%	25%	50%		

Text book/s*	1.	Forouzan, B, "Communication Networks", TMH, Latest Edition	
Other References	2.	Tanenbaum, A.S." Computer Networks", 4th Edition, PHI	
	1.	W. Stallings, "Data and Computer Communication" Macmillan Press	

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	CO1: Classify the basic network infrastructure to learn the overall function of networking systems and transmission mediums.	PO1, PO2, PO3,PO4 PSO2
2.	CO2: Demonstrate analog and digital transmission techniques.	PO1, PO2, PO3,PO4 PSO2
3.	CO3: Apply knowledge of switching and error detection and correction.	PO1, PO2, PO3,PO4 PSO2
4	CO4: Illustrate the network layer and transport layer including IP Addressing, routing, TCP and UDP services.	PO1, PO2, PO3,PO4 PSO2
5	CO5: Explain the functionality of application layer.	PO1, PO2, PO3,PO4 PSO2
6.	CO6: Outline the cryptography and network security.	PO1, PO2, PO3,PO4 PSO2

C O S	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1	P S O	P S O
5	1	-	5	•	5	Ű	,	Ű		0	1	2
CO1	3	2	2	2								2
CO2	3	2	2	2								2
CO3	3	2	2	2								2
CO4	3	2	2	2								2
CO5	3	2	2	2								2
CO6	3	2	2	2								2
AVG.	3	2	2	2								2

PO and PSO mapping with level of strength for Course Name Computer Networks and Data Communication (BCO221)

Scho	ool:	School of Engineering & Technology						
Depa	artment	Computer Science & Applications						
Prog	gramme:	BSc CS Current Academic Year: 2023-24						
Batc	: h:	2023-26						
Sem	ester	IV						
1	Course Code	BCO220						
2	Course Title	Application based Programming in Python						
3	Credits	3						
4	Contact Hours (L-T-P)	3-0-0						
	Course Status	Compulsory						
5	Course Objective	Emphasis is placed on procedural programming and object oriente and language constructs common to most high-level langua Programming and Machine Learning.	ed, algorithm design, ages through Python					
6	Course Outcomes	Upon successful completion of this course, the student will be able CO1. Apply the concepts of decision-making and looping structure CO2. Understanding Modular programming approach using metho CO3.Understand and Implement the use of Python lists, tuples and CO4. Incorporate object-oriented programming concept in program CO5: Creating python packages in Complex applications. CO6: Design real life Applications in python using Machine Learn	to: es in programming. ods and functions. dictionaries. nming. ing					
7	Course Description	Python is a language with a simple syntax, and a powerful set of libraries. It is widely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience. We cover data types, control flow, object-oriented programming and apply to basic concepts of Machine learning.						
8	Outline syllabus		CO Mapping					
	Unit 1	Introduction	CO1					
	А	History, Python Environment, Variables, Data Types, Operators.						
	В	Conditional Statements: If, If- else, Nested if-else.						
	~	Looping: For, While, Nested loops.						
	C	Control Statements: Break, Continue, And Pass. Comments						
	Unit 2	List, Tuple, Dictionaries and Functions	CO2, CO3					
	А	Lists and Nested List: Introduction, Accessing list, Operations, Working with lists Library Function And Methods with Lists						
	В	Tuple: Introduction, Accessing tuples, Operations, Working, Library Functions and Methods with Tuples. Dictionaries : Introduction, Accessing values in dictionaries, Working with dictionaries, LibraryFunctions						
	С	Functions: Defining a function, Calling a function, Types of functions, Function Arguments Anonymous functions, Global and local variables						
	Unit 3	Exception Handling, OOP and File Handling	CO4					
	А	Exception Handling : Definition Exception, Exception handling Except clause, Try, finally clause	5					
	В	OOPs concept : Class and object, Attributes, Abstraction, Encapsulation, Polymorphism and Inheritance						
	С	Static and Final Keyword, Access Modifiers and specifiers, scope of a class User Defined Exceptions						
	Unit 4	Module and Applications	CO5					
	А	Modules: Importing module, Math module, Random module						
	B Matplotlib, Packages							

Syllabus: Application based Programming in Python

С	Applications: S Bubble Sort	oplications: Searching Linear Search, Binary Search. Sorting: ubble Sort							
Unit 5	Introduction t	Attroduction to python Applications C troduction to machine learning,Problems under the category of achine learning, Basic algorithms of machine learning with labeled ata, Naïve Bays classifiers concepts							
A	Introduction to machine learnin data, Naïve Ba								
В	,Confusion mat	trix, precision a	nd Recall and other metrics						
С	Django framew	vorks basics for	web designing						
Mode of examination	Theory	eory							
Weightage	CA	MTE	ETE						
Distribution	25%	25%	50%						
Text book/s*	1. The McGrwHill	Complete Refe	erence Python, Martin C. Brown,						
Other References	 Introd E Balahurusam Introd Liang, Pearson Maste House Startin 	Introduction to computing in problem solving using Python, Balahurusamy, McGrwHill Introduction to programming using Python, Y. Daniel ang, Pearson Mastering Python, Rick Van Hatten, Packet Publishing ouse Starting out with Python, Tony Gaddis, Pearson							

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	CO1. Apply the concepts of decision-making and looping structures in programming.	PO1,PO2,PO3,PO4,PO8,PO10, PSO1,PSO2
2.	CO2. Understanding Modular programming approach using methods and functions.	PO1,PO2,PO3,PO4,PO8,PO10, PSO1,PSO2
3.	CO3.Understand and Implement the use of Python lists, tuples and dictionary.	PO1,PO2,PO3,PO4,PO8,PO10, PSO1,PSO2
4.	CO4. Incorporate object-oriented programming concept in programming.	PO1,PO2,PO3,PO4,PO5,PO8,PO10, PSO1,PSO2
5.	CO5: Creating python packages in Complex applications.	PO1,PO2,PO3,PO4,PO5,PO8,PO10, PSO1,PSO2
6.	CO6: Design real life Applications in python using Machine Learning	PO1,PO2,PO3,PO4,PO5,PO8,PO10, PSO1,PSO2,

PO and PSO mapping with level of strength for Course Name Application based Programming in Python and Machine Learning(BCO220)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	-	1	1	2
CO2	3	3	3	3	-	-	-	1	-	1	1	2
CO3	3	3	3	3	-	-	-	1	-	1	1	2
CO4	3	2	3	3	2	-	-	1	-	2	2	1
CO5	3	3	3	3	2	-	-	1	-	2	2	1
CO6	3	2	3	3	2	-	-	1	-	2	2	1

Course	Course Norme	PO	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PSO 1	PSO 2
Code	Course Maine	1									10		
	Application	3	3	3	3	1			1		1.5	1.5	1.5
	based												
BCO220	Programming in												
	Python												

Syllabus: Social Media Analytics

Scł	nool:	School of Engineering & Technology									
De	partment	Computer Science & Applications									
Pro	ogramme:	BSc CS Current Academic Year: 2023-24									
Ba	tch:	2023-26									
Sei	nester	IV									
1	Course Code	BCO403									
2	Course Title	Social Media Analytics									
3	Credits	3									
4	Contact Hours	3-0-0									
	(L-T-P)										
~	Course Status	Core	1								
5	Course	The objective of this course is to understand the role of social media data and an halping organizations achieve their goals and understand their Publics and to ide	nalytics in								
	Objective	select key performance indicators to accurately measure the success of social me	edia efforts:								
6	Course	After the completion of this course, students will be able to:									
	Outcomes	CO1: <i>Explain</i> the basic concepts of social network analysis									
		CO2: Collaborative with peers to apply these methods to a variety of social met	dia								
		CO3 : <i>Describe</i> the link between qualitative and quantitative methods of social r	network								
		analysis									
		CO3: Explain now these social technologies impact society and vice versa CO5: Examine the ethical and legal implications of leveraging social media dat	· 0								
		CO6: <i>Develop</i> and Utilize SM analytics data to inform and support strategic dec	a. Sision-making								
		in online marketing campaigns.	ision maning								
7	Course	The course will introduce students to the science and social science of network analy									
	Description	Through real world examples, including analysis of their own social networks, students will									
		develop skills for describing and understanding the patterns and usage of services like									
0		Facebook, Twitter, YouTube, and others.	<u> </u>								
8	Outline syllabus		CO								
	Unit 1	INTRODUCTION TO SOCIAL MEDIA ANALYTICS	Mapping								
	А	Social media landscape, Need for SMA; SMA in Small organizations; SMA	CO1								
		in large organizations; Application of SMA in different areas									
	В	Network fundamentals and models: The social networks perspective - nodes.	CO1								
		ties and influencers, social network and web data and methods									
	С	Graphs and Matrices- Basic measures for individuals and networks.	CO1. CO2								
	-	Information visualization									
	Unit 2	CONNECTIONS & WEB ANALYTICS TOOLS									
	A	Making connections: Link analysis. Random graphs and network evolution.	CO1. CO2								
	В	Social contexts: Affiliation and identity. Web analytics tools: Clickstream	CO1. CO2								
	-	analysis, A/B testing, online surveys, Web crawling and Indexing.	,								
	С	Natural Language Processing Techniques for Micro-Text Analysis	CO1 CO2								
	- Unit 3	SOCIAL ANALYTICS (FACEBOOK, INSTAGRAM, TWITTER)									
	A	Facebook Analytics: Introduction parameters demographics Analyzing page	CO3								
		audience.	235								
	B	Reach and Engagement analysis Post- performance on FR Social	CO3								
	2	campaigns Measuring and analyzing social campaigns									
	C	Defining goals and evaluating outcomes Network Analysis 9 (LinkedIn	CO3								
		Instagram YouTube Twitter etc. Google analytics)									
	Unit 4	PROCESSING AND VISUALIZING DATA									
		Processing and Visualizing Data Influence Maximization Link Prediction	CO3 CO4								
	A D	Collective Closeification Applications in Advertising and Come Appl the	CO3, CO4								
	D	Conective Classification, Applications in Advertising and Game Analytics.	003,004								

С	Introduction to Python Program	ming, Collec	ting and analyzing social media	CO3, CO4				
	data; visualization and explorati	on						
Unit 5	CASE STUDY IMPLEMENT	ATION						
А	Practical component: CASE ST	actical component: CASE STUDY Students should analyze the social						
	media of any ongoing campaign	edia of any ongoing campaigns and present the findings						
Mode of examination	Theory	Theory						
Weightage	СА	MTE	ETE					
Distribution	25%	25%	50%					
Text book/s*	1. Marshall Sponder(2017 Latest edition							
Reference Books	1. Jim Sterne(2021), Soci Optimize Your Market	al Media Me ing Investme	trics: How to Measure and nt, Wiley Latest Edition.					

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	3	3				2	2	1	3	2
CO2	3	2	3	3				2	2	2	2	3
CO3	3	3	3	3				1	1	1	3	2
CO4	2	2	2	2	1			2	3	3	2	2
CO5	3	2	3	3	1	-	1	3	2	2	2	2
CO6	2	2	3		3		3		2	3	3	3

PO and PSO mapping with level of strength for Course Name: Social Media Analytics(BCO403)

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO 2	P 0 3	P 0 4	P 0 5	P O 6	P O 7	P O 8	P O 9	P O 10	PS O 1	PSO 2
	Social Media Analytics	2.6	2.3	2.8	2.8	1.6		2	2	2	2	2.5	2.3

Strength of Correlation

1. Addressed to *Slight (Low=1) extent* 2. Addressed to *Moderate (Medium=2) extent*

3. Addressed to Substantial (High=3) extent

Syllabus: Data Warehousing and Data Mining

Sc	chool:	School of Engineering & Technology								
D	epartment	Computer Science & Applications								
Pı	ogramme:	BSc CS Current Academic Year: 2023-24								
Ba	atch:	2023-26								
Se	emester	IV								
1	Course Code	BCO402								
2	Course Title	Data Warehousing and Data Mining								
3	Credits	3								
4	Contact Hours	3-0-0								
	Course Status	Elective								
5	Course Objective	 Provide students with an overview of the methodologies and approaches to data mining 								
		 Gain insight into the challenges and limitations of different data mining techniques 								
		3. Provide the students with practice on applying data mining solutions								
		4. Prepare students for research in the area of data mining and related applications								
		5. Enhance students communication and pro	blem solving skills							
6	Course Outcomes Course Description	Students will be able to: CO1: To understand the basic concept of datamin CO2: Demonstrate the Data Pre-processing & tra CO3: Explain Various Pattern Mining Methodolo CO4: Compare & Contrast Classification& Predic CO5: Experiment with Clustering Algorithms CO6: Apply Data mining Techniques in real worl This course introduces advanced aspects of data w mining encompassing the principles analyse the	ing insformation Techniques gy ction Mechanism d Knowledge Discovery varehousing and data data_identify the problems							
	Description	and choose the relevant models and algorithms to	apply.							
8	Outline syllabus		CO Mapping							
	Unit 1	Introduction								

A	Evolution of Dat concepts, Kind c	a mining and intr of Data & issues i	oductory n Data Mining	CO1
В	Knowledge Disc	overy Process,		
С	Introduction to o	outlier.		-
Unit 2	Data Pre proces	ssing		
А	Descriptive Data Cleaning,	Summarization,	Data	CO1, CO2,CO6
В	Integration and T	Fransformation,		-
С	Data Reduction, Hierarchy Gener			
Unit 3	Frequent Patter	rn Mining		
А	Efficient and Sca Methods: Aprior	alable Frequent It i Algorithm	CO3, CO6	
В	FP -Growth, EC	LAT Algorithm		
С	correlation Anal			
Unit 4	Classification &	rediction		
А	What is classific classification, D	ation, requiremen ecision Tree-ID3	ts of Algorithm, ,	CO4, CO6
В	Naive Bayes Cla classification, Ba	assifier, Rule Base	ed	
С	Support Vector I data. Prediction:	Machine for linea - Linear Regress	rly separable	
Unit 5	Clustering			
А	What is cluster a analysis, Applic	nalysis, requirem cations of Cluster	ents of cluster Analysis	CO5,CO6
В	Partitioning met	hods-k-means and	l k-mediods,	
С	Hierarchical Me divisive, Density	tive and DBSCAN		
Mode of examination	Theory			
Weightage	СА	MTE	ETE	
Distribution	25%	50%		
Text book/s*	1. J.Han,M <i>Concept</i> , Morga	<i>'Data Mining</i> ",Edition:3		

Other	1.	M.H. Dunham, Data Mining	
References		Introductory and Advanced Topics,	
		Pearson Education.	
	2.	Adriaans, <i>Data Mining</i> , Pearson Education	
	3.	VikramPudi& P. Radhakrishnan, "Data Mining", Oxford University Press	

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes(PSO)
1.	CO1: To understand the basic concept of datamining	PO1,PO10
2.	CO2: Demonstrate the Data Pre processing & transformation techniques	PO1, PO5, PO10
3.	CO3: Explain Various Pattern Mining Methodology	PO1 ,PO2, PO3,PO5
4.	CO4: Compare & Contrast Classification& Prediction Mechanism	PO1, PO2 PO3, PO4, PSO1, PSO2
5	CO5 :Experiment with Clustering Algorithms	PO1 ,PO2 PO3,PO4,PO5, PSO1, PSO2
6	CO6: Apply Data mining Techniques in real world Knowledge Discovery	PO2, PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO10, PSO2

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2
CO 1	3	-	-	-	-	-	-	-	-	3	-	-
CO 2	3	-	-	-	-	-	-	-	-	3	-	-
CO 3	2	2	2	-	2	-	-	-	-	-	-	-
CO 4	2	2	2	3		-	-	-	-	-	2	2
CO 5	2	3	3	3	3	-	-	-	-	-	2	2
CO 6	-	3	3	3	2	2	2	2	3	2	-	3

PO and PSO mapping with level of strength for Course Name DWDM (BCO403)

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO 1	PO 2	PO 3	P O 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PS O 2
	2.5	2.5	2.5	3	2.3	2	2	2	3	2.6	2	2.3

