Programme: Bachelor of Science Specialization: Information Technology

Sr no.	Programme Outcome
Sr no.	Scientific knowledge: Apply the knowledge of mathematics, science, and
PO1.	computing to the solution of complex scientific problems.
	Problem analysis: Identify, formulate, research literature, and analyse complex
200	scientific problems reaching substantiated conclusions using first principles of
PO2	scientific problems reaching substantiated conclusions using mist princip
-	mathematics, natural sciences, and applied sciences. Design/development of solutions: Design solutions for complex problems and
	design system components or processes that meet the specified needs with
PO3	appropriate consideration for the public health and safety, and the cultural,
	societal, and environmental considerations.
	Conduct investigations of complex problems: Use research-based knowledge
PO4	and research methods including design of experiments, analysis and interpretation
104	of data, and synthesis of the information to provide valid conclusions.
	Modern tools usage: Create, select, and apply appropriate techniques, resources,
PO5	and modern computing and IT tools including prediction and modelling to
103	complex scientific activities with an understanding of the limitations.
	The software engineer and society: Apply reasoning informed by the contextual
PO6	knowledge to assess societal, health, safety, legal and cultural issues, and the
	consequent responsibilities relevant to the professional practice.
	Environment and sustainability: Understand the impact of the professional
PO7	software engineering solutions in societal and environmental contexts, and
	demonstrate the knowledge of, and need for sustainable development.
DO	Ethics: Apply ethical principles and commit to professional ethics and
PO8	responsibilities and norms of the scientific practice.
	Individual and teamwork: Function effectively as an individual, and as a
PO9	member or leader in diverse teams, and in multidisciplinary settings.
	Communication: Communicate effectively on complex activities with the
	scientific community and with the society at large, such as, being able to
PO10	comprehend and write effective reports and design documentation, make effective
	presentations, and give and
	receive clear instructions.
	Project management: Demonstrate knowledge understanding of the scientific
2011	and management principles and apply these to one's own work, as a member and
	leader in a team, to manage projects and in multidisciplinary environments.
	Life-long learning: Recognize the need for, and have the preparation and ability
2012	to engage in independent and life-long learning in the broadest context of
	technological change

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Program Specific Outcomes

Programme	Programme Specific Outcomes
B.Sc. Information Technology	A graduate with a B.Sc. in Information Technology will have the ability to PSO1. Demonstrate mastery of Information Technology in the following core knowledge areas:
	 Data Structures and Programming Languages Databases, Software Engineering and Development, Software Quality Assurance. Blockchain Technology, Artificial Intelligence, Computer Security Computer Hardware and Architecture, Networking, Linux Administration
	PSO2. Apply problem-solving skills and the knowledge of information technology and computing fundamentals to solve real world problems.
	PSO3. Develop technical project reports and present them orally

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Programme: B.Sc. (Information Technology)

Under Choice Based Credit System Programme Structure

(To be implemented from Academic Year- 2019-2020)

F.Y.B.Sc. (Information Technology)

	Semester - I					
Sr. No.	Course Code	Course Title	Course Type	Credits		
1	19UBIT101	Introduction to Information Technology	Core Course	3		
2	19UBIT102	Digital Electronics	Core Course	3		
3	19UBIT103	Introduction to Programming	Skill Enhancement Course	3		
4	19UBIT104	Discrete Mathematics	Allied Course	3		
5	19UBIT105	Communication Skills	Language	3		
6	19UBIT106	Introduction to Information Technology Practical	Core Course Practical	2		
7	19UBIT107	Digital Electronics Practical	Core Course Practical	2		
8	19UBIT108	Introduction to Programming Practical	Skill Enhancement Course Practical	2		
9	19UBIT109	Discrete Mathematics Practical	Allied Course Practical	2		
10	19UBIT110	Foundation Course	Ability Enhancement Compulsory Course	2		
		Total		25		

		Semester - II		
Sr. No.	Course Code	Course Title	Course Type	Credits
1	19UBIT201	Object oriented Programming	Core Course	3
2	19UBIT202	Database management Systems	Core Course	3
3	19UBIT203	Web Programming	Skill Enhancement Course	3
4	19UBIT204	Computer Networks	Skill Enhancement Course	3
5	19UBIT205	Numerical and Statistical Methods	Allied Course	3
6	19UBIT206	Object Oriented Programming Practical	Core Course Practical	2
7	19UBIT207	Database management Systems Practical	Core Course Practical	2 H
8	19UBIT208	Web Programming Practical	Skill Enhancement Course Practical	2
9	19UBIT209	Computer Networks Practical	Skill Enhancement Course Practical	2
10	19UBIT210	Environmental Studies	Ability Enhancement Course	2 Infor:
		Total		250

Programme Structure

(To be implemented from Academic Year- 2020-2021)

S.Y.B.Sc. (Information Technology)