Syll	abus: Quant	itative and	l Qualitative Aptitude Skill Building										
School: School of Engineering & Technology Department Computer Science & Applications													
DepartmentComputer Science & ApplicationsProgramme:BSc CS Current Academic Year: 2023-24													
Pr	ogramme:	BSc CS Current Academic Year: 2023-24											
Ba	atch:	2023-26											
Se	emester	IV											
1	Course Code	ARP210	Course Name : Quantitative and Qualitative Aptitude	Skill Building									
2	Course Title		Quantitative and Qualitative Aptitude Skill Building										
3	Credits	3 2											
4	Contact Hours (L-T-P)		1-0-2										
	Course Status		Active										
5	Course Objective	To enhance degree expo softer com altitudinal employabili of employa	To enhance holistic development of students and improve their employability skills. Provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a will have entered the threshold of his/her 2 nd phase of another base of another based of the sement of akill building activity requires										
6	After completion of this course, students will be able to: CO1: Develop and deliver the effective presentations to interpret the deeper meaning of life. CO2: Improve listening skills so as to understand complex business communication in a variety of glob English accents through proper pronunciation Course Outcomes CO3: Demonstrate a good understanding of effective business writing and telephone handling Skills CO4: Acquire higher level competency in use of aptitude, logical and analytical reasoning CO5: Develop higher level strategic thinking and diverse mathematical concepts through buildi number puzzles CO6: Demonstrate higher level quantitative aptitude tools for making business decisions												
		8											
8	T T •4 •4		Outline syllabus – ARP210										
	Unit 1 A	Communicate to Conquer CO MAPPING VMOSA (Vision, Mission, Values and Ethics) Business CO1 Communication -Verbal Communication Skills Barriers in CO1 communication Basics of effective communication – PRIDE & STAP Model											
	В	Different social style of Lister Feedbacks	styles of communication & style flexing (Based on the 4 es-Analytical, Driving, Expressive, Amiable) Importance ning & practice of Active Listening The Art of Giving Feedback Skills Asking fact finding questions- Probing Skills	CO2									
	С	Email Etiquette Business Writing Skills Telephone Etiquette Skills (CO3 Telephone Handling Skills) Non Verbal Communication- Kinesthetics, Proxemics, Paralanguage MTI Reduction Program Introduction to APTITUDE TRAINING Reserving I opical											
	Unit 2		uon to AFIII UDE IRAINING- Reasoning- Logical/ Analytical										
	А	Codii	ng Decoding , Ranking & Their Comparison Level-2	CO4									
	В		Series, Blood Relations & Number Puzzle	CO5									

Unit 3	Quantitative Aptitude	
А	Number System Level 2	CO5
В	Vedic Maths Level-2 Probability Permutation & Combination	CO6
C	Percentage, Profit & Loss ,Partnership, Simple Interest & Compound	CO6
C	Interest	
Unit 4	Verbal Abilities - 2	
А	Paragraph Jumbles	CO2
В	Critical Reasoning	CO2
Unit 5	Basics of GD and PI	
А	Understanding and Practicing Mock Group Discussions	CO2
В	Understanding and Practicing Mock Personal Interviewsss	CO2
Weightage	CA 250/ MTE 250/ ETE 500/	
Distribution	CA-23% MIE-23% EIE-30%	
	Wiley's Quantitative Aptitude-P Anand Quantum CAT – Arihant Publications Quicker Maths- M.	
Text book/s*	Tyra Power of Positive Action (English, Paperback, Napoleon Hill) Streets of Attitude (English,	
TEXT DOOK/S*	Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self-esteem and awareness – Nathaniel	
	Brandon Goal Setting (English, Paperback, Wilson Dobson	

PO and PSO mapping with level of strength for Course Name Quantitative and Qualitative Aptitude Skill Building(ARP210)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	2	-	-
CO2	-	-	-	-	-	-	-	-	1	2	-	-
CO3	-	-	-	-	-	-	-	-	1	2	-	-
CO4	-	-	-	-	-	-	-	-	1	2	-	-
CO5	1	-	-	-	-	-	-	-	1	2	-	-
CO6	1	-	-	-	-	-	-	-	1	2	-	-

Scho	ol:	School of Engineering & Technology											
Depa	rtment	Computer Science & Applications											
Prog	ramme:	BSc CS Current Academic Year: 2023-24											
Batch	n:	2023-26											
Seme	ster	IV											
1	Course Code	BOL224											
2	Course Title	Design and Analysis of Algorithm Lab											
3	Credits	1											
4	Contact	0-0-2											
	Hours												
	(L-T-P)												
	Course Status	Core/Compulsory											
5	gorithms and provide												
6	Course	After completion of this course, the student shall be able to :											
	Outcomes	CO1: Apply and analyze the complexity of certain divide and conquer algorithms.											
		greedy, dynamic programming and backtracking											
		CO3: Apply and analyze the complexity of certain dynamic programming algorith	ms.										
		CO4: Establish the classes P, NP, and NP-Complete problems and be able to prove that a certain problem is NP. Complete											
		IS NP-Complete. CO5: Analyze the working of string-matching algorithms											
		CO6: Analyze the criteria and specifications appropriate to new problems, and ch	oose the appropriate										
		algorithmic design technique for their solution.											
7	Course	This source introduces concents related to the design and analysis of algorit	hma Spacifically it										
<i>′</i>	Description	discusses recurrence relations, and illustrates their role in asymptotic and pro-	babilistic analysis of										
	I I I	algorithms. It covers in detail study of greedy strategies, divide and conquer techniques, dynamic											
		programming paradigms for designing algorithms, and illustrates them using a number of well-known											
		problems and applications. It also covers advanced concepts in data structure	s for solving newer										
0	Q (1)	problems. The programming assignments can be coded in C/Python/Java.	CO Mania										
8	Outline sylla		CO Mapping										
			CO1										
	A D	WAP to demonstrate difference between linear search and binary search.	COI										
	В	a) Insertion Sort	COI										
		b) Merge sort.											
		c) quick sort											
	С	WAP to search min and max element out of an array.	CO1										
	Unit 2	Greedy Methods											
	А	WAP to implement Kruskal's algorithm to find the minimum spanning tree from a	CO2										
		given undirected graph.											
		WAP to implement Prim's algorithm to find the minimum spanning tree from a given undirected graph											
		given undirected graph.											
	B	WAP to demonstrate concept of Fractional Knapsack Problem	CO2										
	B	WAP to demonstrate concept of Fractional Knapsack Problem WAP to implement Dijkastra's algorithm to find the single source shortest path	CO2										
	B C	WAP to demonstrate concept of Fractional Knapsack Problem WAP to implement Dijkastra's algorithm to find the single source shortest path. WAP to implement Bellman Ford Algorithm to find the single source shortest path.	CO2 CO2										
	B C Unit 3	WAP to demonstrate concept of Fractional Knapsack Problem WAP to implement Dijkastra's algorithm to find the single source shortest path. WAP to implement Bellman Ford Algorithm to find the single source shortest path. Dynamic programming	CO2 CO2										
	B C Unit 3 A	WAP to demonstrate concept of Fractional Knapsack Problem WAP to implement Dijkastra's algorithm to find the single source shortest path. WAP to implement Bellman Ford Algorithm to find the single source shortest path. Dynamic programming WAP to implement Matrix Chain Multiplication problem,	CO2 CO2 CO2, CO3										

Syllabus: Design & Analysis of Algorithm Lab

	С	WAP to demonstrate the concept of Lon	igest Common	Subsequence(LCS)	CO2, CO3
	Unit 4	Advanced data structures			
	Α	WAP to demonstrate concept of Red Bla	ack Trees along	g with insertion.	CO1,CO2,CO3, CO4
	В	WAP to demonstrate concept of height b	palanced B-Tre	ees.	CO1,CO2,CO3, CO4
	С	WAP to demonstrate concept of graph the	raversal algorit	hms BFS and DFS.	CO1,CO2,CO3, CO4
	Unit 5	Selected topics			
	A	CO4, CO5, CO6			
	В	WAP to demonstrate concept of Rabin H	Karp algorithm	for string matching.	CO4, CO5, CO6
	С	algorithm.	CO4, CO5, CO6		
	Mode of				
	examination		1	Γ	
	Weightage	CA	CE(Viva)	ESE	
	Distribution	25%	25%	50%	
	Text book/s*	Thomas H. Cormen, Charles E. Leisers "Introduction to Algorithms", 3/e, TMH	on, Ronald L.	Rivest, and Clifford Stein.	
	Other References				
Refere	nces				
Text b	oook	L. Rivest, and Clifford St	ein. "Introduction to		
Other 1	References	ithms", Galgotia Publication ter Algorithms", Addison W	n. Vesley		
Softwa	are	Turbo C/Python/Java			

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	1	2	-			-	2	-	3	2
CO2	2	2	2	2	-			-	3	-	2	3
CO3	2	1	2	-	-			-	1	-	3	2
CO4	1	2	2	3	-			-	2	-	2	2
CO5	3	3	1	3	_	-	-	-	3	-	2	1
CO6	2	2	3	2	2	-	-		2	-	3	2

PO and PSO mapping with level of strength for Course Name Design and Analysis of Algorithm Lab(BOL224)

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BOL224	Design and Analysis of Algorithm Lab	2	2.17	1.83	2.4	2	-	-	-	2.2	-	2.5	2

Strength of Correlation

1. Addressed to Slight (Low=1) extent
2. Addressed to Moderate (Medium=2) extent
3. Addressed to Substantial (High=3) extent

School:		School of Engineering & Technology							
Depa	artment	Computer Science & Applications							
Prog	ramme:	BSc CS Current Academic Year: 2023-24							
Batc	h:	2023-26							
Sem	ester	IV							
1	Course Code	BOL220							
2	Course Title	Application based Programming in Python lab							
3	Credits	2							
4	Contact Hours (L-T-P)	0-0-4							
	Course Status	Compulsory							
5	Course Objective	Emphasis is placed on procedural programming, algorithm de constructs common to most high-level languages through Pytho Machine Learning.	esign, and language n Programming and						
6	Course Outcomes	Upon successful completion of this course, the student will be able t CO1. Apply the concepts of decision-making and looping structure CO2. Understanding Modular programming approach using metho CO3.Understand and Implement the use of Python lists, tuples and CO4. Incorporate object-oriented programming concept in program CO5: Creating python packages in Complex applications. CO6: Design real life Applications in python using Machine Learni	o: s in programming. ds and functions. dictionaries. ming. ng						
7	Course Description	Python is a language with a simple syntax, and a powerful set of libra in many scientific areas for data exploration. This course is an intro- programming language for students without prior programming expe- types, control flow, object-oriented programming and apply to basic learning.	ries. It is widely used duction to the Python rience. We cover data concepts of Machine						
8	Outline syllabus		CO Mapping						
	Unit 1	Introduction	CO1,CO2						
	A	 Getting started with python environment like Jupyter, Spyder, Pycharm Demonstrate basic data type in python. Demonstrate the working of 'id' and 'type' 							
	В	 Demonstration of type casting. Demonstrate different in-built string functions. Program to implement all conditional statements 							
	С	6. Program to implement different control structures							
	Unit 2	List, Tuple , Dictionaries and Functions	CO3						
	А	 Program to implement operations on lists Program to implement operations on Dictionaries. 							
	В	 Program to implement operations on Tuple Program to implement Exception Handling 							
	С	 5. Program to use different functions 6. Write a python program to find the factorial of a given number using functions. 7. Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding. Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius If (distance between two balls centers) <= (sum of their radii) 							
		then (they are colliding) Write a python to print Fibonacci series using functions.							

Syllabus: Application based Programming in Python Lab

Unit 3	Exception Handling, OOP and File Handling	CO4
А	1. Program to use object oriented concepts like inheritance,	
	overloading polymorphism etc.	
	2. Program for file handling	
В	3. Write a Python program to demonstrate working of classes	
	and objects.	
	Write a Python program to demonstrate class method & static	
	method	
С	4. Write a Python program to demonstrate constructors.	
	5. Write a program to perform division by handling	
	exceptions.	
	Demonstrate a python code to print try, except and finally block	
Unit 4	Module and Applications	C05
	1 Program to use modules and package	
11	2. Program to implement searching and sorting	
В	3. Write a python program to create a package (Engg), sub -	
	nackage(vears) modules (sem) and create staff and student function	
	to module.	
ſ	Write a python program to create a package (college) sub -package	
C	(alldent) modules(it.cse) and create admin and cabin function to the	
	module.	
Unit 5	Machine Learning Application	CO6
А	Wap to understand the concept of data, labeled data, supervised	
	techniques for a machine learning application. Implementation of	
	SVM, Naïve Bayes classifier	
В	• WAP to implement unsupervised machine learning	
	algorithms such as K-means clustering	
	• KNN (k-nearest neighbors)	
	• Hierarchal clustering	
С	Create a website using Djengo framework.	
Mada af	Due sties 1/07/cue	
examination		
Weightage	$C\Delta$ $CE(Viva)$ ESE	
Distribution	25% 25% 50%	
Text book/s*	1 The Complete Reference Python Martin C Brown	
10At 000K/S	McGrwHill	
Other References	1. Introduction to computing in problem solving using Python,	
	E Balahurusamy, McGrwHill	
	2. Introduction to programming using Python, Y. Daniel	
	Liang, Pearson 2. Mastering Dython Diely Van Hetten Deelest Dubliching	
	House	
	4. Starting out with Python. Tony Gaddis. Pearson	

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	CO1. Apply the concepts of decision-making and looping structures in programming.	PO1,PO2,PO3,PO4,PO8,PO10, PSO1,PSO2
2.	CO2. Understanding Modular programming approach using methods and functions.	PO1,PO2,PO3,PO4,PO8,PO10, PSO1,PSO2
3.	CO3.Understand and Implement the use of Python lists, tuples and dictionaries.	PO1,PO2,PO3,PO4,PO8,PO10, PSO1,PSO2
4.	CO4. Incorporate object-oriented programming concept in programming.	PO1,PO2,PO3,PO4,PO5,PO8,PO10, PSO1,PSO2
5.	CO5: Creating python packages in Complex applications.	PO1,PO2,PO3,PO4,PO5,PO8,PO10, PSO1,PSO2
6.	CO6: Design real life Applications in python using Machine Learning	PO1,PO2,PO3,PO4,PO5,PO8,PO10, PSO1,PSO2,

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	-	1	1	2
CO2	3	3	3	3	-	-	-	1	-	1	1	2
CO3	3	3	3	3	-	-	-	1	-	1	1	2
CO4	3	2	3	3	2	-	-	1	-	2	2	1
CO5	3	3	3	3	2	-	-	1	-	2	2	1
CO6	3	2	3	3	2	-	-	1	-	2	2	1

PO and PSO mapping with level of strength for Course Name Application based Programming in Python Lab(BOL220)

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BOL220	Application based Programming in Python Lab	3	3	3	3	1			1		1.5	1.5	1.5

Strength of Correlation

- *1.* Addressed to *Slight (Low=1) extent2.* Addressed to *Moderate (Medium=2) extent*
- 3. Addressed to Substantial (High=3) extent

School: Department Programme:			School of Engineering & Technology							
			Computer Science & Applications							
			BSc CS	BSc CS Current Academic Year: 2023-24						
B	atch:	2023-26								
S	emester		IV							
1	Course Code	RBL002	RBL002 Course Name: Research Based Learning -2							
2	Course Title		Research B	Research Based Learning -2						
3	Credits		0							
4	Contact Hours (L-T-P)		0-0-2							
	Course Status		Compulsor	Compulsory (Audit Course)						
5	Course Objectiv	 To angn student's skill and interests with a realistic research problem or project To understand the significance of problem and its scope Students will make decisions within a framework Students will be able to: CO1: Identify and formulate problem statement with systematic approach. CO2: Develop teamwork and problem-solving skills, along with the ability to perform literature revie with others. CO3: Plan the solution of problem as per the problem statement framed. CO4: Classify and understand basic methodology for hypothesis verification and 								
			CO5: Implement the solution by using different aspects of programming language/other tools and techniques. CO6: Develop a glory of the need to engage in life-long learning.							
7	Course Descript	Course Description		the student ope, identif set of specif	s will learn ying the skill fications and	how to define the ls required for develo all subjects of that S	probler oping themester	n for developing he Research based r.		
	Mode of examination	Practical	l /Viva	*		~				
	Weight age	CA			CE (Viva)	ETE				
Distribution 25%					25%	50%				

Syllabus: Research Based Learning-2

S. No.	Course Outcome	Programme outcomes (PO)
1.	CO1: Identify and formulate problem statement with systematic approach.	PO1,PO2,PO5,PO6
2.	CO2: Develop teamwork and problem-solving skills, along with the ability to perform literature review with others.	PO2,PO3,PO4,PO8
3.	CO3: Plan the solution of problem as per the problem statement framed.	PO2,PO3,PO4
4.	CO4: Classify and understand basic methodology for hypothesis verification and validation of Research successfully.	PO3,PO4
5.	CO5: Implement the solution by using different aspects of programming language/other tools and techniques.	PO3,PO4,PO10,PSO1,PSO2
6.	CO6: Develop a glory of the need to engage in life-long learning.	PO8,PO9, PO10
PO and PSO mapping with level of strength for Course Name Research Based Learning 2		

(Course Code RBL002)		

-					(/					
Cos	Programme Outcomes(POs)												
	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PS01 PS02												
CO1	3	3	-	-	2	2	-	-	-	-	-	-	
CO2	-	3	2	3	-	-	-	2	-	-	-	-	
CO3	-	3	2	3	-	-	-	-	-	-	-	-	
CO4	-	-	2	2	-	-	-	-	-	-	-	-	
CO5	-	-	3	2	-	-	-	-	-	2	2	2	
CO6	-	-	-	-	-	-	-	3	3	3		-	

CO/PO Mapping

(1/2/3 indicates strength of correlation)

3-Strong, 2-Medium, 1-Low

TERM-V

School:		School of Engineering & Technology								
Depa	artment	Computer Science & Applications								
Prog	gramme:	BSc CS Current Academic Year: 2023-24								
Batc	ch:	2023-26								
Sem	ester	V								
1	Course Code	BCO321								
2	Course Title	Web Technologies								
3	Credits	4								
4	Contact Hours (L-T-P)	4-0-0								
	Course Status	Core/Compulsory								
5	Course Objective	To develop skills in analyzing the usability of a web and understand f and technology of web design.	undamentals of tools							
6	Course Outcomes	 CO1: Analyze a web page and identify its elements and attributes. CO2: Apply the languages HTML and CSS to develop web page. CO3: Apply HTML and CSS to design web pages. CO4: Demonstrate the concepts of PHP. CO5: Understand the working of MYSQL CO6: Design webpages using different web technologies to real worked. 	1.							
7	Course Description	This course is an overview of the modern Web technologies used for the development. The purpose of this course is to give students the basic the how things work in the Web world.	the Web understanding of							
8	Outline syllabus		CO Mapping							
	Unit 1	Introduction to web								
	А	Introduction to Web: History of Internet, WWW, Client or Browser, website, internet browsers,	CO1							
	В	HTTP Protocol: Basic features of HTTP, Working of HTTP, Request and Response, Web browser and Web servers, Features of Web 2.0	CO1							
	С	Web Design: Web site design principles, Concepts of effective web design, Web design issues, planning the site and navigation.	CO1							
	Unit 2	HTML & STYLE SHEETS								
	A	HTML: HTML: History of HTML (Hypertext Mark-up Language), Structure of HTML Document: Text Basics, Structure of HTML Document: Images and Multimedia, Links and webs, Document Layout, Creating Forms, Frames and Tables								
	В	Style sheets: Need for CSS, introduction, basic syntax and structure, using CSS, background images,	CO2, CO6							
	C Unit 3	Colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2 Java Script & DHTML	CO2, CO6							

А	Javascript: Clier Javascript, simp and repetition	tt-side scripting le Javascript, va	, what is Javascript, how to develop ariables, functions, conditions, loops	CO3, CO6					
В	Advance script, environments, fo	Javascript and orms and validation	objects, the DOM and web browser tions	CO3, CO6					
С	DHTML: Comb buttons, controll	CO3, CO6							
Unit 4	РНР								
А	PHP: - Introduc with examples	tion and basic s	syntax of PHP, decision and looping	CO4,CO6					
В	PHP and HTML	, Arrays, Funct	ions, Form processing,	CO4,CO6					
С	Advance Feature Programming w	Advance Features: Cookies and Sessions, Object Oriented Programming with PHP							
Unit 5	PHP and MyS()L:							
А	PHP and MySQ examples, Conn	CO5, CO6							
В	Creating databas	CO5, CO6							
С	listing table nar queries, deleting	nes, creating a database, dele	table, inserting data, altering tables ting data and tables	,CO5, CO6					
Mode of examination	Theory								
Weightage Distribution	CA	MTE	ЕТЕ						
Distribution	25%	25%	50%						
Text book/s*	1. HTML	1. HTML Complete Reference, BPB Publication							
Other References	1. HTML Publica	 HTML, DHTML, JavaScript, Perl, CGI, Ivan Bayross, BPB Publication. 							
	2. HTML	Complete Refe	erence, BPB Publication						
	3. Jeffrey	C. Jackson, "W	/eb Technologies: A Computer						
	Science	e Perspective",	Pearson						

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Analyze a web page and identify its elements and attributes	PO1, PO2, PO3, PO4, PO10, PSO1
2.	CO2: Apply the languages HTML and CSS to develop web page.	PO1, PO2, PO3, PO4, PO5, PO10, PSO1, PSO2
3.	CO3: Apply the Java Script and DHTML in web page.	PO1, PO2, PO3, PO4, PO5, PO10, PSO1
4	CO4: Demonstrate the concepts of PHP.	PO1, PO2, PO3, PO4, PO5, PSO1
5	CO5: Understand the working of MYSQL	PO1, PO2, PO3, PO4, PO5, PO8 PO10, PSO1
6	CO6: Design webpages using different web technologies to real world	PO1, PO2, PO3, PO4, PO5, PO7, PO9, PO10, PSO1, PSO2

Scł	nool:	School of Engineering & Technology							
De	partment	Computer Science & Applications BSc CS Current Academic Year: 2023-24							
Pro	ogramme:								
Ba	tch:	2023-26							
Ser	nester	V							
1	Course Code.	BCO225							
2	Course Title	Introduction to R							
3	Credits	4							
4	Contact Hours (L-T-P)	4-0-0							
	Course status	Compulsory							
5	Course Objectives	To familiarize the students with the basics of programming in R lits applications in data analysis.	anguage, and						
		Upon successful completion of this course, student will be able to:							
		CO1: Demonstrate R programming using Decision statements Functions. (K3)	s, Loops and						
		CO2: Apply functions to improve readability of programs. (K3)							
		CO3: Select and construct programs using different data structure	s available in						
	Course Outcomes	R. (K1, K3)	1						
		CO4: Summarize data using descriptive statistics and perform analysis $(K2, K4)$	n distribution						
		CO5: Design visualizations of data using different types of gran	ohs and plots						
		(K5)	ins and prots.						
		CO6: Estimate data using complex statistical testing. (K6)							
7	Course Description	R is a programming language and software environment for statist graphics representation and reporting. This course provides an ir the basics of programming in R, and its applications in data analys	tical analysis, atroduction to is.						
8	Outline syllabus:		CO Mapping						
	Unit 1	Introduction to R Programming, Decisions, Loops and Function							
	А	Introduction to R Programming, R-Studio Installation (GUI): F Windows Environment, Simple Math in R	CO1						
	В	Introduction to Data Types, Variables, Operators	CO1						
	C	Decision Statements R Loops R Functions	CO2						
	Unit 2	Data Structures in R	02						
	A	Introduction to Arrays Working with Strings	CO3						
	D	D to Starting (Oliver D V to Diversity)							
	D	Frame	CO3, CO2, CO6						
	С	Conversion of Data Objects: Matrix to Data frame, Data frame to Matrix, Data Frame to list, Matrix to list.	PCO3, CO2						
	UNIT 3	Descriptive Statistics							
	А	Reading Datasets, Working with different file types .txt, .csv etc., Combining Datasets	CO4						
	В	Descriptive Statistics and Tabulation: Summarizing data with R Contingency Tables	,CO4						
	С	Data Distribution Analysis: Shapiro Wilk Test, Kolmogorov Smirnov, Quantile Plots	VCO4						

Syllabus: Introduction to R

Unit 4							
A	Load data in R class intervals a	environment and plottir and unequal class interv	ng a graph, histograms (e vals), Bar Chart, Box plo	_{qual} CO5 t,			
В	Stem-leaf plot,	Scatter Plot, Line Char	t, Pie chart,	CO5, CO6			
С	Customization adding legends	of plot settings, addin	g text, saving plot to a	file,CO5,CO6			
Unit 5	Hypothesis Te	sting and Correlation	Analysis				
А	Hypothesis Tes	ting: Student t test, Ma	nn Whitney Test	CO6			
В	Correlation An procedures.	Correlation Analysis, Random number generation and sampling procedures.					
С	Complex Statis	tics: One way and two-	way ANOVA	CO6			
Mode of examination	1 Theory						
Weightage	CA	MTE	ETE				
Distribution	25%	25%	50%				
Text book/s*	1. Gardener, M Language, Wile	Gardener, M (2012): Beginning R: The Statistical Programming anguage, Wiley Publications.					
	2. Braun W J, Programming v	tical					
Other References	1. Crawley, M. Edition. Wiley. 2. Crawley, M.	J. (2015): Statistics: A J. (2012): The R Book.	In Introduction Using R, 2 nd Edition. Wiley.	, 2 nd			

S.	Course Outcome	Programme Outcomes (PO) & Programme
No.		Specific Outcomes (PSO)
1.	CO1. Demonstrate R programming	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
	using Decision statements, Loops and	
	Functions.	
2.	CO2. Apply functions to improve	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
	readability of programs	
3.	CO3. Select and construct programs	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
	using different data structures available	
	in R.	
4.	CO4. Summarize data using descriptive	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
	statistics and perform distribution	
	analysis.	
5.	CO5. Design visualizations of data	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
	using different types of graphs and	
	plots.	
6.	CO6. Estimate data using complex	PO1, PO2, PO3, PO4, PO8, PO 10, PSO1
	statistical testing.	

Course Code_ Course Name	CO' s	P 0 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PS O 1	PSO 2
BCO225 Introductio	CO1	2	1	1	2	-	-	-	2	-	-	2	-
n to R	CO2	2	2	2	2	-	-	-	2	-	-	2	-
	CO3	2	2	1	2	-	-	-	2	-	-	2	-
	CO4	2	2	2	2	-	-	-	2	-	-	2	-
	CO5	2	2	2	2	-	-	-	2	-	-	2	-
	CO6	3	3	2	2	-	-	-	2	-	-	2	-

PO and PSO mapping with level of strength for Course Name Introduction to R (Course Code $B\mathrm{CO225})$

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	P 0 6	P 0 7	P 0 8	P 0 9	P O 10	PS 0 1	PS 0 2
BCO22 5	Introduction to R Programming	2.1	2	1.7	2	-	-	-	2	-	-	2	

Strength of Correlation

1. Addressed to Slight (Low=1) extent
2. Addressed to Moderate (Medium=2) extent
3. Addressed to Substantial (High=3) extent

Scho	ool:	School of Engineering & Technology								
Depa	artment	Computer Science & Applications								
Prog	gramme:	BSc CS Current Academic Year: 2023-24								
Batc	h:	2023-26								
Sem	ester	V								
1	Course Code	200322								
2	Course Title	Software Engineering and Quality Assurance								
3	Credits	4								
4	Contact Hours (L-T-P)	4-0-0								
	Course Status	Core Course								
5	Course Objective	 The objective of this course is to provide Fundamental knowledge of software engineering. To make student aware of best software engineering practices Inculcate ability in students to work as an effective member of software engineering teams. To help students to develop skills that will enable them to dev high quality. 	r leader in elop software of							
6	Course Outcomes	 CO1: Illustrate and compare an effective software engineering process, based on knowledge of widely used development lifecycle model. CO2: Apply effective requirement elicitation techniques to develop SRS for a project. CO3: Construct design documents with the help of designing tools. CO4: Analyze testing strategies for a software system. CO5: Develop and deliver quality software as an individual or as part of a multidisciplinary team. 								
7	Course Description	This course provides knowledge of software engineering. It introduces software processes and agile methods and essential software development initial specification to system maintenance. Formalisms and tools to development are also presented, including common design patterns and Course focuses on all levels of testing.	s concepts such as ent activities, from assist in software nd UML notation.							
8	Outline syllabus		CO Mapping							
	Unit 1	Introduction to Software Engineering and Process Models								
	А	Significance, challenges and Software Myths in software engineering, Software Characteristics	CO1							
	В	Software Development Methodologies: Waterfall model, prototyping model, Incremental model, Spiral model, V model	CO1							
	С	Agility, Agile Process models: Extreme Programming (XP), Adaptive Software Development (ASD), Scrum	CO1							
	Unit 2	Requirement Engineering								
	A	Types of Requirements, Feasibility study	CO2							
	B	Requirement Engineering process, Elicitation techniques	CO2							
	С	Requirement Documentation: Document SRS according to IEEE CO2 standards, Characteristics of SRS								
	Unit 3	Software Design								
	A	Design Concepts, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design	CO3, CO6							
	В	Effective modular design: Cohesion, Coupling	CO3, CO6							
	С	UML Diagrams and Tools: Introduction to UML Diagrams, Use Case, Object and Class, Interaction diagrams: Sequence & Collaboration	CO3, CO6							
	Unit 4	Software Implementation and Testing								

A	Fundamental of limitations of test	testing: Objecti	ves, principles, myths and facts,	CO4					
В	Levels of testin techniques	ng, Acceptance	Festing and its types, Integration	CO4, CO6					
С	White Box Testi Test case designi	ng, Black Box Te ng, Debugging	esting, Verification and Validation,	CO4, CO6					
Unit 5	Maintenance &	Quality Manager	ment						
A	Introduction to D Maintenance, Co	roduction to Maintenance, Need for Maintenance, Categories of CO5, CO6 aintenance, Cost of Maintenance							
В	Quality Concepts Quality Assurance	Puality Concepts: Quality, Quality Control, Cost of Quality, Software CO5, CO6 Duality Assurance, SQA Plan							
С	Statistical Softw Quality Standard	are Quality Assu s, Capability Matu	rance: Six Sigma, The ISO 9000 Irity Model	CO5, CO6					
Mode of examination	Theory/Jury/Viva	a							
Weightage	CA	MTE	ETE						
Distribution	25%	25%	50%						
Text book/s*	1. Pressman R S McGraw Hill.	. Pressman R S, Software Engineering: A Practitioners Approach, McGraw Hill.							
Other References	 Datta S, Softw University Press, K.K. Aggrawa Age International 	vare Engineering: 2010. al and Yogesh Sin l Publication	Concepts and Applications, Oxford ngh, "Software Engineering", New						
	3. Sommerville,	lan. "Software Eng	gineering", Pearson(Latest Ed).						

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	CO1: Illustrate and compare an effective software engineering process, based on knowledge of widely used development lifecycle model	PO1,PO3,PO8,PO9,PO10,PSO1,PSO2
2.	CO2: Apply effective requirement elicitation techniques to develop SRS for a project	PO1,PO2,PO3,PO4,PO5,PO8,PO9,PO10, PSO1,PSO2
3.	CO3: Construct design documents with the help of designing tools	PO1,PO2,PO3,PO4,PO5, PO8,PO9,PO10, PSO1,PSO2
4.	CO4:Analyze testing strategies for a software system	PO1,PO2,PO4,PO5,PO6,PO7,PO8,PO9,PO10, PSO1,PSO2
5.	CO5: Develop and deliver quality software as an individual or as part of a multidisciplinary team.	PO1,PO2,PO3,PO4,PO5, PO6,PO7, PO8,PO9,PO10, PSO1,PSO2
6.	CO6: Adapt techniques and tools necessary for software engineering practices	PO1,PO4,PO5,PO8,PO9,PO10, PSO2

PO and PSO mapping with level of strength for Course Name Software Engineering and Quality Assurance (Course Code BCO322)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
	CO1	3	-	2	-	-	-	-	1	2	3	1	2
BCO322	CO2	3	3	2	3	3	-	-	1	2	3	2	3
Software Engineering and	CO3	3	2	3	3	3	-	-	1	2	3	2	3
Quality Assurance	CO4	3	1	-	1	3	2	2	2	3	3	1	3
	CO5	3	1	3	3	3	3	3	2	3	3	1	3
	CO6	2	-	-	1	3	-	-	1	2	2	-	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BCO322	Software Engineering and Quality Assurance	2.8	1.75	2.5	2.2	3	2.5	2.5	1.3	2.3	2.8	1.4	0

Strength of Correlation

- 1. Addressed to Slight (Low=1) extent
- 2. Addressed to Moderate (Medium=2) extent
- 3. Addressed to Substantial (High=3) extent