		Seme	ster – 3	
Sr. No.	Course Code	Course Title	Course Type	Credits
1	20UBIT301	Blockchain Technology	General Elective	2
2	20UBIT302	Microprocessor Architecture	Core Course	2
3	20UBIT303	Python Programming	Core Course	2
4	20UBIT304	Core Java	Discipline Specific Elective 1	2
	20UBIT305	C#	Discipline Specific Elective 1	
5	20UBIT306	Data Structure	Core Course	2
6 20UBIT307 Blockchain General Elective Practical Technology Practical		2		
7	20UBIT308	Microprocessor Architecture Practical	Core Course Practical	2
8	20UBIT309	Python Programming Practical	Core Course Practical	2
9	20UBIT310	Core Java Practical	Discipline Specific Elective 1 Practical	2
	20UBIT311	C# Practical	Discipline Specific Elective 1 Practical	
10	20UBIT312	Data Structure Practical	Core Course Practical	2
		Total		20

-		Semes	ster – 4	
Sr. No.	Course Code	Course Title	Course Type	Credits
1	20UBIT401	Artificial Intelligence	Core Course	2
2	20UBIT402	Operating System	Core Course	2
3	20UBIT403	Embedded Systems	Core Course	2
4	20UBIT404	Enterprise Java	Discipline Specific Elective 2	2
	20UBIT405 Net Technology Discipline Specific Elective 2			
5	20UBIT406	Operation Research	General Elective Course	2
6	20UBIT407	Artificial Intelligence Practical	Core Course Practical	2
7	20UBIT408	Operating System Practical	Core Course Practical	2
8	20UBIT409	Embedded Systems Practical	Core Course Practical	2
9	20UBIT410	Enterprise Java Practical	Discipline Specific Elective 2 Practical	2
	20UBIT411	.Net Technologies	Discipline Specific Elective 2 Practical	
10	20UBIT412	Operation Research Practical	General Elective Practical	2
-		Total	Department of	20

Programme Structure

(To be implemented from Academic Year- 2021-2022)

T.Y.B.Sc. (Information Technology)

		Semester - 5		*
Sr. No.	Course Code	Course Title	Course Type	Credits
1	21UBIT501	Software Engineering & Project Management	General Elective	2
2	21UBIT502	Cryptography & Network Security	Core Course	2
3	21UBIT503	Internet of Things	Core Course	2
4	21UBIT504	Spring	Discipline Specific Elective 1	2
	21UBIT505	ASP.Net Core	Discipline Specific Elective 1	
5	21UBIT506	Project	Core Course	4
6	21UBIT507	SEPM Practical	General Elective Practical	2
7	21UBIT508	Cryptography & Network Security Practical	Core Course Practical	2
8	21UBIT509	Internet of Things Practical	Core Course Practical	2
9	21UBIT510	Spring Practical	Discipline Specific Elective 1 Practical	2
	21UBIT511	ASP.Net Core Practical	Discipline Specific Elective 1 Practical	Z
		Total		20

		Semester – 6			
Sr. No.	Course Code	Course Title	Course Type	Credits	
1	21UBIT601	Geographic Information System	Core Course	2	
2	21UBIT602	Software Testing	Core Course	2	
3	21UBIT603	User Experience & User Design	Discipline Specific Elective 1	2	
	21UBIT604	Steganography and Digital Watermarking	Discipline Specific Elective 1	2	
4	21UBIT605	Linux	Discipline Specific Elective 2	2	
	21UBIT606	Android	Discipline Specific Elective 2		
5	21UBIT607	Project	Core Course	4	
6	21UBIT608	Geographic Information System Practical	Core Course Practical	2	
7	21UBIT609	Software Testing Practical	Core Course Practical	2	
8	21UBIT610	User Experience & User Design Practical	Discipline Specific Elective 1 Practical	2	
9	21UBIT611	Steganography and Digital Watermarking Practical	Discipline Specific Elective 1 Practical		
	21UBIT612	Linux Practical	Discipline Specific Elective 2 Practical	HEAD Dartment	

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10	21UBIT613	Android Practical	Discipline Specific Elective 2 Practical	
	MENSON IN	Total		20



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SEMESTER I

B. Sc (Information Technology)		Semester – I	
	luction to Information nology	Course Code	: 19UBIT101
Lectures per week (1	Period is 50 minutes)		5
Cre	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Information Technology)		Semester – I	
	duction to Information zy Practical	Course Code	e: 19UBIT106
Lectures per week (1 Period is 50 minutes)		3	
Cr	edits		2
Evaluation System		Hours	Marks
	Practical Examination	2 Hrs.	50
	Internal		