Syllabus: Research Methodlogy

School:		School of Engineering & Technology							
Dep	artment	Computer Science & Applications							
Pro	gramme:	BSc CS Current Academic Year: 2023-24							
Bat	ch:	2023-26							
Sem	nester	V							
1	Course Code	BRM002							
2	Course Title	Research Methodology							
3	Credits	3							
4	Contact Hours (L-T-P)	-0-0							
	Course Status	Compulsory							
5	Course Objective	The primary objective of this course is to develop a research orientati scholars and to acquaint them with fundamentals of research methods course aims at introducing them to the basic concepts used in research social research methods and their approach. It includes discussions or techniques, research designs and techniques of analysis.	on among the . Specifically, the n and to scientific n sampling						
6	Course Outcomes Course Outcomes CO2: Formulate hypotheses or suggested solutions CO3: Categorize various sources of research design, information for literature rev data collection CO4: Discuss the different sampling techniques CO5: Escalate the components of scholarly writing and evaluate its quality								
7	Course Description	Research Methodology is a hands-on course designed to impart educa foundational methods and techniques of academic research in social s management context. Research scholars would examine and be practi main components of a research framework i.e., problem definition, re collection, ethical issues in research, report writing, and presentation.	tion in the ciences and business cally exposed to the search design, data						
8	Outline syllabus		CO Mapping						
	Unit 1	Introduction to Research							
	А	Meaning of Re-search, Retracing the path, Importance of re-search.	CO1						
	В	Philosophies, and the language of research theory building Theoretical background of a research philosophy	CO1						
		The meaning of methodology (structured definition and examples)							
	С	Understanding research terminologies i.e., Concepts, Constructs, Variables, and Definitions etc.	CO1						
	Unit 2	Problems and Hypotheses							
	А	Identifying research problem, State-of-the-Art, The problem definition lifecycle	CO1, CO2						

В	Meaning/Definit	tion of a hypoth	esis. Real world examples.	CO1, CO2				
С	Testing and Ver	ification of Hyp	oothesis.	CO1, CO2				
Unit 3	Research desig	n						
A	Experimental an	d Non-experim	ental research design	CO1, CO3				
В	Field research, S	Survey Research	a, Survey outcomes	CO1, CO3				
С	Methods of data qualitative meth collection	collection – Se ods of data colle	condary data collection methods, ection, and Survey methods of data	CO1, CO3				
Unit 4	Sampling Tech	niques						
A	Research Popula Population	Research Population and Sample. Target Population, Accessible						
В	Sampling techni design	ampling techniques – The nature of sampling, Probability sampling esign						
С	Nonprobability s	CO1, CO4, CO5						
Unit 5	Data Analysis &	Data Analysis & Report Generation						
A	Types of Data S	ources, Web Da	ata, Survey Data	CO1, CO3, CO6				
В	Data attributes, 1 Mean, Median, 1 Range	Discrete vs Con Mode; Range, Q	tinuous Data attributes Quartile, Variance, SD, Interquartile	CO1, CO3, CO6				
С	Report generation Abstract, Introdu References, and	on, report writin uction, Methodo Appendices	g, and APA format – Title page, ology, Results, Discussion,	CO1, CO3, CO6				
Mode of examination	Theory							
Weightage	СА	CE(Viva)	ESE					
Distribution	25%	25%	50%					
Text book/s*	 Bryman Method Kerling Behavid Rubin, Method 	 Bryman, Alan & Bell, Emma (2011). Business Research Methods (Third Edition), Oxford University Press. Kerlinger, F.N., & Lee, H.B. (2000). Foundations of Behavioural Research (Fourth Edition), Harcourt Inc. Rubin, Allen & Babbie, Earl (2009). Essential Research Methods for Social Work, Cengage Learning Inc., USA. 						
Other References	1. Chawla methodolog Ltd. Delhi.	 Chawla, Deepak & Sondhi, Neena (2011). Research methodology: Concepts and cases, Vikas Publishing House Pvt. Ltd. Delhi. 						

	2. Pawar, B.S. (2009). Theory building for hypothesis specification in organizational studies, Response Books, New Delhi.	
	3. Neuman, W.L. (2008). Social research methods: Qualitative and quantitative approaches, Pearson Education.	

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Understand the basic framework of research process	PO1, PO2, PO3, PO4, PO9, PO10, PSO1, PSO2
2.	CO2: Formulate hypotheses or suggested solutions	PO1, PO2, PO3, PO4, PO6, PSO1, PSO2
3.	CO3: Categorize various sources of research design, information for literature review and data collection	PO1, PO3, PO4, PO5, PO7, PO8, PO10, PSO1, PSO2
4	CO4: Discuss the different sampling techniques	PO1, PO2, PO3, PO4, PO6, PO9, PSO1, PSO2
5	CO5: Escalate the components of scholarly writing and evaluate its quality	PO1, PO3, PO4, PO5, PO7, PO8, PO9, PO10, PSO1, PSO2
6	CO6: Conduct disciplined research under supervision in an area of their choosing	PO1, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PSO1, PSO2

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	2	2	2	-	-	-	-	2	2	2	3
CO2	2	3	3	3	-	2	-	-	-	-	3	3
CO3	2	2	-	2	2	-	2	2	-	2	2	2
CO4	3	3	3	3	-	3	-	-	3	-	3	3
CO5	2	-	3	2	3	-	3	3	2	3	3	2
CO6	3	-	-	3	2	2	2	2	2	2	2	3

PO and PSO mapping with level of strength for Course Name Research Methodology (Course Code BRM002)

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BRM002	Research Methodology	2.5	2.5	2.75	2.5	2.3	2.3	2.3	2.3	2.25	2.25	2.5	2.7

Strength of Correlation: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Syllabus: Web Technology Lab

School:		School of Engineering & Technology								
Depa	artment	Computer Science & Applications								
Prog	ramme:	BSc CS Current Academic Year: 2023-24								
Batc	h:	2023-26								
Sem	ester	V								
1	Course Code	BOL321								
2	Course Title	Web Technology Lab								
3	Credits	1								
4	Contact Hours (L-T-P)	-T-P) 0-0-2								
	Course Status	Core/Compulsory								
5	Course Objective	The objective of this course is to provide a foundation of technologies and techn in web development. Based upon the development of a web, this course provid insight of computer and networking technologies, and hands on experience in w programming.								
6	Course Outcomes	CO1: Understand the basic concepts of HTML. CO2: Design the web page using CSS CO3: Apply java script to validate the different fields of the web pages. CO4: Implement the basic construct, arrays, and session using PHP. CO5: Demonstrate to build a connection with database and perform the basic operat of DBMS. CO6: Develop a website using html, CSS, JavaScript and MYSOL								
7	Course Description	This course is an overview of the modern web technologies used for t development. The purpose of this course is to give students the basic how things work in the Web world from the technology point of view the basic overview of the different technologies.	he Web understanding of as well as to give							
8	Outline syllabus		CO Mapping							
	Unit 1	Introduction								
	А	Introduction to various HTML Tags.	CO1							
	В	Write a program to display list of items in different styles.	CO1							
	С	Write an HTML program to design an entry form of student details.	CO1							
	Unit 2	CSS								
	A	Create Style sheet to set formatting for text tags and embed that style sheet on web pages created for your site.	CO2							
	В	Develop and demonstrate the usage of inline, internal and external style sheet using CSS	CO2							

С	Write an HTML countries. When printed next in the font of the capita	page that cont the user select ne list. Add CS al (color, bold a	ains a selection box with a list of 5 s a country, its capital should be S to customize the properties of the and font size).	CO2			
Unit 3	Java Script						
A	Design signup fo numbers etc. usi	orm to validate ng Java script.	username, password, and phone	CO3			
В	Write a <mark>JavaScri</mark> Celsius, Fahrenh	Vrite a JavaScript program to convert temperatures to and from Celsius, Fahrenheit.					
С	Write a JavaScri numbers from 0 resulting values	pt that calculat to 10 and outp in an HTML ta	es the squares and cubes of the uts HTML text that displays the ble format.	CO3			
Unit 4	РНР						
A	Implement the b	CO4					
В	Write programs	CO4					
С	Implement the a	mplement the advanced features of PHP like, Cookies and Sessions					
Unit 5	MYSQL						
A	Create the datab Perform basic D	ase-on-databas DL operation o	e server like MYSQL, Orcale. on it.	CO5			
В	Perform the basi	c operation lik	e Insert, update, delete and select	CO5, CO6			
С	Write an HTML and send it to sto	CO6					
Mode of examination	Practical/Viva						
Weightage Distribution	СА	CE(Viva)	ESE				
Distribution	25%	25%	50%				
Text book/s*	1. HTML 2. Learnir JavaScr Robbin	 HTML and CSS: Design and build websites, by Jon Duckett Learning Web Design: A beginner's guide to HTML, CSS, JavaScript, and Web Graphics, By Jennifer Niederst Robbins 					
Other References							

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Understand the basic concepts of HTML.	PO1, PO2, PO3, PO5, PO10, PSO1, PSO2
2.	CO2: Design the web page using CSS	PO1, PO2, PO3, PO4, PO9, PO10, PSO1, PSO2
3.	CO3: Apply java script to validate the different fields of the web pages.	PO1, PO2, PO3, PO5, PO6, PO8, PSO1, PSO2
4	CO4: Implement the basic construct, arrays, and session using PHP.	PO1, PO2, PO3, PO4, PO6, PO8 PO10, PSO1, PSO2
5	CO5: Demonstrate to build a connection with database and perform the basic operations of DBMS.	PO1, PO2, PO3, PO4, PO7, PO9, PSO1, PSO2
6	CO6: Develop a website using html, CSS, JavaScript and MYSQL	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name Web Technology Lab (Course Code BOL321)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	2	3	-	2	-	-	-	-	2	3	3
CO2	2	3	3	3	-	-	-	-	2	2	3	3
CO3	2	3	3	-	3	2	-	2	-	-	3	3
CO4	3	2	3	2	-	2	-	2	-	2	3	2
CO5	2	3	3	3	-	-	2	-	2	-	2	3
CO6	2	3	3	3	2	3	3	2	3	3	3	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BOL321	Web Technology Lab	2.2	2.7	3	2.75	2.3	2.3	2.5	2	2.3	2.25	2.8	2.8

Strength of Correlation: 1-Slight (Low) 2-Moderate (Medium)

3-Substantial (High)

Sch	ool:	School of Engineering & Technology								
Dep	artment	Computer Science & Applications								
Pro	gramme:	BSc CS Current Academic Year: 2023-24								
Bat	ch:	2023-26								
Sem	nester	V								
1	Course Code.	BOL225								
2	Course Title	Introduction to R Lab								
3	Credits	1								
4	Contact Hours (L-T-P)	0-0-2								
	Course status	Compulsory								
5	Course Objectives	To familiarize the students with the basics of programming i its applications in data analysis.	n R language, and							
	Course Outcomes	Upon successful completion of this course, student will be ab CO1: Demonstrate R programming using Decision statem Functions. (K3) CO2: Apply functions to improve readability of programs. (K CO3: Select and construct programs using different data strue R. (K1, K3) CO4: Summarize data using descriptive statistics and per analysis. (K2, K4) CO5: Design visualizations of data using different types of (K5) CO6: Estimate data using complex statistical testing. (K6)	le to: nents, Loops and 3) ctures available in rform distribution graphs and plots.							
7	Course Description	R is a programming language and software environment for s graphics representation and reporting. This course provides the basics of programming in R, and its applications in data as	statistical analysis, an introduction to nalysis.							
8	Outline syllabus:		CO Mapping							
	Unit 1	Introduction to R Programming, Decisions, Loops and Fu								
	A	 P1. Write a R Program to make simple calculate. P2. Write a R program to demonstrate the usage of different types of operators. P3. Write a R program to find whether a given year is leap year or not. P4. Write a R program to calculate factorial of a given number. 	CO1, CO2							
	Unit 2	Data Structures in R								
	A	P5. Write R programs to create vector using c, rep, paste and seq functions.P6. Write a R program to find transpose of a given matrix.P7. Write R programs to create and manipulate data frames.	CO3, CO2, CO6							
	UNIT 3	Descriptive Statistics								
	A	 P8. Write a R Program to print summary statistics of a given dataset. P9. Write a R Program to perform Shapiro Wilk Test, Kolmogorov Smirnov test. P10. Write a R program to plot quantile quantile plots. 	CO4							
	Unit 4	Data Visualization in R								
	A	P11. Write R programs to create bar chart, histogram, pie chart, scatter plot, line chart, stem leaf plot.	CO5, CO6							

Unit 5	Hypothesis Testing and	pothesis Testing and Correlation Analysis									
А	P12. Write R programs to implement Student t and Mann Whitney Test.										
	P13. Write a R program given dataset.	to perform correlation	on analysis of a								
	P14. Write a R program	to implement ANOV	A technique.								
Mode of examination	Theory										
Weightage	CA										
Distribution	25%	25%	50%								
Text book/s*	1. Gardener, M (2012) Programming Language,	Beginning R: Wiley Publications.	The Statistical								
	2. Braun W J, Murdoch Statistical Programming v New York										
Other References 1. Crawley, M.J. (2015): Statistics: An Introduction Using R, 2 nd Edition. Wiley.											
	2. Crawley, M.J. (2012):	The R Book, 2 nd Edi	tion. Wiley.								

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific
		Outcomes (PSO)
1.	CO1. Demonstrate R programming using	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
	Decision statements, Loops and Functions.	
2.	CO2. Apply functions to improve readability of programs	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
3.	CO3. Select and construct programs using different data structures available in R.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
4.	CO4. Summarize data using descriptive statistics and perform distribution analysis.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
5.	CO5. Design visualizations of data using different types of graphs and plots.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
6.	CO6. Estimate data using complex statistical testing.	PO1, PO2, PO3, PO4, PO8, PO 10, PSO1

Course Code_ Course Name	CO' s	P 0 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PS O 1	PSO 2
BOL225 Introductio	CO1	2	1	1	2				2			2	
n to R Lab	CO2	2	2	2	2				2			2	
	CO3	2	2	1	2				2			2	
	CO4	2	2	2	2				2			2	
	CO5	2	2	2	2				2			2	
	CO6	3	3	2	2				2			2	

PO and PSO mapping with level of strength for Course Name Introduction to R Lab (Course Code: BOL225)

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	P 0 2	P 0 3	P 0 4	P O 5	P O 6	P 0 7	P 0 8	P 0 9	P O 10	PS O 1	PS O 2
BOL22 5	Introduction to R lab	2.1	2	1. 7	2	-	-	-	2	-	•	2	

Strength of Correlation

- 1. Addressed to *Slight (Low=1) extent*
- 2. Addressed to *Moderate* (*Medium=2*) extent
- 3. Addressed to Substantial (High=3) extent

S	llahus	Research	Rased	Learning_3
o j	manus.	Neseal CII	Daseu	Lear mig-5

S	chool:		School of En	gineering	& Technolo	gy							
D	epartment		Computer So	cience & A	pplications								
P	rogramme:		BSc CS Curi	rent Acade	mic Year: 2	2023-24							
B	atch:		2023-26										
S	emester		V										
1	Course Code		RBL003 Cor	urse Name: I	Research Based	Learning -	3						
2	Course Title		Research Based Learning -3										
3	Credits		2										
4	Contact Hours (L-T-P)		0-0-4										
	Course Status		Compulsory										
5	Course Objectiv	e	 To align stud To understar Students will 	lent's skill an nd the signific l make decisi	d interests with ance of proble ons within a fra	n a realistic j m and its sco amework.	problem or Research. ope.						
6	Course Outcome	28	Students will be able to: CO1: Identify and formulate problem statement. CO2: Design a Hypothesis. CO3: Develop the solution by using different aspects of Research Methodology. CO4: Classify and understand various tools and techniques for verification and validation of Research. CO5: Analyze and make use of modern methods for solving real word problems. CO6: Develop teamwork and need to engage in life-long learning, along with										
7	Course Descript	ion	In RBL, the stud Research, and De using software er economic concern	In RBL, the students will learn how to define the problem for developing Research, and Design applicable solutions in one or more application domain using software engineering approaches that integrate ethical, social, legal and economic concerns									
8	Outline syllabus						CO Mapping						
	Unit 1	Identify and f	ormulate problem	statement and	l Design a Hyp	othesis.	C01,C04						
	Unit 2	Problem Defi	nition and identific	cation.	<u> </u>		CO2,CO6						
	Unit 3	Team/Group problem state	formation and ment, resource req	Research As uirement.	ssignment. Fi	nalizing the	eCO3						
	Unit 4	Design; impl research tool	ement Research v	work in any	programming	language of	rCO4,CO5						
	Unit 5	Use of variou validation of	s test tools and teo Research	chniques for 1	Hypothesis ver	ification and	ICO6						
	Mode of examination	Practical /Viv	a										
	Weight age Distribution			1									
		CA		CE(Viva)	ETE								
1		25%		25%	50%								

S. No.	Course Outcome	Programme outcomes (PO) and Programme Specific Outcome(PSO)
1.	CO1: Identify and formulate problem statement.	PO1, PO2, PO4,PO6, PO8,PO9, PO10, PSO1,PSO2,PSO3
2.	CO2: Design a Hypothesis.	PO1, PO2, PO3,PO4,PO5, PO7, PO8, PO9, PSO1,PSO2,PSO3
3.	CO3: Develop the solution by using different aspects of Research Methodology.	PO1, PO2, PO3,PO4,PO5, PO6, PO8, PO9, PSO1,PSO2
4.	CO4: Classify and understand various tools and techniques for verification and validation of Research.	PO1, PO2, PO3,PO4,PO5, PO8,PO9, PO10, PSO1,PSO2,PSO3
5.	CO5: Analyze and make use of modern methods for solving real word problems.	PO1, PO2, PO5, PO6, PO7, PO8, PO9, PO12 PSO1,PSO2
6.	CO6: Develop teamwork and need to engage in life-long learning, along with the ability to communicate effectively with others.	PO2, PO4, PO8,PO9, PO10, PO11, PO12,PSO1,PSO3

						Progra	amme O	utcom	es (POs)					
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
3	3	-	2	-	1	-	1	2	-	2	1	2	2	3
3	2	2	2	2	-	-	1	2	-	2	1	2	1	1
3	2	2	2	2	3	-	1	2	-	2	1	2	2	-
3	3	2	2	3	-	-	1	2	-	-	1	2	2	2
3	2	-	-	3	-	-	1	2	-	-	1	2	2	-
	1	-	1	-	-	-	2	2	3	3	3	1	-	1
3	2.2	1	15	17	0.7	0	12	2	1	0	,	1 2	1 5	12
	PO1 3 3 3 3 3 3 3	PO1 PO2 3 3 3 2 3 2 3 2 3 2 3 2 1 1 3 2.2	PO1 PO2 PO3 3 3 - 3 2 2 3 2 2 3 2 2 3 2 - 3 2 - 3 2 - 3 2 - 3 2 - 3 2.2 1	PO1 PO2 PO3 PO4 3 3 - 2 3 2 2 2 3 2 2 2 3 2 2 2 3 2 2 2 3 2 - - 1 - 1 - 3 2.2 1 1.5	PO1 PO2 PO3 PO4 PO5 3 3 - 2 - 3 2 2 2 2 3 2 2 2 2 3 2 2 2 3 3 2 2 2 3 3 2 - - 3 3 2 - - 3 3 2 - 1 - 3 2.2 1 1.5 1.7	PO1 PO2 PO3 PO4 PO5 PO6 3 3 - 2 - 1 3 2 2 2 2 - 3 2 2 2 2 3 3 3 2 2 2 3 3 3 2 - 3 - 3 2 - - 3 - 3 2 - - 3 - 3 2 - - - - 3 2 - - - - 3 2 - 1 - - 3 2.2 1 1.5 1.7 0.7	Progra PO1 PO2 PO3 PO4 PO5 PO6 PO7 3 3 - 2 - 1 - 3 2 2 2 - - - 3 2 2 2 3 - - 3 2 2 2 3 - - 3 2 2 2 3 - - 3 3 2 2 3 - - 3 2 - - 3 - - 3 2 - - 3 - - 3 2 - 1 - - - 3 2.2 1 1.5 1.7 0.7 0	Programme O PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 3 3 - 2 - 1 - 1 3 2 2 2 - 1 - 1 3 2 2 2 2 - 1 1 3 2 2 2 3 - 1 1 3 3 2 2 3 - 1 1 3 3 2 2 3 - 1 1 3 3 2 2 3 - 1 1 3 2 - - 3 - 1 1 3 2.2 1 1.5 1.7 0.7 0 1.2	Programme Utcome PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 3 3 - 2 - 1 - 1 2 3 3 - 2 2 - 1 2 3 2 2 2 2 - 1 2 3 2 2 2 3 - 1 2 3 3 2 2 3 - 1 2 3 3 2 2 3 - 1 2 3 2 - - 3 - 1 2 3 2 - - 3 - 1 2 3 2.2 1 1.5 1.7 0.7 0 1.2 2	Programme Utcome (POs) PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 3 3 - 2 - 1 - 1 2 - 3 3 - 2 2 - 1 2 - 3 2 2 2 2 - 1 2 - 3 2 2 2 3 - 1 2 - 3 2 2 3 - 1 2 - 3 3 2 2 3 - 1 2 - 3 3 2 2 3 - 1 2 - 3 2 - - 3 - 1 2 - 3 2 - - 3 - 1 2 - 3 2.2 1 - - - 2 2 3 3 <	Processes PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 3 3 - 2 - 1 - 1 2 - 2 3 3 - 2 2 - 11 2 - 2 3 2 2 2 2 - 1 2 - 2 3 2 2 2 3 - 1 2 - 2 3 3 2 2 3 - 1 2 - 2 3 3 2 2 3 - 1 2 - 2 3 3 2 2 3 - 1 2 - - 3 2 - - 3 - 1 2 3 3 3 2.2 1 1.5 1.7 0.7 0 1.2 2 1 2	Programme Outcomes (POs) PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 3 3 - 2 - 1 - 1 2 - 2 1 3 2 2 2 2 - 1 2 - 2 1 3 2 2 2 2 - 1 2 - 2 1 3 2 2 2 3 - 1 2 - 2 1 3 2 2 2 3 - 1 2 - 2 1 3 3 2 2 3 - - 1 2 - 1 1 3 2 - 3 - - 1 2 - 1 1 3 2.2 1 1.5 1.7 0.7 0 1.2 2 1 2 1 2 <td>Processes PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 3 3 - 2 - 1 - 1 2 - 2 1 2 3 3 - 2 2 - 1 2 - 2 1 2 3 2 2 2 2 - 1 2 - 2 1 2 3 2 2 2 - - 1 2 - 2 1 2 3 2 2 2 3 - 1 2 - 2 1 2 3 3 2 2 3 - - 1 2 - 1 2 3 2 - - 3 - - 1 2 - 1 2 3 2 - 1 - - 2</td> <td>Programme Outcomes (POs) PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS01 PS02 3 3 - 2 - 1 - 1 2 - 2 1 2 2 3 3 - 2 2 - 1 1 2 - 2 1 2 2 3 2 2 2 - - 1 2 - 2 1 2 2 1 2 2 1 2 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 2 1 1 2 2 1 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 2 2 1 2 <t< td=""></t<></td>	Processes PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 3 3 - 2 - 1 - 1 2 - 2 1 2 3 3 - 2 2 - 1 2 - 2 1 2 3 2 2 2 2 - 1 2 - 2 1 2 3 2 2 2 - - 1 2 - 2 1 2 3 2 2 2 3 - 1 2 - 2 1 2 3 3 2 2 3 - - 1 2 - 1 2 3 2 - - 3 - - 1 2 - 1 2 3 2 - 1 - - 2	Programme Outcomes (POs) PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS01 PS02 3 3 - 2 - 1 - 1 2 - 2 1 2 2 3 3 - 2 2 - 1 1 2 - 2 1 2 2 3 2 2 2 - - 1 2 - 2 1 2 2 1 2 2 1 2 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 2 1 1 2 2 1 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 2 2 1 2 <t< td=""></t<>

PO and PSO mapping with level of strength for Course Name Research Based Learning -3 (Course Code RBL003)

CO/PO Mapping

(1/2/3 indicates strength of correlation)

3-Strong, 2-Medium, 1-Low

Sch	ool:	School of Engineering & Technology										
Dep	artment	Computer Science & Applications										
Pro	gramme:	BSc CS Current Academic Year: 2023-24										
Bat	ch:	2023-26										
Sen	nester	V										
1	Course Code	INC003										
2	Course Title	Industry connect										
3	Credits	1										
4	Contact Hours (L-T-P))-0-2										
	Course Status											
5	Course Objective	 Experience the activities and functions of business professionals. Develop and refine oral and written communication skills. Identify areas for future knowledge and skill development. 										
6	Course Outcomes	 Students will be able to: CO1. Integrate the concepts and strategies of academic study in a real time environment CO2. Identify, formulate and model problems and find engineering solution based on systems approach. CO3. Develop teamwork and apply prior acquired knowledge in problem solving. CO4. Develop communication, interpersonal and other critical skills required for caree growth. CO5. Practice engineer's responsibilities, self-understanding, self-discipline and ethica standards. CO6. Explore career alternatives prior to graduation. 										
7	Course	The opportunity to explore potential career paths while putting classroom knowledg										
	Description	and abilities into practise in a professional context is provided by an internship. Student also have the chance to network professionally and have a better understanding of what they still need to study thanks to the experience.										
8	Outline syllabus	CO Mapping										
	Unit 1	Establish the internship's goals and requirements and make CO1,CO2 sure students understand how they relate to their University study plan.										
	Unit 2	Definition and identification of the problem, creation of CO2 teams and groups, and project assignment. completing the problem definition and, if necessary, the resource requirements.										
	Unit 3	The work plan for the internship is created by encouraging teamwork and using previously learned problem-solving skills.										
	Unit 4	Execute the project with the team and demonstrate it. the CO4 intern's final report and assessment form must be submitted.										
	Unit 5	Final evaluation form completed by the supervisor at the CO5,CO6 Host Organization and final presentation before departmental committee.										
	Mode of examination	Practical										
	Weightage	CA MTE ETE										
	Distribution	25% 25% 50%										
	Text book/s*	1. Scrum: The Art of Doing Twice the Work in Half the Time by Jeff Sutherlan and J.J. Sutherland										

Other References	1.	A Guide to the Project Management Body of Knowledge by Project
		Management Institute
	2.	Project Management for The Unofficial Project Manager by Kory Kogon,
		Suzette Blakemore, & James Wood
	3.	Project Management Absolute Beginner's Guide by Gregory M. Horine

S. No	Course Outcome	Programme outcomes (PO) and Programme Specific Outcome(PSO)
1.	CO1. Integrate the concepts and strategies of academic study in a real time environment.	PO1,PO2,PO4,PO5,PO7,PO8,PO9,PSO1,PSO2
2.	CO2. Identify, formulate and model problems and fi engineering solution based on a systems approach.	PO1,PO2,PO3,PO4,PO5,PO7,PO8,PO9, PSO1,PSC
3.	CO3. Develop teamwork and apply prior acquir knowledge in problem solving.	PO1,PO3,PO4,PO5, PO8,PO9, PSO1,PSO2
4.	CO4. Develop communication, interpersonal and other critical skills required for career growth.	PO8,PO10
5.	CO5. Practice engineer's responsibilities, self- understanding, self-discipline and ethical standards.	PO6,PO8
6.	CO6. Explore career alternatives prior to graduation.	PSO1,PSO2

Cos	Programme Qutcomes(PQs)											
03	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	2	-	3	2	-	1	1	1	-	1	2
CO2	1	2	1	2	2	-	1	1	1	-	1	2
CO3	2	-	2	2	2	-	-	1	3	-	1	2
CO4	-	-	-	-	-	-	-	1	-	3	-	-
CO5	-	-	-	-	-	2	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	2	2

PO and PSO mapping with level of strength for Course Name Industry connect

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
INC003	Industry connect	1.6	2	1.5	2.3	2	2.0	1	1.4	1.7	3	1.25	2

Strength of Correlation: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

TERM-VI

5	Syllabus: Dot Net Framework using C#								
School:		School of Engineering & Technology							
Department		Computer Science & Applications							
Programme:		BSc CS Current Academic Year: 2023-24							
Ba	itch:	2023-26							
Semester		VI							
1	Course	BCO606							
	Code								
2	Course	Dot Net framework u	sing C#						
	Title								
3	Credits	3	3						
4 Contact		3-0-1							
	Hours								
	(L-T-P)								
	Course	Program Elective 3							
	Status								

5	Course	Understand the fundamentals of object-oriented concept in C#, defining classes, object	s, invoking								
	Objective	methods inheritance, interfaces and exception handling mechanisms. To develop skills in anal									
		the usability of a web and understand the fundamentals of ASP.NET with ADO.NET.									
6	Course	After successfully completion of this course students will be able to:									
	Outcomes	CO1: Uunderstand the philosophy and architecture of .NET Framework.									
		CO2: Describe the fundamental of C# programming language and learn how to build object									
		oriented applications using C#.									
		CO3: Explain the concept of Namespace system, multithreading and exception handling.									
		CO4: Implement the ASP.Net web controls in web form.									
		CO5: Apply the validation controls and ADO.NET.									
		CO6: Develop real world problems using C# & ASP.NET.									
7	Course	Basic Object-Oriented Programming (OOP) concepts, including objects, classes,	, methods,								
	Description	parameter passing, information hiding, inheritance and polymorphism are introduced	and their								
		implementations using C# are discussed. ASP.NET and ADO.NET are discussed to	give basic								
		understanding and its implementation to design the web pages.									
8	Outline syllab	us	CO								
			Mapping								
	Unit 1	Introduction to .Net framework & components									
	А	Introduction, The Origin of .Net Technology, Common Language Runtime (CLR),	CO1,								
			CO2								
	В	Common Type System (CTS), Common Language Specification (CLS), Microsoft	CO1,								
		Intermediate Language (MSIL),	CO2								
	С	Just-In – Time Compilation, Framework Base Classes, Assemblies and its types	CO1,								
			CO2								
	Unit 2	Introduction to C# with class and object									
	А	Introduction, Data Types, Identifiers, Variables, Constants, Literals, Type conversion,	CO1,								
		Array and Strings,	CO2								
	В	Object and Classes, Abstraction, Encapsulations & Data hiding, Inheritance									
	С	Polymorphism, Operator Overloading, Interfaces, Delegates and Events.									
	Unit 3	Namespace-System, Multi-threading and Exception handling									
	А	Namespace- System, Access Modifiers: Public, Private, Protected, Internal and									
		Protected Internal	CO6								
	В	Introduction to Multi-Threading: creating thread using Thread class, Thread life cycle,									
		sleep, join, abort and Thread priority									
	С	Managing Console, I/O Operations, Input-Output in C#, Error Handling: try, catch,	CO3,								
		throw and throws, Checked and Unchecked exceptions, User define exception	CO6								
	Unit 4	ASP.NET Controls									
	А	ASP.NET Web Controls: ASP.Net Life cycle, Differentiate Client side and Server-side	CO4,								
		controls.	CO6								
	В	Label, Textbox, Button Controls, Drop-down list, List box,	CO4,								
			CO6								
	C	Radio Button list, Check box list, File Upload, Data Grid, Grid View	СОЗ,								
		-									
	Unit 5	ASP.NET validation controls & ADO.NET									
	А	ASP.NET Validation: Compare Validator, Range Validator, Regular Expression	CO5,								
		Validator, Required Field Validator, Validation Summary									
	В	ADO.Net: Introduction to ADO.Net. Architecture ADO.NET, Data Set, Data Table,									
	С	Data Row, Data Adapter, Data Reader, DB Command and DB Connection Objects									
<u> </u>											
	Mode of	Theory									
<u> </u>	examination										
	Weightage	CA MTE ETE									
	Distribution	25% 25% 50%									
	Text										
	book/s*	1 Balagurusamy," Programming with C#", (TMH)									
		2 Shibi Parikkar, "C# with .Net Frame Work", Firewall									
	3	Media.ASP.NET: The Complete Reference:Matthew Macdonald									
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Reference Books	1 2	Mark Michaelis, "Essential C# 3.0: For .NET Framework 4.5, 2/e, Pearson Education Fergal Grimes," Microsoft .Net for Programmers". (SPI)									

Sl. No.	Course Outcome (CO)	Programme Outcome(PO) and Programme Specific Outcome(PSO)
1.	CO1: Uunderstand the philosophy and architecture of .NET Framework.	PO1, PO2
2.	CO2: Describe the fundamental of C# programming language and learn how to build object-oriented applications using C#.	PO1, PO2, PO4
3.	CO3: Explain the concept of Namespace system, multithreading and exception handling.	P01, PO2, PO3, PO4, PO10, PSO1
4.	CO4: Implement the ASP.Net web controls in web form.	PO1, PO2, PO3, PO10
5.	CO5: Apply the validation controls and ADO.NET.	PO2, PO3, PO4, PO10
6.	CO6: Develop real world problems using C# & ASP.NET.	PO1, PO2, PO3, PO4, PO5, PO6, PO8, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name Dot Net framework using C# (BCO606)

Course	~~.	PO	PO	PO	PO4	РО	PO	РО	PO	PO	PO	PSO	PSO
Code_ Course Name	CO's	1	2	3		5	6	7	8	9	10	1	2
DCO606	CO1	3	2								2		
BC0000	COI	3	4	-	-	-	-	-	-	-	4	-	-
Dot Net	CO2	2	3	-	2	-	-	-	-	-	-	-	-
framework	CO3	2	3	2	3	-	-	-	-	-	2	2	-
using C#	CO4	2	3	2	-	-	-	-	-	-	2	-	-
	CO5	-	2	2	3	-	-	-	-	-	2	2	1
	CO6	2	3	2	3	3	2	-	2	-	2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	P 0 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BCO6 06	Dot Net framework using C#	2 2	2.6 7	2	2.7 5	3	2	0	2	0	2	2	1.5