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Course Outcome:

including the Internet, the Web, Software and Hardware & to identify security and privacy threats in digital environment Demonstrate that they can use digital technology in research, analysis, and critical inquiry Apply a variety of information technologies to their own work, demonstrating their competence in researching, creating, and presenting projects using a	CO	Course Outcomes	Bloom's Taxonomy	PO
Recall the fundamentals of information technology, including the Internet, the Web, Software and Hardware & to identify security and privacy threats in digital environment Demonstrate that they can use digital technology in research, analysis, and critical inquiry Apply a variety of information technologies to their own work, demonstrating their competence in researching, creating, and presenting projects using a	By th	e end of this course, learner will be able to:		
Demonstrate that they can use digital technology in research, analysis, and critical inquiry Apply a variety of information technologies to their own work, demonstrating their competence in researching, creating, and presenting projects using a	1	Recall the fundamentals of information technology, including the Internet, the Web, Software and Hardware & to identify security and privacy threats in digital environment	Understanding	1,2
Apply a variety of information technologies to their own work, demonstrating their competence in researching, creating, and presenting projects using a	2	Demonstrate that they can use digital technology in	Applying	3
HEAD	3	Apply a variety of information technologies to their own work, demonstrating their competence in		4

Department of

Information Technology

B. Sc (Informat	tion Technology)	Seme	ster – I
Course Name: Digital Electronics		Course Code: 19UBIT10	
Lectures per week (1 Period is 50 minutes)		5	
Credits		3	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Informa	tion Technology)	Seme	ster – I
Course Name: Digital Electronics Practical		Course Code: 19UBIT1	
Lectures per week (1 Period is 50 minutes)		3	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:	Remembering	&	1,2
1	Understand the structure of various number systems and its application in digital design	Understanding		
	Apply digital logic it to solve real life problems.	Applying		3
3	Apply digital logic it to solve fear the prosental Analyse, design and implement digital electronic circuits, combinational logic circuits, sequential circuits, multiplexers and demultiplexers & Construct digital circuits using various types of gates	Analyzing		4

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Lectures per week (1 Period is 50 minutes)			5
Cre	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Information Technology) Course Name: Discrete Mathematics Practical Lectures per week (1 Period is 50 minutes) Credits		Semes	ster – I				
		ek (1 Period is 50 minutes) 3					
						Hours	Marks
				Evaluation System	Practical Examination	2 Hrs.	50
	Internal						

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to: Remember and Utilize the algebraic techniques effectively to analyse basic discrete structures and algorithms & Interpret whether the given arguments are valid or invalid logically and mathematically	Understanding	&	1, 2

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B. Sc (Information Technology)	Semester – I	
Course Name: Professional Communication Skills	Course Code: 19UBIT105 5 3	
Lectures per week (1 Period is 50 minutes)		
Credits		
Evaluation System	Hours	Marks

of

B. Sc (Information Technology) Course Name: Introduction to Programming Practical Lectures per week (1 Period is 50 minutes) Credits		Durse Name: Introduction to Programming Practical Course Code: 19UBIT108 Lectures per week (1 Period is 50 minutes) 3					
						Hours	Marks
				Evaluation System	Practical Examination	2 Hrs.	50
					Internal		

B. Sc (Information Technology)		Seme	ster – I
Course Name: Introduction to Programming Lectures per week (1 Period is 50 minutes)		Course Code: 19UBIT10	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Recall and Understand the concept of algorithms based on which they can draw flowcharts for solving Mathematical and Engineering problems.	Remembering & Understanding	1, 2
2	Apply an algorithm for solving Mathematical	Applying	3
3	Analyze and solve the issues in file organization and the usage of file systems	Analyzing	4
4	Develop C applications using C programming language	Creating	3, 5

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B. Sc (Information Technology)	Semester – I
Course Name: Discrete Mathematics	Course Odden 19UBIT104 Department
	Information Technology

Theory Examination	2 Hrs.	60
Internal		40

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Remember and understand how to make their communication more effective	Remembering & Understanding	1, 2, 10
2	Write an impactful resume and job application letter and handle basic business correspondence confidently	Applying	3, 5
3	Analyse the ways to make their communication more effective	Analyzing	4, 10

B. Sc (Information Technology) Course Name: Foundation Course Lectures per week (1 Period is 50 minutes) Credits		Semester – I Course Code: 19UBIT110 5 3					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
					Internal		40

Course Outcome:

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Recall and understand the diverse but united culture of India	Remembering & Understanding	1
2	Develop the empathy towards various social problems of the country	Applying	8
3	Value their fundamental rights and duties s a citizen of the country	Analyzing	12

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SEMESTER II

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B. Sc (Information Technology) Course Name: Object Oriented Programming with C++ Lectures per week (1 Period is 50 minutes) Credits		Semes	ter – II				
		Course Code: 19UBIT201 5 3					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40				

B. Sc (Information Technology)	Semester – II
Course Name: Object Oriented Programming with C++ Practical	Course Code: 19UBIT206
Lectures per week (1 Period is 50 minutes)	3
Credits	HEAD
	Department

Evaluation System		Hours 2 Hrs.	Marks 50
	Practical Examination		
	Internal		

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Understand the principles of Object-oriented programming approach to design software	Remembering & Understanding	1
2	To choose the appropriate concept object – oriented programming for designing applications	Applying	5
3	To develop the applications using Object-oriented programming	Analyzing	3