Syllabus: Machine Learning

School: School of Engineering & Technology							
De	epartment	Computer Science & Applications					
Pr	ngramme.	BSc CS Current Academic Vear: 2023-24					
R	ogrunne.	2023-26					
Da So	mostor	2025-20 VI					
<u>5</u> e	Course Code	VI DCO260 Course Name: Machine Learning					
1	Course Code	BC0368 Course Name: Machine Learning					
2	Course Title	Machine Learning					
3	Credits	4					
4	Contact Hours	4-0-0					
	(L-I-P)	Compulsory					
5	Course	The objective of the course is to introduce basic fundamental c	oncepts in Artificial				
5	Objective	Intelligence (AI) with a practical approach in understanding the	em. To visualize the scope				
	Objective	of AI and its role in futuristic development.	iem. To visualize the scope				
6	Course	Students will be able to:					
0	Outcomes	CO1: Compare AI and non-AI solutions. Basics of machine le	arning and differentiation				
		with AI	C				
		CO2: To Apply machine learning on labelled and unlabelled d	ata.				
		CO3: To explore the concept of machine learning for various problem solving in AI					
		CO4: Classify supervised and unsupervised learning and know	ledge representation and				
		introduction to fuzzy logic					
		CO5: Learning extension in the form of deep learning concepts.					
	~	CU6: Practical implementation on various types of data of Machine Leaning algorithms					
7	Course	This course introduces basic aspects of Artificial intelligence	and how the concept of Al				
	Description	can be extended in the sub domain of machine learning with ov	erall coverage starting from				
0	Outline gullebus	supervised learning, unsupervised learning up to deep learning	CO Manning				
0	Unit 1	INTRODUCTION TO AL and MI	CO Mapping				
		Foundation of AL Goals of AL History and AL course line	CO1 CO5				
	R	Introduction to Intelligent Agents: Environment: Structure of	CO1, CO5				
	D	Agent AI Solutions Vs Conventional Solutions: a	01,005				
		philosophical, approach: a practical approach.					
		r r r r r r r r					
	С	Learning, Difference between AI and Machine Learning	CO1, CO5				
		Types of Learning, Well defined learning problems,					
		Designing a Learning System, History of ML,					
	Unit 2	Machine Learning Approaches and various types					
	А	Introduction of Machine Learning Approaches – (Artificial	CO1, CO2, CO3				
		Neural Network, Clustering, Reinforcement Learning,					
		Decision Tree Learning, Bayesian networks, Support Vector					
		Machine, Genetic Algorithm), Issues in Machine Learning					
	D	and Data Science VS Machine Learning;	<u>CO1 CO2 CO3</u>				
	D	of support vector karnel (Linear karnel polynomial karnel	C01, C02, C03				
		and Gaussian kernel)					
	С	Hyperplane – (Decision surface) Properties of SVM and	CO1 CO2 CO3				
	e	Issues in SVM.	001, 002, 003				
	Unit 3	Supervised Learning and Unsupervised machine learning					
		Algorithms					
	A	DECISION TREE LEARNING - Decision tree learning	CO1, CO4				
		algorithm, Inductive bias, Inductive inference with decision					
		trees, Entropy and information theory, Information gain, ID-3					
		Algorithm, Issues in Decision tree learning.					
	В	INSTANCE-BASED LEARNING – k-Nearest Neighbour	CO1, CO4				
		Learning, Locally Weighted Regression. K-means clustering),					
	9	Hierarchal clustering, Anomaly detection					
	C	Radial basis function networks, Case-based learning.	CO4				

Unit 4	Neural Networks			
А	ARTIFICIAL NE	URAL NETWORK	S - Perceptron's,	CO4
	Multilayer perceptr	and the Delta rule,		
	Multilayer networks			
В	Different types of	CO4		
	learning.			
С	Case study of CNN	CO4		
	a smart speaker, Sel			
Unit 5	Deep Learning			
А	DEEP LEARNING	CO1,CO5		
	neural network, T			
	Activation function	ected), Concept of		
	Convolution (1D an	of network,		
В	Introduction to Re	CO1,CO5		
	Example of Reinfor			
С	Learning Models f	CO1,CO5		
	process, Q Learni			
	Algorithm), App			
	Introduction to Dee	p Q Learning.		
Mode of	Theory			
examination				
Weightage	CA	MTE	ETE	
Distribution	25%	25%	50%	
Text book/s*	1. Tom M. Mitch	ell, –Machine Learn	ning, McGraw-Hill	
	Education (India) P	rivate Limited, 2013.		
	2. Ethem Alpaydin	n, —Introduction to	Machine Learning	
	(Adaptive Computa	ation and Machine Le	arning), MIT Press	
	2004.			
Other	3. Stephen Marslan	d, —Machine Learnin	ng: An Algorithmic	
References	Perspective, CRC P	ress, 2009.		
	4. Bishop, C., Patt	ern Recognition and	Machine Learning.	
	Berlin: Springer-Ve	rlag.		
	5. M. Gopal, "Appli	ied Machine Learning	', McGraw Hill	
	Education			

S.	Course Outcome	Programme outcomes (PO) &
No.		Programme Specific outcomes (PSO)
1.	CO1: Compare AI and non-AI solutions. Basics of machine	PO1, PO2, PO3, PO4, PO5, PO10,
	learning and differentiation with AI	PSO1, PSO2,
2.	CO2: To Apply machine learning on labelled and unlabelled	PO1, PO2, PO3, PO4, PO5, PO10,
	data.	PSO1, PSO2
3.	CO3: To explore the concept of machine learning for various	PO1, PO2, PO3, PO4, PO5, PO6,
	problem solving in AI	PO7,PO10,PSO1, PSO2
4.	CO4: Classify supervised and unsupervised learning and	PO1, PO2, PO3, PO4, PO5, PO6,
	knowledge representation and introduction to fuzzy logic	PO7,PSO1, PSO2,
5.	CO5: Learning extension in the form of deep learning	PO1, PO2, PO3, PO4, PO5, PO6, PO7,
	concepts.	PO8, PO9, PO10, PSO1, PSO2
6	CO6: Practical implementation on various types of data of	PO1, PO2, PO3, PO4, PO5, PO6, PO7,
	Machine Leaning algorithms	PO8, PO9, PO10, PSO1, PSO2

Course Code_ Course Name	CO' s	PO 1	P 0 2	P 0 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PS O 1	PSO 2
	CO1	1	2	3	2	2	-	-	-	-	2	3	2
	CO2	2	3	3	2	3	-	-	-	-	2	3	3
Machine Learning	CO3	3	3	3	3	2	1	1	-	-	1	3	2
(BCO368)	CO4	3	3	3	3	2	2	1	-	-	2	3	2
	CO5	2	3	3	3	3	2	2	2	3	2	3	3
	CO6	2	3	3	3	3	2	2	2	3	2	3	3

PO and PSO mapping with level of strength for Course Name: Machine Learning(BCO368)

Average of non-zeros entry in following table (should be auto calculated).

BCU30 Machine 2.2 2.8 3.0 2.7 2.3 1.8 1.5 2.0 3.0 1.8 3.0	2.5	2.5
8 Learning		

Strength of Correlation

1. Addressed to *Slight (Low=1) extent* 2. Addressed to *Moderate (Medium=2) extent*

3. Addressed to Substantial (High=3) extent

Syllabus:Cloud Computing

Sch	nool:	School of Engineering & Technology							
De	partment	Computer Science & Applications							
Pro	ogramme:	BSc CS Current Academic Year: 2023-24							
Bat	tch:	2023-26							
Ser	nester	VI							
1	Course Code	BCO190 Course Name: Cloud Computing							
2	Course Title	Cloud Computing							
3	Credits	4							
4	Contact Hours (L-T-P)	4-0-0							
	Course Status	Compulsory							
5	Course Objective	1. Provide students with an overview of the fundamental concepts of	Cloud Computing.						
		2. Gain insight into the challenges and limitations Models of cloud co	omputing.						
		3. To learn the various technologies of the cloud computing paradigm and learn aborecent advances in Cloud Computing and enabling technologies.							
		4. Prepare students for research in the area of cloud Computing risks and cloud security challenges.							
6	Course Outcomes	 At the end of the course, students will have achieved the following learning objectives. CO 1. Define the basics of cloud and recall the computer Science concepts which are helpful in understanding on demand service architecture. 							
		CO 2. Classify and describe the architecture and taxonomy of parallel computing, including shared and distributed memory	and distributed						
		CO 3. Apply and Manage Virtualization and Workflow to use the clou applications.	ud in file systems and						
		CO 4. Categorize and Characterize between Infrastructure services, de and governance in cloud computing	ployment models,						
		CO 5. Evaluate the importance of cloud using monitoring and manager performance improvement of HPC and to follow the Governance	ment of services for e and Compliances.						
		CO 6. Elaborate the design concept and formulate to build the solution providers.	using cloud service						
7	Course Description	This course introduces advanced aspects of Cloud Computing, encompas analyze the cloud, identify the problems, and choose the relevant models apply.	sing the principles, to and algorithms to						
8	Outline syllabus		CO Mapping						
	Unit 1	Cloud Computing Fundamentals							
		A. Types of Computing, Grid computing, distributed computing, Client-server computing, Introduction to distributed systems,	CO1, CO2, CO3						
		 B. Cloud Computing definition, Roots of Cloud Computing, Layers and Types of Clouds 							
		C. Infrastructure as a Service Providers, Platform as a Service Providers							
	Unit 2	Understanding Abstraction and Virtualization							

	А.	Introduction to Virtual Machines, The Anatomy of Cloud	CO1, CO2,CO3
	В.	Management of Virtual Machines for Cloud Infrastructures, Understanding The Logical	
	C.	Design, Secure Distributed Data Storage in Cloud Computing	<u>y</u> .
Unit 3	Cloud (Computing Services and Applications	
A	А.	Introduction of CometCloud, Aneka and CloudSim, Integration of Private and Public Clouds.	on CO2,CO3,CO4
	B.	Introduction of Enterprises Demand and Cloud Computing, Dynamic ICT Services,	
	C.	Scientific Application for Cloud Environments, Classification of Scientific	1
Unit 4	Cloud (Computing Risk and Performance Issues	
A	A. B.	Model for Federated Cloud Computing, Security Considerations. HPC in the Cloud: Performance-related Issues, Game Hosting on Cloud Resources,	CO3, CO4,CO5
	C.	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues	ıd
Unit 5	C. AWS, N	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services	
Unit 5 A	C. AWS, M A.	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues <u>MS Azure and Google Cloud Services</u> AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service	CO4,CO5, CO6
Unit 5 A	С. AWS, N А. В.	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database,	CO4,CO5, CO6
Unit 5 A	C. AWS, M A. B. C.	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Google Cloud: Compute Engine,Migrate for Compute Engine	CO4,CO5, CO6
Unit 5 A Mode of examination	C. AWS, M A. B. C. Theory	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Google Cloud: Compute Engine,Migrate for Compute Engine	d CO4,CO5, CO6
Unit 5 A Mode of examination Weightage Distribution	C. AWS, M A. B. C. Theory CA	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Google Cloud: Compute Engine,Migrate for Compute Engine MTE ETE	CO4,CO5, CO6
Unit 5 A Mode of examination Weightage Distribution	C. AWS, M A. B. C. Theory CA 25%	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Google Cloud: Compute Engine,Migrate for Compute Engine MTE ETE 25% 50%	d CO4,CO5, CO6
Unit 5 A Mode of examination Weightage Distribution Text book/s*	C. AWS, N A. B. C. Theory CA 25% 1.	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Google Cloud: Compute Engine,Migrate for Compute Engine MTE ETE 25% 50% CLOUD COMPUTING Principles and Paradigms, Edited by	d CO4,CO5, CO6
Unit 5 A Mode of examination Weightage Distribution Text book/s* Other References	C. AWS, M A. B. C. Theory CA 25% 1.	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Google Cloud: Compute Engine,Migrate for Compute Engine MTE ETE 25% 50% CLOUD COMPUTING Principles and Paradigms, Edited by Rajkumar Buyya, Jam	CO4,CO5, CO6
Unit 5 A Mode of examination Weightage Distribution Text book/s* Other References	C. AWS, N A. B. C. Theory CA 25% 1. 2.	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Google Cloud: Compute Engine,Migrate for Compute Engine MTE ETE 25% 50% CLOUD COMPUTING Principles and Paradigms, Edited by Rajkumar Buyya, Jam Cloud Computing: A Practical Approach, Anthony T. Velte,	d CO4,CO5, CO6
Unit 5 A Mode of examination Weightage Distribution Text book/s* Other References	C. AWS, M A. B. C. Theory CA 25% 1. 2.	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Google Cloud: Compute Engine,Migrate for Compute Engine MTE ETE 25% 50% CLOUD COMPUTING Principles and Paradigms, Edited by Rajkumar Buyya, Jam Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter Barrie Sociedary "Cloud Computing (Bible)" Wilay	d CO4,CO5, CO6
Unit 5 A Mode of examination Weightage Distribution Text book/s* Other References	C. AWS, M A. B. C. Theory CA 25% 1. 2. 3. 4	Legal Issues in Cloud Computing(PCI DSS), Data Privacy an Security Issues MS Azure and Google Cloud Services AWS Services:Elastic Compute Cloud, Identity and Access Management, Simple Storage Service MS Azure Services:Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Google Cloud: Compute Engine,Migrate for Compute Engine MTE ETE 25% 50% CLOUD COMPUTING Principles and Paradigms, Edited by Rajkumar Buyya, Jam Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter Barrie Sosinsky "Cloud Computing (Bible)", Wiley. Ronald L. Krutz and Russell Dean Vines "Cloud Security: A	d CO4,CO5, CO6

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	Define the basics of cloud and recall the computer Science concepts which are helpful in understanding on demand service architecture.	PO1, PO2,PO3,PSO3
2.	Classify and describe the architecture and taxonomy of parallel and distributed computing, including shared and distributed memory	PO1, PO2,PO3,PSO1,PSO3
3.	Apply and Manage Virtualization and Workflow to use the cloud in file systems and applications.	PO1,PO2,PO3,PSO1,PSO2
4.	Categorize and Characterize between Infrastructure services, deployment models, and governance in cloud computing	PO1,PO2,PO4,PSO1,PSO2
5.	Evaluate the importance of cloud using monitoring and management of services for performance improvement of HPC and to follow the Governance and Compliances.	PO1,PO2,PO4,PSO1,PSO3
6	Elaborate the design concept and formulate to build the solution using cloud service providers.	PO1,PO2,PO3,PSO1,PSO2,PSO3

PO and PSO mapping with level of strength for Course Name: Cloud Computing(BCO190)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
BCO190 Cloud	CO1	3	3	3	3				2	2	1	3	2
Computing	CO2	3	2	3	3				2	2	2	2	3
	CO3	3	3	3	3				1	1	1	3	2
		2	2	2	2	1			2	3	3	2	2
	CO4												
	CO5	2	2	2					3	3	1	3	
	CO6	3	2								2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BCO190	Cloud												
	Computing	2.83	2.67	1.67	1.67	1.00	1.00	1.00	2.00	1.00	2.67		2.50
	Fundamentals												

Strength of Correlation

1. Addressed to *Slight (Low=1) extent* 2. Addressed to *Moderate (Medium=2) extent*

3. Addressed to Substantial (High=3) extent

Syllabus: Information Security and Cyber Laws

Sch	ool:	School of Engineering & Technology								
Dep	partment	Computer Science & Applications								
Pro	gramme:	BSc CS Current Academic Year: 2023-24								
Bat	ch:	2023-26								
Sen	nester	VI								
1	Course Code	BCO604								
2	Course Title	Information Security and Cyber Laws								
3	Credits	3								
4	Contact Hours	3-0-0								
	(L-T-P)									
	Course Status	Elective								
5	Course Objective	Enable learner to understand, explore, and acquire a critical understanding Cyber Law. Give learners in depth knowledge of Computer Science Act and legal frame work of Right to Privacy, Data Security, Data Protection and tools								
6	Course Outcomes	 On successful completion of this module studer CO1: Develop competencies for dealing with fr (confidence tricks, scams) and other cybercrime pornography etc. that are taking place via the In CO2: Explore the legal and policy developmen to regulate Cyberspace CO3: Formulate various security measures for CO4: Apply the principles in real life situations CO5: Identify various Cybercrimes and take ne CO6: Assess the various online activities. 	nts will be able to rauds and deceptions es for example, child nternet ts in various countries cyber-attacks.							
7	Course DescriptionThis course introduces aspects of cyber security, encompassing the principle to analyze the data, identify the problems, and choose the relevant countermeasures to apply.									
8	Outline syllabus	3	CO Mapping							
	Unit 1	Introduction to Cyber Security								
	А	Understanding Computers, Internet and Cyber Laws, information security legal liabilities,	CO1, CO2							
	В	intellectual property, defamation, privacy concerns, censorship, cyber fraud, e – commerce law,	CO5, CO6, CO3							