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B. Sc (Information Technology)		Semester – II					
Course Name: Database Management System Lectures per week (1 Period is 50 minutes) Credits		Course Code: 19UBIT202 5 3					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
Internal		40					

B. Sc (Information Technology) Course Name: Database Management System Practical		Semester – II Course Code: 19UBIT207		
				Lectures per week (
Credits		2		
		Hours	Marks	
Evaluation System	Practical Examination	2 Hrs.	NEADO	
	Internal	Bande	of enemals	
			Sandy Bay Fance	

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		BUNG.
1	Understand database concepts and database management system software	Remembering & Understanding	1, 2
2	Model an application's data requirements using conceptual modelling tools like ER diagrams and design database schemas based on the conceptual model	Applying	5
3	Evaluate business information and find the requirements of a problem in terms of data	Evaluation	4, 6

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B. Sc (Information Technology) Course Name: Web Programming Lectures per week (1 Period is 50 minutes) Credits		Semester – II Course Code: 19UBIT203 5					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
					Internal		40

B. Sc (Information Technology) Course Name: Web Programming Practical Lectures per week (1 Period is 50 minutes) Credits		Semester – II Course Code: 19UBIT208 3 2					
						Hours	Marks
				Evaluation System	Practical Examination	2 Hrs.	50
					Internal		

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:	C(**)	ment
		Banking an	d Insurance

1	Explain aesthetics and formal concepts of layout and organization to design websites that effectively communicate using visual elements	Chacibianiani	1, 2, 3
2	Select and apply markup languages for processing, identifying, and presenting of information in web pages	Applying	5
3	Create websites using appropriate security principles, focusing specifically on the vulnerabilities inherent in common web implementations	Creating	3, 11

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B. Sc (Informa	tion Technology)		ter – II
	omputer Networks	Course Code	: 19UBIT204
Lectures per week (1 Period is 60 minutes) Credits		5	
			3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc	(Information Technology)	Semes	ter – II
Course Name: Computer Networks Practical		Course Code	: 19UBIT209
	er week (1 Period is 60 minutes)		3
Credits			2
		Hours	Marks
Evaluation	Practical Examination	2 Hrs.	50
System	Internal		

Course Outcome:

со	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Understand and apply the terminology and concepts of the OSI reference model and the TCP-IP reference model	Remembering Understanding & Applying	1,2
2	Experience with wireless networking concepts	Applying Debet	ment
		Info Banking Soul	m

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B. Sc (Information Technology)		ter – II	
Course Name: Numerical and Statistical Method		: 19UBIT205	
Lectures per week (1 Period is 50 minutes)		5	
edits		3	
Credits		Marks	
Theory Examination	2 Hrs.	60	
Internal		40	
	al and Statistical Method Period is 50 minutes) edits Theory Examination	al and Statistical Method Course Code Period is 50 minutes) edits Hours Theory Examination 2 Hrs.	

Course Outcome: Bloom's			PO	
СО	Course Outcomes	Taxonomy		
By th	e end of this course, learner will be able to:	I Ding	&	1, 2
1	Compare and calculate errors in approximation by numerical method	Remembering Understanding	α	1, 2
2	Apply Numerical analysis in the field of Science and Engineering and iterational methods to solve problems of nonlinear equations	Applying		4, 5
3	Analyze and interpret the hypothetical results using different statistical test in research	Understanding Analysing	&	3, 4

B. Sc (Informa	tion Technology)	Semester – II	
Course Name: Environmental Studies		Course Code: 19UBIT2	
	Period is 50 minutes)		5
Credits		3	
Cr	cuits	Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

Course Outcome:

PO Bloom's **Course Outcomes** CO Taxonom FADEAD InforBanking and Internan

Program Outcomes

Sr no.	Programme Outcome
PO1.	Scientific knowledge: Apply the knowledge of mathematics, science, and
101,	computing to the solution of complex scientific problems.
PO2	Problem analysis: Identify formulate research literature, and analyse complex
	scientific problems reaching substantiated conclusions using first principles of
	mathematics natural sciences and applied sciences
	Design/development of solutions: Design solutions for complex problems and
	design system components or processes that meet the specified fields with
PO3	appropriate consideration for the public health and safety, and the cultural,
	agginted and anying manufal considerations
	G I I I I I I I I I I I I I I I I I I I
PO4	and research methods including design of experiments, analysis and
	- F J-t J the intermetion to provide valid conclusion
	Madam Asala magga Create select and apply appropriate techniques,
PO5	and modern computing and I tools including prediction and income
100	
	my reasoning illiumica by the control and reasoning illiumica by the
PO6	Impowledge to access societal health, salety, legal and cultural liberty
100	1 11 time relevant to the projessional practice.
	- I metain a hility: I inderstand the impact of the profession
PO7	o and a single single solutions in societal and city in the single singl
	1 and the language of and need for sustainable development
200	Ethics: Apply ethical principles and commit to professional cames and
PO8	ibilities and norms of the scientific Dractice.
	I dividual and teamwork: Function effectively as an individual, and as a
PO9	where or leader in diverse teams, and in multidisciplinary settings.
	Communicate effectively on complex activities with the
	and with the society at large, such as, being able to
PO10	comprehend and write effective reports and design documentation, make effective
	presentations, and give and
	receive clear instructions.
	Project management: Demonstrate knowledge understanding of the scientific
PO11	and management principles and apply these to one's own work, as a member and
	leader in a team, to manage projects and in multidisciplinary environments.
	Life-long learning: Recognize the need for, and have the preparation and ability
PO12	to engage in independent and life-long learning in the broadest context of
	technological change

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Program Specific Outcomes

Programme	Programme Specific Outcomes
B.Sc. Information Technology	A graduate with a B.Sc. in Information Technology will have the ability to PSO1. Demonstrate mastery of Information Technology in the following core knowledge areas:
	 Data Structures and Programming Languages Databases, Software Engineering and Development, Software Quality Assurance. Blockchain Technology, Artificial Intelligence, Computer Security Computer Hardware and Architecture, Networking, Linux Administration
	PSO2. Apply problem-solving skills and the knowledge of information technology and computing fundamentals to solve real world problems.
	PSO3. Develop technical project reports and present them orally

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SEMESTER 3

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B. Sc (Informat	tion Technology)	Semest	er – III
Course Name: Blo	ckchain Technology	Course Code	: 20UBIT301
Lectures per week (1	Period is 50 minutes)		5
	edits		3
A VIEW OF THE PARTY OF THE PART		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40
	Total Marks		100

B. Sc (Information Technology)

Semester – III

Course Name: B	lockchain Practical	Course Code	: 20UBIT307
Lectures per week (1	Period is 50 minutes)		3
Cr	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		1 . 2
1	Clear understanding of State-of-the-art, open research challenges, and future directions & to Understand emerging abstract models for Blockchain Technology	Remembering & Understanding	
2	Understand and Apply Cryptographic concept, Blockchain Technique and Distributed system	Understanding & Applying	4, 5
3	Identify major research challenges and technical gaps existing between theory and practice in cryptocurrency domain. And Design, build, and deploy applications based on Blockchain Technology	Analysing, Evaluate & Applying	4, 5, 6

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R Sc (Informat	tion Technology)	Semest	er – III
	processor Architecture	Course Code	: 20UBIT302
Lectures per week (1	Period is 50 minutes)		5
	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
Evaluation System	Internal		40
	Total Marks		100

	tion Technology)	S-SIDAMI SHIDING	er – III : 20UBIT308
Course Name: Micro	oprocessor Architecture	Course Cour	. 200Bi 1300
Lectures per week (1 Period is 50 minutes)		3
	edits	*	2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrspens	150 50
		In Banking and	Instituce Light

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-	R Sc (Informat	tion Technology)	Semester	- III	C202
	Course Name: Pr	thon Programming	Course Code: 2	MARI	1303
-	ectures per week (1	Period is 50 minutes)	5	_	-
	Cr.	edits	3	Ma	-les
100	Ci		Hours	Ma 6	
17.	Evaluation System Theory Examination Internal		2 Hrs.	and the second	
E				100	
-		Total Marks		10	PO
СО	Course Outcomes	7000	Bloom's Taxonomy		-ro
D 4	e end of this course, le	earner will be able to:			- 1 2
By th	Understand and cla microprocessor and instructions and a	ssify the instruction set of 80 distinguish the use of different apply it in assembly language	ent Onderstand		1, 2
2	programming Develop basic Asse	embly program to use of regis	ter Applying		3, 5
3	system and archite	l architecture of a microcomputecture & organization of 80 and understand the different dvanced microprocessor	85 Analysing	. &	2, 4

B. Sc (Informa	tion Technology)	Semes	ter – III
	n Programming Practical	Course Code	e: 20UBIT309
Lectures per week (1 Period is 50 minutes)		3	
	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal	1	

Cours	e Outcome:	adid Malfins
СО	Course Outcomes	Taxonomyen De of Station 100
By th	e end of this course, learner will be able to:	Barrang aget in

1	Explain basic principles of Python programming language	Remembering Understanding	&	1
2	Apply object-oriented concepts	Applying		2, 5
3	Design and implement a project to solve a real-world problem using the language idioms, data structures, and standard library of Python	Analysing	&	3, 5

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D. C. Anformat	ion Technology)		er – 111
B. Sc (Information Technology) Course Name: Core Java		Course Code: 20UBIT30	
Course Nam	e: Core sava		5
	Period is 50 minutes)		3
Cr	edits	Hours	Marks
	TIL Eination	2 Hrs.	60
Evaluation System	Theory Examination		40
	Internal		100
F	Total Marks		

B. Sc (Informa	B. Sc (Information Technology)		er – III
	Core Java Practical	Course Code	: 20UBIT310
Lectures per week (1 Period is 50 minutes)		3
	redits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