С	insurance law, resolution, the	CO6, CO4, CO2							
Unit 2	Intellectual rig	hts							
А	Protection of I CyberSpace in	CO1,CO2. CO3							
В	Compensation Provisions of I important Offe the Internet in	Compensation and Adjudication of Violations of Provisions of It Act and Judicial Review, Some important Offeneces under the CyberSpace Law and the Internet in India,							
С	C Other Offences under the Computer Science Act in India								
Unit 3	Role of Evider	nces and Rules	3						
А	The Role of El Miscellaneous	lectronic Evide Provisions of	ence and the the IT Act,	CO1,CO2, CO4					
В	Legal Aspects Signatures,	Legal Aspects of Electronic Records/Digital Signatures,							
С	The Rules and in India	The Rules and Regulations of Certifying Authorities in India							
Unit 4	Cyber Space L	Laws							
А	International E	Efforts Related	to CyberSpace Laws,	CO1,CO2, CO6					
В	Fundamental J International I	urisdiction Pri Law, Classic U	inciples Under S. Jurisdiction	CO2,CO4,CO6					
С	Principles, Co crimes	uncil of Europ	e convention on cyber	C01,C03,C05					
 Unit 5	Tools								
А	Cyber Check,	TrueBack,		CO1,CO2, CO6					
В	Hasher, Email	Tracer		CO1.CO2,CO6,CO5					
С	Pasco, Nmap,	BinText		CO2,CO3,CO5					
Mode of examination	Theory								
 Weightage	CA	MTE	ETE						
Distribution	25%	25%	50%						
Text book/s*	1. Cyber Handbook of I	Law and IT P	rotection, Chander Harish ecurity, HosseinBidgol						
Other References									

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	CO1: Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cybercrimes for example, child pornography etc. that are taking place via the Internet	PO1,PO2,PO3,PO7,PO10,PSO1
2.	CO2: Explore the legal and policy developments in various countries to regulate Cyberspace	PO1,PO2,PO6,PO7,PO8,PO10, PSO1, PSO2
3	CO3: Formulate various security measures for cyber-attacks.	PO1, PO2, PO6, PO7, PO8, PO10, PSO1, PSO2
4	CO4: Apply the principles in real life situations.	PO1, PO2, PO3, PO4, PO5, PO10, PSO1
5	CO5: Identify various Cybercrimes and take necessary actions.	PO1, PO2, PO3,PO4, PO5,PO6,PO7, PO9,PO10, PSO1, PSO2
6	CO6: Assess the various online activities.	PO1, PO2,PO3,PO4,PO5,PO7 ,PO9,PO10, PSO1

PO and PSO mapping with level of strength for Course Name Information Security and Cyber Laws (Course Code BCO604)

Course Code_ Course Name	CO 's	PO 1	P O 2	Р О З	PO 4	Р О 5	Р О 6	Р О 7	P O 8	Р О 9	P O 10	PSO 1	PSO 2
BCO604 Information	CO 1	2	2	3				3			3	2	
Cyber Laws	CO 2	3	3				2	2	3		3	3	2
	CO 3	2	2				2	2	2		2	3	3
	CO 4	2	2	2	3	3					3	2	
	CO 5	2	2	2	2	2	2	2		2	2	2	3
	CO 6	3	2		2	2		3		3	2	2	

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO 2	PO 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	PSO 1	PSO 2
BCO60 4	Informatio n Security and Cyber Laws	2.3	2.1	2.3	2. 3	2. 3	2	2. 4	2. 5	2. 5	2. 4	2.3	2.6

Strength of Correlation

- 1. Addressed to Slight (Low=1) extent 2. Addressed to Moderate (Medium=2) extent
- 3. Addressed to Substantial (High=3) extent

Scho	ool:	School of Engineering & Technology	
Depa	artment	Computer Science & Applications	
Prog	gramme:	BSc CS Current Academic Year: 2023-24	
Bate	: :h:	2023-26	
Sem	ester	VI	
1	Course Code	BCO605 Course Name: Big Data Analytics	
2	Course Title	Big Data Analytics	
3	Credits	3	
4	Contact Hours	3-0-0	
	(L-T-P)		
	Course Status	Elective	
5	Course Objective	 Understand the Big Data Platform and its Use cases Provide an overview of Apache Hadoop Provide HDFS Concepts and Interfacing with HDFS Understand Map Reduce Jobs Provide hands on Hodoop Eco System Apply analytics on Structured, Unstructured Data. Exposure to Data Analytics with 	
6	Course Outcomes	The students will be able to: CO1: Identify Big Data and its Business Implications. CO2: List the components of Hadoop and Hadoop Eco-System CO3: Access and Process Data on Distributed File System CO4: Manage Job Execution in Hadoop Environment CO5: Develop Big Data Solutions using Hadoop Eco System CO6: Develop big data handling applications for end user	
7	Course Description	This course provides a comprehensive introduction to big data, cor- tools, and techniques for processing and analyzing large datasets. S about data storage and retrieval, data preprocessing, data mining, a visualization. They will gain hands-on experience with popular big such as Hadoop and Spark, as well as programming languages like course will also explore the ethical and legal considerations surrou including privacy and security issues. By the end of the course, stu equipped with the skills to tackle real-world big data challenges ar decisions.	vering concepts, Students will learn and data g data frameworks e Python and R. The nding big data, idents will be ad make data-driven
8	Outline syllabus		CO Mapping
	Unit 1	INTRODUCTION TO BIG DATA AND HADOOP	
	А	Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop	CO1, CO2
	В	Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming,	CO1, CO2
	С	Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.	CO1, CO2
	Unit 2	HDFS(Hadoop Distributed File System)	
	А	The Design of HDFS, HDFS Concepts, Command Line Interface	CO1, CO2,CO4
	В	Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives,	CO1, CO2,CO4
	С	Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures	CO1, CO2,CO4
	Unit 3	Map Reduce	
	A	Anatomy of a Map Reduce Job Run, Failures, Job Scheduling	CO1,CO2,CO3

	В	Shuffle and	Sort, Task Execut	ion,	CO1,CO2,CO3							
	С	Map Reduc	Iap Reduce Types and Formats, Map Reduce Features. C									
	Unit 4	Hadoop Ec	o System									
	А	Pig : Introd	uction to PIG, Exe	cution Modes of Pig, Comparison	CO1,CO2,CO3							
		of Pig with	Pig with Databases, Grunt, Pig Latin, User Defined Functions,									
	Р	Hive Hive	Shall Hive Service	as Hive Metestore Comparison	CO1 CO2 CO3							
	D	with Traditi	ional Databases. H	iveOL. Tables. Ouerving Data and	01,002,005							
		User Define	ed Functions.									
	С	Hbase : HP	Basics, Concepts, C	Clients, Example, Hbase Versus	CO1,CO2,CO3							
		RDBMS. B	Big SQL : Introduct	tion								
	Unit 5	Data Analy	tics with R:									
	А	Introduction	a, Supervised Learn	ning, Unsupervised Learning,	CO1,CO2,CO3							
	В	Collaborativ	ve Filtering		CO1,CO2,CO3							
	С	Big Data Ar	nalytics with BigR		CO1,CO2,CO3							
	Mode of	Theory										
	examination											
	Weightage	CA	MTE	ETE								
	Distribution	25%	25%	50%								
	Text book/s*	1. To	m White "Hadoop	b: The Definitive Guide" Third Edit								
		on,	, O'reily Media, 20									
		2. See	ema Acharya, Subl	hasını Chellappan, "Bıg Data								
	Other Deferences		information of the second seco	15 avid I. Hand, "Intelligent Data								
	Other References	I. MI	alveis" Springer	2007								
		2. Ja	av Liebowitz, "Big	Data and Business Analytics"								
		Au	ierbach Publication									
		3. To	om Plunkett, Mark	Hornick, "Using R to Unlock the								
		Va	lue of Big Data: B	ig Data Analytics with Oracle R								
		En	terprise and Oracle									
		Mo	cGraw-Hill/Osborn	ne Media (2013), Oracle press.								
		4. A	nand Rajaraman ar	nd Jef rey David Ulman, "Mining of								
		Ma	assive Datasets", C	Cambridge University Press, 2012.								

S. No.	Course Outcome	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	CO1 Identify Big Data and its Business Implications.	PO1,PO2,PO3,PO4,PSO1
2.	CO2: List the components of Hadoop and Hadoop Eco-System	PO1, PO3, PO4, PSO2
3.	CO3: Access and Process Data on Distributed File System	PO2,PO3,PO4,PSO3
4.	CO4: Manage Job Execution in Hadoop Environment	PO7, PO10,PO11, PSO5
5	CO5: Develop Big Data Solutions using Hadoop Eco System	PO4,PO8
6.	CO6: Develop big data handling applications for end user	PO4,PO8

COs												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	3	3				2	2	1	3	2
CO2	3	2	3	3				2	2	2	2	3
CO3	3	3	3	3				1	1	1	3	2
CO4	2	2	2	2	1			2	3	3	2	2
CO5	3	2	3	3	1	-	1	3	2	2	2	2
CO6	3	2	3	3	1	-	1	3	2	2	2	2

PO and PSO mapping with level of strength for Course Name Big Data Analytics (BCO605)

Syllabus: Dot Net framework using C# Lab

Sch	nool:	School of Engineering & Technology	
De	partment	Computer Science & Applications	
Pro	gramme:	BSc CS Current Academic Year: 2023-24	
Bat	tch:	2023-26	
Ser	nester	VI	
1	Course Code	ROI 606	
2	Course Title	Dot Not fromowork using C#Lab	
3	Credits		
4	Contact Hours	0-0-2	
-	(L-T-P)		
	Course Status	Program Elective 3	
5	Course	This course is prepared for the beginners to help them to understand basics of	C# along with
	Objective	classes, objects, invoking methods inheritance, interfaces and exception handlin	g mechanisms
		and ASP.NET programming. After completing this course, students will be able to	o find yourself
		at a moderate level in ASP.NET using C# programming from where you can tak	e yourself to
6	Course	next levels.	
0	Outcomes	CO1: Demonstrate C# environment and executing C# Programs	
	Outcomes	CO2: Understand and formulate the problems in basic programming constructs i	ısing C#
		CO3: Applying OOP concepts to solve real world problems.	using en.
		CO4: Implement inheritance, polymorphism, multithreading features using C# a	and handle run
		time errors.	
		CO5: Apply the validation controls in web forms and connect with database usin	ng ADO.NET.
_	~	CO6: Develop real world problems using C# & ASP.NET.	
7	Course	ASP.NET is a web application framework developed and marketed by Micro	osoft to allow
	Description	programmers to build dynamic web sites. It allows you to use an object-oriented	programming
8	Outline syllabus		CO
Ŭ	Summe synuous		Mapping
		Visual Studio installation and program execution	
		Installing Visual-Studio, uses of IDE, Writing C# programs, program	
	Unit 1	execution, Programs on different data types, promotion rules in expressions,	CO1, CO2
		narrowing & type casting, logical-bit wise-arithmetic operators.	
		Programming revisited	
	Unit 2	Programs using if else, switch case statements, for, while, do. while loop	
		control structures, break and continue Programs using command line	CO2, CO6
		arguments, taking input from keyboard, Arrays, nested control structures.	
		Class, object and constructor	
	Unit 3	objects accessing members of a class through objects. Programs to define	CO3 CO6
	enit 5	constructors, initializing instance variables, method overloading, constructor	005,000
		overloading.	
		Inheritance, package, Interface, Exception and Multithreading	
		Programs on different types of inheritance, method overriding, achieving	
		multiple inheritance through interfaces, inheritance in interfaces, private,	
	Unit 4	protected and public mode, try. catch. finally for exception handling, throw user	CO4, CO6
		defined exceptions, uses of throws, nested try catch, rethrowing exceptions.	
		Programs to define Thread, achieving multithreading using Thread class.	
	Unit 5	ASP. NE1, Validation and ADU.NET	
	Unit 3	validators in VS Establish the connection using ADO NET component in	CO5 CO6
		connected and Dis-connected mode.	CO3, CO0
	Mode of	Lab/Viva	
	examination		

Weightage	СА	MTE	ETE			
Distribution	25%	25%	50%			
Text book/s*	 4 Balagurusamy," Programm 5 Shibi Parikkar, "C# with 6 Media.ASP.NET: The Cont 	ning with C .Net Frame mplete Refe	#", (TMH) Work" , Firewall erence:Matthew Macdonald			
Reference Books3Mark Michaelis, "Essential C# 3.0: For .NET Framework 4.5, 2/e, Pearson Education Fergal Grimes," Microsoft .Net for Programmers". (SPI)						

Sl. No.	Course Outcome (CO)	Programme Outcome(PO) and Programme Specific Outcome(PSO)
1.	CO1: Demonstrate C# environment and executing C# Programs.	PO1, PO2
2.	CO2: Understand and formulate the problems in basic programming constructs using C#.	PO1, PO2, PO4
3.	CO3: Applying OOP concepts to solve real world problems.	P01, PO2, PO3, PO4, PO10, PSO1
4.	CO4: Implement inheritance, polymorphism, multithreading features using C# and handle run time errors.	PO1, PO2, PO3, PO10
5.	CO5: Apply the validation controls in web forms and connect with database using ADO.NET	PO2, PO3, PO4, PO10
6.	CO6: Develop real world problems using C# & ASP.NET.	PO1, PO2, PO3, PO4, PO5, PO6, PO8, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name C# with ASP.Net (Course Code - BOL606)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	CO1	3	2	-	-	-	-	-	-	-	2	-	-
BOL606	CO2	2	3	-	2	-	-	-	-	-	-	-	-
Dot Net	CO3	2	3	2	3	-	-	-	-	-	2	2	-
framework	CO4	2	3	2	-	-	-	-	-	-	2	-	-
using C# Lab	CO5	-	2	2	3	-	-	-	-	-	2	2	1
	CO6	2	3	2	3	3	2	-	2	-	2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course	Course Name		PO	PO	PO	PO	PO	РО	PO	PO	PO	PSO	PSO
Code			2	3	4	5	6	7	8	9	10	1	2
BOL60 6	Dot Net framework using C# Lab	2 · 2	2.6 7	2	2.7 5	3	2	0	2	0	2	2	1.5

List of Programs

Write a Simple Program to print your name in C#
Write a program to print the given string by using the Write and Write Line Method.
Write a program how to read the values form console given by the user using Read Line Method
Write a program to make a function (addition of Two numbers) in Single Class
Write a program to make a function in first class (addition of Two numbers) and call a function by creating object of first class in to second class and inputs given by the user.
Write a program to make a function in first class and call a function into second class by declare static method of first class
Write a program to print the element of collections (like. Array) by using For each Loop.
Write a program to print the element of an Array by using For each Loop and inputs given by the user.
Write a program to print the tables from 1 to 10 by using the 2- Dimensional Array
Write a program to implements the methods and properties on Array (like: Get Length(),Get Value Get Length(),,Copy To(),Reverse(),Length)
Write a program to print the elements by using Jagged Array with For each Loop.
Write a program to print the elements by using the Array List Class and inputs given by the user.
Write a program to implements the methods and properties on Array List. (like: Add(),Clear(),Insert(),Remove(),Sort(), Count, Capacity).
Write a program to display the given string by using Immutable String (String Class).
Write a program to implements the methods and properties on string (like: Compare(),Compare To(), Concat(),Trim(),Insert()).
Write a program to display the given sting by using Mutable String (String Builder Class).
Write a program to implements the methods and properties on String Builder (like: Compare(),Compare To(),Concat(),Trim(),Insert()).
Write a program to create a class for Room and make a Constructor & Destructor for Room
Class and then use the Construct to pass the values in method for Area and display it.
Write a program to calculate the Area of Circle by using the Parameterized Constructor and
inputs given by the user (Length, Width).

Write a program to calculate the Area of Rectangle and perimeter by using the Constructor Overloaded and inputs given by the user (Length, Width)

Write a program to calculate the Area of Room and inherit the base class and calculate the volume of Room in second class and then display the area and volume (Single Inheritance).