Course Outcome:

СО	Course Outcomes	Bloom's Department Taxonomy
		Information Technologie

1	Define Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.	Remembering Understanding	&	1
2	Demonstrates and explain how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.	Understanding Evaluating	&	2, 5
3	Develop Java based Application and use of different exception handling mechanisms and concept of multithreading, applets, exception handling for robust faster and efficient application development.	Applying Creating	&	3, 5

2000	in Technology)	Seme	ster – I
B. Sc (Informa)	ogramming with C#	Course Code	: 20UBIT305
Course Name: Fr	Period is 50 minutes)		5
Lectures per week (1	edits		3
CI	The state of the s	Hours	Marks
	Theory Examination	2 Hrs.	60
Evaluation System	Internal		40
	Total Marks		100

R Sc (Informa	tion Technology)		ter – III
	mming with C# Practical	Course Code	e: 20UBIT311
Lectures per week (1 Period is 50 minutes) Credits		3 2	
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		PRIN

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co	Course Outcomes	Bloom's Taxonomy		PO
By the	end of this course, learner will be able to:			
1	Define Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.	Remembering Understanding	&	1
2	Demonstrates and explain how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.	Understanding Evaluating	& HEAD	2, 5

3	Develop C# based Application and use of different exception handling mechanisms and concept of multithreading, applets, exception handling for robust faster and efficient application development.	Creating	&	3, 5
---	---	----------	---	------

tion Technology)	Semester – III Course Code: 20UBIT3
Data Structure	5
edits edits	Hours Marks
Theory Examination Internal	2 Hrs. 40
	Data Structure Period is 50 minutes) edits Theory Examination

Name Det	tion Technology) a Structure Practical	Semest Course Code	: 20UBIT312
Lectures per week (Period is 50 minutes)	Hours	Marks 50
Evaluation System	Practical Examination Internal	2 Hrs.	30

	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to: Understand and implement various data structures	Remembering & Understanding Applying	1, 3
2	along with their application Students will be able to develop and implement Linear and Non-Linear data structures Choose the appropriate data structure for modeling a	Analyzing	3
3	Choose the appropriate days	W	5

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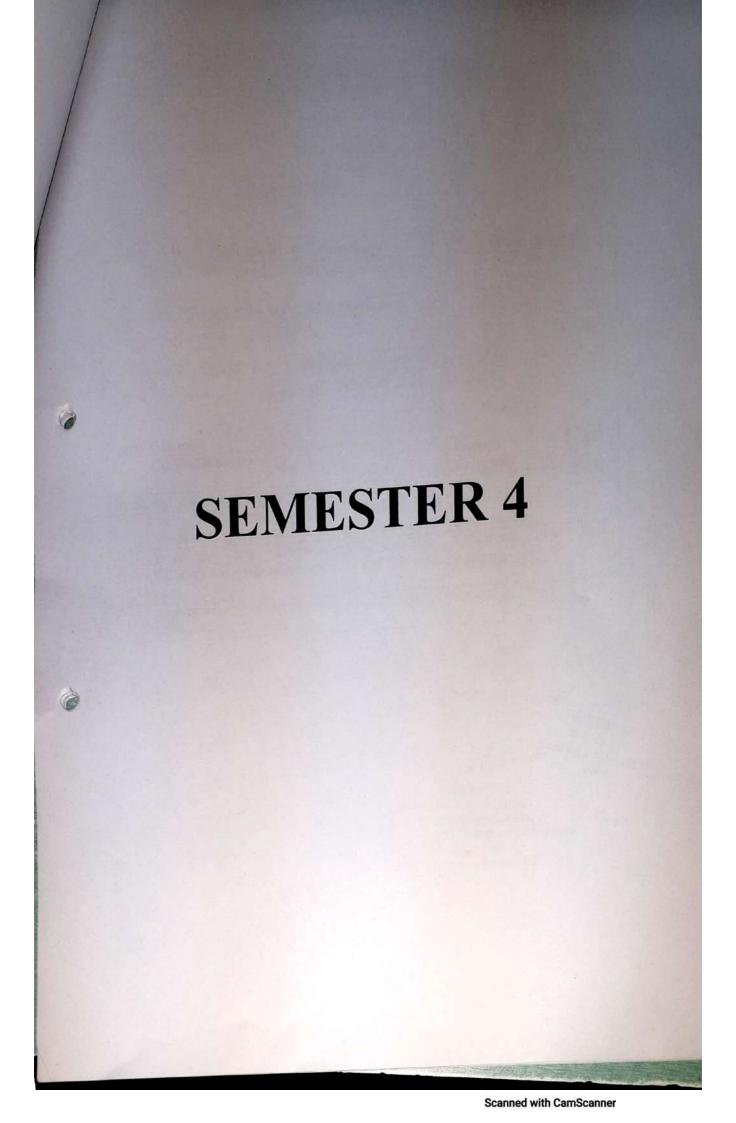
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B. Sc (Information	tion Technology)	Semes	ter – IV
Course Name: A	rtificial Intelligence	Course Code	e: 20UBIT401
Lectures per week (1	Period is 50 minutes)		5
	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40
	Total Marks		100

B. Sc (Informa	tion Technology)		ter - IV
The second secon	cial Intelligence Practical	Course 20UB	e Code: IT407
	(1 Period is 50 minutes)		2
C	redits	Hours	Mark
Evaluation System	Practical Examination	2 Hrs.	50
Evaluation System	Internal		

-	-	14	
Course	()11	teame.	
Course	Vu	ttome.	

Cours	e Outcome:	Bloom's		PO
СО	Course Outcomes	Taxonomy		
By th	be end of this course, learner will be able to: Define & Understand knowledge of the building	Remembering Understanding	&	1
2	blocks of AI as presented in terms of intelligent agents Study and apply various searching algorithms, Understand concept of propositional and first order	Understand	&	2, 5
3	logic. Analyze and formalize the problem based on different techniques to solve them			2, 3

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B. Sc (Informat	ion Technology)	Semeste	r-IV
Course Name: (Perating System	Course Code:	20UBIT402
Lectures per week (1	Period is 50 minutes)	5	
	edits	3	
A SECOND		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40
	Total Marks		100

	tion Technology) rating System Practical	Semester – IV Course Code: 20UBIT408
	1 Period is 50 minutes) redits	2 Hours Mark
Evaluation System	Practical Examination Internal	2 Hrs. 50

Cours	e Outcome: Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to: Understand the concept of a process, thread, mutual exclusion, and deadlock	Understanding Analysing	&	2,5
2	Apply and analyze the concept management techniques of process scheduling	Applying		3, 4
3	Evaluate performance of Parallel algorithms and IPC			0

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B. Sc (Informa	ation Technology)	Semest	er – IV
Course Name:	Embedded System	Course Code	: 20UBIT403
Lectures per week	(1 Period is 50 minutes)		5
(Credits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40
	Total Marks		100

B. Sc (Informat Course Name: Embe	ion Technology) dded System Practical	Semester – IV Course Code: 20UBIT
Lectures per week (1	Period is 50 minutes) edits	2 Hours Mar
Evaluation System	Practical Examination Internal	2 Hrs. 50

ours	e Outcome:	Bloom's Taxonomy	PO
CO	Course Outcomes	Taxonomy	
By th	ne end of this course, learner will be able to: de end of this course, learner will be able to: design	Remembering &	1, 3
1	requirements of embedded systems	Understanding Evaluating &	4,5
2	Evaluate the requirements of programmers and tool chain Systems, related software architectures and tool chain		3, 4,
3	for Embedded Systems Analyze the embedded systems' specification and develop software programs		

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m Landow)	Semester – IV
B. Sc (Information Technology)	Course Code: 20UBIT404
Course Name: Enterprise Java Lectures per week (1 Period is 50 minutes)	3 Department
Lectures per Week (17 cm) Credits	Information of the state of the
	Inganhattori Alasuranea



		Hours	Marks
Evaluation System	Theory Examination	y Examination 2 Hrs. Internal	60
valuation System	Internal		40
	Total Marks		100

B. Sc (Information Technology) Course Name: Enterprise Java Practical		Semester – IV Course Code: 20UBIT41	
	Credits		2
		Hours	Marks
Evaluation	Practical Examination	2 Hrs.	50
System	Internal		

CO	Course Outcomes	Bloom's Taxonomy		PO
By th	Define the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans	Remembering Understanding	&	1, 2
2	(EJB) Apply event handling on Swing components Understand the use Struts frameworks and apply the concept to reuse the codes for quick development	Applying	&	3, 5

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B. Sc (Information Technology) Course Name: .NET Technology Lectures per week (1 Period is 50 minutes)		Semester – IV Course Code: 20UBIT405		
		Cre	edits	
		Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60	
Dimminus of store	Internal		40	
	Total Marks		100	

B. Sc (Information Technology)	Semes	ter – IV
	ne: .NET Technology Practical	Course Code	e: 20UBIT411
	r week (1 Period is 60 minutes)		3
	Credits		Marks
		Hours	Commence of the Commence of th
Evaluation	Practical Examination	2 Hrs.	50
System	Internal		

	Bloom's	PO
Course Outcomes	Taxonomy	
the end of this course, learner will be able to:	Remembering &	1, 2, 5
id the features of ASP NET & C#	9.1.	3, 5
Use appropriate data sources and data bindings in		2, 3, 5
Create dynamic web applications, create and consume	Creating	2, 3, 3
	Use appropriate data sources and data bindings in	Course Outcomes Taxonomy Te end of this course, learner will be able to: Demonstrate the features of Dot Net Framework along with the features of ASP. NET & C# Use appropriate data sources and data bindings in ASP.NET web applications Create dynamic web applications, create and consume Creating

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G Name: On	Bhulabhai De. tion Technologykandivii (Wes. erational Research	Course Code	: 19UBIT406
Course Name: Op	Period is 50 minutes)		5
Lectures per week (1 Period is 50 minutes)		3	
Credits	turis .	Hours	Marks
Crustom	Theory Examination	Hours 2 Hrs.	Marks 60
Evaluation System	Internal		40

(Information Technology)	Semester – IV	
: Operational Research Practical	Course Co	de: 20UBIT412
r week (1 Period is 60 minutes)		3
Credits		2
	Hours	Marks
Practical Examination	2 Hrs.	HEA50
Internal		Department
	Practical Examination	c: Operational Research Practical cr week (1 Period is 60 minutes) Credits Hours Practical Examination 2 Hrs.