Write a program to design a class vehicle, car and bike by using Multi Level inheritance and then call the method of vehicles, car and bike by creating object of bike class (Multi -level inheritance).

Write a program to implement the interfaces which contains the methods Addition, Multiplication respectively and create a new class which implement both methods and display the output of these methods by creating a new class.

Write a program to create a class and make a function for Multiplication for two numbers and overload the existing function then display the output.

Write a program how the unary minus operator is overloaded

Write a program how the binary plus operator is overloaded on addition of two complex numbers.

Write a program to create a class and make the function Display and override the existing Function by using the Virtual and Override keywords.

Write a program how a delegate is created and used in program.

Write a program to Create the Multicast delegate by call the several methods in one call.

Write a program to simulate a calculator by using the delegate

Write a program to create the two event handler of an event and implement by the delegate.

Write a program to handle an arithmetic exception by using try and multiple catch blocks.

Write a program to handle an arithmetic exception by using try and finally block.

Write a program how to create a thread and starts it running

Write a program how to create the multiple thread in a program

Write a program how to manage the priority of threads

Write a program to implement the methods of thread (like: Wait (), Suspend (), Resume (), Abort ()).

Write a program to connect the SQL Database by using the ADO.Net

Write a program to connect the Ms Access by using the ADO.Net

Write a program to illustrate the concept of Connected Mode by using ADO.Net

Write a program to illustrate the concept of Dis-connected Mode by using ADO.Net

Write a program to implement the Pointer in C # by using unsafe mode.

Create a Simple web application by using ASP.Net and Connect with SQL Database and also perform some operation (like: Insert, Update, Delete and Select).

Schoo	l:	School of Engineering & Technology					
Depar	tment	Computer Science & Applications					
Progr	amme:	BSc CS Current Academic Year: 2023-24					
Batch	•	2023-26					
Semes	ster	VI					
1	Course Code	BOL368					
2	Course Title	Machine Learning Lab					
3	Credits	2					
4	Contact Hours (L-T-P)	0-0-4					
	Course Status	Compulsory					
5	Course Objective	 The objective of the course is to introduce basic fundamental Intelligence (AI) with machine Learning, with a practical appropriate them. To visualize the scope of Machine Learning To develop machine learning concept. To workout various libraries and tool with the help of To have an overview of the various processes i Learning in supervised and unsupervised domain To develop a working model of real life problem base on machine 	concepts in Artificial bach in understanding f R or Python. nvolved in Machine hine learning				
6	Course Outcomes	 After the completion of this course, students will be able to: CO-1. To develop basic understanding of data structures required for machine learning. CO-2. To process the data for various statistical and probability calculation for mathematical base. CO-3. To extends data structure for implementation of supervised learning. CO-4. To extend implementation from the point of view of unsupervised machine learning . CO-5. Select Machine learning based applications. CO-6. To develop the artificial intelligence and machine learning approach for project implementation. 					
7	Course Description	In this course students will learn basic introduction of A problem solving agents, reasoning, learning and appli- intelligence	rtificial Intelligence, cations of artificial				
8	Outline syllabus	intenigence.	CO Mapping				
0	Unit 1	Practical based on basics of LISP & goal based problems	o o mapping				
		Sub unit - a, b and c detailed in Instructional Plan	CO1, CO2, CO4				
		Practical related to uninformed search algorithm.					
		Sub unit - a, b and c detailed in Instructional Plan					
	Unit 2	Practical related to informed search algorithm.	CO1, CO2. CO3, CO4				
		Sub unit - a, b and c detailed in Instructional Plan					
	Unit 3	Practical related to machine learning algorithms					
		1. Sub unit - a, b and c detailed in Instructional Plan	CO2, CO3, CO4				
		Practical based on goal based problems					
	Unit 4	Sub unit - a, b and c detailed in Instructional Plan					
		Practical related to uninformed search algorithm.					

Syllabus : Machine Learning Lab

	Sub unit - a, b and c	detailed in Inst	tructional Plan	CO2, CO3, CO4				
Unit 5	Practical related to	informed sea	rch algorithm.					
	Sub unit - a, b and c	CO1, CO2, CO3, CO4, CO6						
Mode of examination	Practical	Practical						
Weightage	CA	CE	ESE					
Distribution	25%	25%	50%					
Text book/s*	1. Rich E& McGraw Hill, Editio	1. Rich E& Knight K, Artificial Intelligence, Tata McGraw Hill, Edition 3.						
Other References	 Russell S &No Approach, Pren Dan W. Patte Systems, Pears Indian Edition. 							

S. No.	Course Outcome (CO)	Programme outcomes (PO) & Programme Specific outcomes (PSO)
1.	CO1: Relate the goals of Artificial Intelligence and AI and non-AI solution.	PO3, PO4, PO5, PO10, PSO1, PSO2
2.	CO2: Analyze and various AI uninformed and informed search algorithms.	PO1, PO2, PO3, PO4, PO5, PO10, PSO1, PSO2
3.	CO3: Extend knowledge representation, reasoning, and theorem proving techniques to real-world problems	PO1, PO2, PO3, PO4, PO5, PO12, PSO1, PSO2
4.	CO4: Make use of: Machine learning algorithms in various application domains of AI.	PO1, PO2, PO3, PO4, PO5, PO12, PSO1, PSO2
5	CO5: Select Artificial Intelligent based applications.	PO1, PO2, PO3, PO4, PO5, PO9, PO10 PO12, PSO1, PSO2
6	CO6: Develop independent (or in a small group) research and communicate it effectively.	PO1, PO2, PO3, PO4, PO5, PO9, PO10 PO12, PSO1, PSO2

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2	PSO3
BOL36	CO1	1	2	3	2	2					2	3	2	2
8	CO2	2	3	3	2	3					2	3	3	2
Learning	CO3	3	3	3	3	2	1	1			1	3	2	3
Lab	CO4	3	3	3	3	2	2	1			2	3	2	3
	CO5	2	3	3	3	3	2	2	2	3	2	3	3	2
	CO6	2	3	3	3	3	2	2	2	3	2	3	3	2

PO and PSO mapping with level of strength for Machine Learning Lab(BOL368)

Average of non-zeros entry in following table (should be auto-calculated).

Course Code/ Name	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
BOL368	2.16	2.83	2.8	3.0	2.5	1.5	1	0.6	1	1.83	3.0	2.33

Strength of Correlation

Addressed to Slight (Low=1) extent
 Addressed to Moderate (Medium=2) extent
 Addressed to Substantial (High=3) extent

List of Practical's:

	Unit 1	Practical b	ased on basics of basics data structures in python/R
Week 1	а	Lab expt.1	Write a python program to import and export data using Pandas library functions
Week 2, 3	b	Lab expt.2	Demonstrate various data pre-processing techniques for a given dataset. Implement
			Dimensionality reduction using Principle Component Analysis (PCA) method.
Week 4	с	Lab expt.3	Write a Python program to demonstrate various Data Visualization Techniques.
	Unit 2		Implement of the transpice Entern Regression Prodeist
Week 5	a, b,	Lab expt.4	Develop Logistic Regression Model for a given dataset.
			Develop Decision Tree Classification model for a given dataset and use it to classify a new sample.
Week 6	с	Lab expt.5	Implement Naïve Bayes Classification in Python
			Build KNN Classification model for a given dataset.
	Unit 3	Practical r	elated to informed search algorithm.
Week 7	Mid term	L	
Week 8	a,b,c	Lab expt.6	Build Artificial Neural Network model with back propagation on a given dataset.
	Unit 4	Practical r	elated to knowledge representations and logical reasoning
Week 9	А	Lab expt.7	Implement Random forest ensemble method on a given dataset.
Week 10	В	Lab expt.8	Implement Boosting ensemble method on a given dataset.
Week 11	с	Lab expt.9	Write a python program to implement K-Means clustering Algorithm
	Unit 5	Practical r	elated to machine learning algorithms
Week 12	a,	Project	Project Work Evaluation-0: Problem Statement with implementation of machine learning for unsupervised/supervised machine learning

Week 13	b	Project	Project Work Evaluation-1: Design Specification. Identification of dataset and the objective of project.
Week 14	с	Project	Project Work Evaluation-2: Development. Python or R implementation for the development of project.

Syllabus	:	Research	Based	Learning-4
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So	chool:		School of Engineering & Technology								
D	epartment		Computer Science & Applications								
P	rogramme:		BSc CS Current Academic Year: 2023-24								
Ba	atch:		2023-26								
Se	emester		VI								
1	Course Code		RBL004 Course Name: Research Based Learning -4								
2	Course Title		Research Based Learning -4								
3	Credits		2								
4	Contact Hours (L-T-P)		0-0-4	0-0-4							
	Course Status		Compulsory								
5	Course Objective	;	 To align student's skill and interests with a realistic problem or Research. To understand the significance of problem and its scope. Students will make decisions within a framework. 								
6	Course Outcome:	S	Students will be able to: CO1: Identify and formulate problem statement. CO2: Design a Hypothesis. CO3: Develop the solution by using different aspects of Research Methodology. CO4: Classify and understand various tools and techniques for verification and validation of Research. CO5: Analyze and make use of modern methods for solving real word problems. CO6: Develop teamwork and need to engage in life-long learning, along with the ability to communicate effectively with others.								
7	Course Description	on	In RBL, the students will learn how to define the problem for developing Research, and Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical. social. legal and economic concerns.								
8	Outline syllabus			CO Mapping							
	Unit 1	Developin	g a draft liter	C01,C04							
	Unit 2	Framing a or bridging	research base g the research	CO2,CO6							
	Unit 3	Justificatio	on of Researc	CO3							
	Unit 4 Verification and Validation of propose research framework using propose tools.							CO4,CO5			
	Unit 5	Communicating and Publishing the research article									
	Mode of examination Weight age Distribution	Practical /	Viva								
F		CA			CE(Viva)	ETE					
		25%			25%	50%					

S. No.	Course Outcome	Programme outcomes (PO) and Programme Specific Outocmes(PSO)
1.	CO1: Identify and formulate problem statement.	PO1, PO2, PO4,PO6, PO8,PO9, PO10, PSO1,PSO2
2.	CO2: Design a Hypothesis.	PO1, PO2, PO3,PO4,PO5, PO7, PO8, PO9, PSO1,PSO2
3.	CO3: Develop the solution by using different aspects of Research Methodology.	PO1, PO2, PO3,PO4,PO5, PO6, PO8, PO9, PSO1,PSO2
4.	CO4: Classify and understand various tools and techniques for verification and validation of Research.	PO1, PO2, PO3,PO4,PO5, PO8,PO9, PO10, PSO1,PSO2
5.	CO5: Analyze and make use of modern methods for solving real word problems.	PO1, PO2, PO5, PO6, PO7, PO8, PO9,PSO1,PSO2
6.	CO6: Develop teamwork and need to engage in life-long learning, along with the ability to communicate effectively with others.	PO2, PO4, PO8,PO9, PO10, PO11, PO12,PSO1

PO and PSO mapping with level of strength for Course Name: Research Based Learning 4 (RBL004)

COs]											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	-	2	-	1	-	1	2	-	2	2
CO2	3	2	2	2	2	-	-	1	2	-	2	1
CO3	3	2	2	2	2	3	-	1	2	-	2	2
CO4	3	3	2	2	3	-	-	1	2	-	2	2
CO5	3	2	-	-	3	-	-	1	2	-	2	2
CO6		1	-	1	-	-	-	2	2	3	1	-
Avg PO attained	3	2.2	1	1.5	1.7	0.7	0	1.2	2	1	2	1.5

Syllabus: Community Connect

Sc	chool:	School of Engineering & Technology										
D	epartment	Computer Science & Applications										
P	ogramme:	BSc CS Current Academic Year: 2023-24										
Re	atch.	2023-26										
De Co	atch.											
50	emester											
1	Course Code	INC003	Course Name:	Community Con	nect							
2	Course Title	Community Connect										
3	Credits	1										
4	Contact Hours	0-0-2										
	(L-T-P)	a 1										
~	Course Status	Compulsory		1 . 1 .	· · · · · · · · · · · · · · · · · · ·							
5	Course	1. The objective of assi	gning the project	related to comm	unity work is to expose our students							
	Objective	2 This type of project y	s faced by the peo	opie in different s	ections of society.							
		2. This type of project w	ork will help the	students to develo	bp better understanding of problems							
		or people living in a	isauvantage posi	ition in the soci	lety, may be sociarry, medicarry,							
		3 This type of live pro	iect work will he	In our students to	connect their class room learning							
		with practical issues/pro	blems in the soc	ietv	beomeet then class-room learning							
6	Course	Students will be able to	o ^r	iety.								
0	Outcomes	1. CO1: Students de	, velon awareness	s of the social, he	alth, and environmental challenges							
	0 410 0 1110 0	faced by the comm	unity		and, and en in channeling channelinges							
		2. C02: Students are	more appreciati	ive of socio-econo	omic realities beyond textbooks and							
		classrooms			ý							
		3. CO3: Students lea	arn to apply the	ir knowledge thr	ough research, awareness creation,							
		and services for con	mmunity benefit	-	-							
		4. CO4: Students a	re able to car	ry out commun	ity-based projects with sincerity,							
		teamwork and timely delivery										
		5. CO5: Students learn to respectfully engage with communities with purposive intent to										
		contribute to societ	y and sustainable	development								
		6. C06: Students are	able to docume	ent and present t	heir community project findings in							
		an academically robust manner										
-	9	In Community Connect anticate students will be a be to 'doub' for will be for the be										
1	Course	In Community Connec	t projects, studen	ts will learn how	to identify problems of rural and							
	Description	underprivileged comm	unities by condu	icting surveys, o	or will help the communities by							
0	Outling syllabus	providing services of sc	or the iss	sues faced by the	III. CO Manning							
0	Unit 1	Team/Group formation	and Project Assig	ment Problem	CO Mapping							
	Umt I	Definition & Finalizing	the problem state	ment Resource	01,002							
		requirement if any	the problem state	chieft, Resource								
	Unit 2	Develop a useful questi	onnaire or service	e to the	CO2 CO3 CO4							
		community that will aid	in achieving the	objectives of	002,000.001							
		the project.	6	J								
	Unit 3	Learn how to interact	with the comm	unity members,	CO3, CO4, CO5							
		whether in survey or	service-based pr	oject – to help								
		develop a more open m	indset in the stud	ents.								
	Unit 4	Analysis of survey data	and/or impact or	the community	CO3, CO4							
		members.	•									
1	Unit 5	Demonstrate and justify	their findings in	light of the data	CO4, CO5, CO6							
1		they have gathered,	or show the b	penefits to the								
1		community of the action	ns they have take	n.								
L												
	Mode of	Practical /Viva										
	examination											
1	Weight age	CA	CE	ETE								
1	Distribution	25%	25%	50%								

S. No.	Course Outcome	Programme outcomes (PO) and Programme Specific Outcome(PSO)
1.	CO1: Students develop awareness of the social, health, and environmental challenges faced by the community	PO2, PO3, PO4, PO6, PO8, PO9, PO10,
2.	C02: Students are more appreciative of socio-economic realities beyond textbooks and classrooms	PO1, PO2, PO3, PO4, PO6, PO8, PO9, PO10
3.	CO3: Students learn to apply their knowledge through research, awareness creation, and services for community benefit	PO1, PO2, PO3, PO4, PO5, PO6, PO9, PO10, PSO1, PSO2, PSO3
4.	CO4: Students are able to carry out community-based projects with sincerity, teamwork and timely delivery	PO2, PO3, PO6, PO8, PO9, PO10, PSO2
5.	CO5: Students learn to respectfully engage with communities with purposive intent to contribute to society and sustainable development	PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10 PSO1, PSO2, PSO3
6.	C06: Students are able to document and present their community project findings in an academically robust manner	PO1, PO2, PO4, PO5, PO9, PO10, PSO2, PSO3

Cos		Programme Outcomes(POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1		1	1	2		3		1	1	1		
CO2	1	2	1	3		3		1	1	1		
CO3	3	3	3	3	2	3			1	2	1	1
CO4		3	3	3		3		3	3	3		1
CO5		2	1	1	1	3	3	3	2	3	1	1
CO6	2	3	1	1	3				2	2		2
Avg PO attainted	1	2.3	1.7	2.3	1	2.5	0.5	1.3	1.7	2	0.3	0.8

PO and PSO mapping with level of strength for Course Name: Community Connect (Course Code CCU108)

(1/2/3 indicates strength of correlation)

CO/PO Mapping 3-Strong, 2-Medium, 1-Low