CO	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:		1 1	
1	Understand the usage of game theory and PERT and CPM in solving Business Problems	Remembering Understanding	&	1, 2
2	Define and apply the best way of transporting goods and assigning the jobs to people	Understanding Applying	&	2, 10,
3	Apply the concept of Linear Programming in solving the problems	Applying		2, 6

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SEMESTER 5

B. Sc (Information Technology) Course Name: Software Engineering & Project Management		Semester - V		
		Course Code: 21UBIT5		
Lectures per week (1	Period is 50 minutes)		5	
Cr	edits		2	
		Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal		40	

B. Sc (Information Technology)		Semester - V	
	SEPM Practicals	Course Code	: 21UBIT50
Lectures per week (1			5
	edits		2
CI	- Curto	Hours	Marks
	Theory Examination	2 Hrs.	60
Evaluation System	Internal		40

Camero	Outcome:
COULTSE	Outcome.

	se Outcome: Course Outcomes	Bloom's Taxonomy		
March September	he end of this course, learner will be able to: Define and Understand the concepts of Software	Remembering Understanding Applying Analysing Analyzing	&	1, 2, 1 1, 2, 3 4, 5, 6 3, 4, 6 8, 9, 10, 11 12

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	Semester - V
B. Sc (Information Technology)	Course Code: 21UBIT502
B. Sc (Information	Course
B. Sc (Information Technology Course Name: Cryptography & Network Security Course Name: (1 Period is 50 minutes)	2 HEAD
Course Name: Cryptography Clubs (1 Period is 50 minutes) Lectures per week (1 Period is 50 minutes)	Depar Mirris
Credits	Hours of
	Information Technology
Evaluation System	1
Evaluation System	1



Theory Examination	2 Hrs.	60
Internal		40

B. Sc (Information Technology) Course Name: Cryptography & Network Security Lectures per week (1 Period is 50 minutes) Credits		Semester – V Course Code: 21UBIT508			
					5 2
				Hours	
		Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40		

Ours	e Outcome.			PO	
CO	Course Outcomes	Bloom's Taxonomy		PO	
By th	e end of this course, learner will be able to:		&	1, 2, 8	
1	Define, Understand and Classify various cryptographic terms	Remembering Understanding	α		
2	Understand and Apply Various symmetric and	Understanding Applying	&	1, 2, 3	
3	asymmetric key cryptography and Mode of operations Understand and Evaluate various cryptographic algorithm & various TCP - IP threats and	Understanding	&	2, 4, 6, 8	
	vulnerabilities		-		

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B. Sc (Information Technology)		Semes	ter – V		
	Internet of Things	Course Code: 21UBIT:		Course Code: 21UBIT50	
	Period is 50 minutes)		5		
	edits		2		
		Hours	Marks		
Course Name	Theory Examination	2 Hrs.	60		
2,	Internal		40		
		D. C.			

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B. Sc (Information Technology) Course Name: Internet of Things Practicals Lectures per week (1 Period is 50 minutes) Credits		Semester – V Course Code: 21UNIT509 5 2					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
					Internal		40

CO	Course Outcomes Bloom's Taxonomy			PO
By th	e end of this course, learner will be able to:			
1	Acquire good understanding of the Internet of Things concept and systems architecture	Remembering Understanding	&	1, 3
2	Conceptualize the standard security and privacy preserving mechanisms, and understand different cloud integration methods	Understanding Applying	&	2, 5
3	Operate with wireless technologies and networking protocols specific to IoT systems & Design, implement, test and create IoT system equipped with sensors and wireless transceivers to help the society	Applying Evaluating Creating	and	2, 3, 5, 6, 7

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B. Sc (Information Technology)		Semester – V	
Course Name: Spring		Course Code: 21UBIT504	
Lectures per week (1 Period is 50 minutes) Credits		5 2	
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Information Technology)	Semester - V	
Course Name: Spring Practicals	Course Code: 21UBIT510	
Lectures per week (1 Period is 50 minutes)	5	
Credits	Department	
	Information Technolog	

Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40

Course Outcome:

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		- 1 - 1-m)		ster – V	14
	Course Name: ASP.NET CORE		Course Code: 21UBIT505		Г505
				5	
T	octures ner week (1	Period is 50 minutes)		2	
	Cre	edits		Ma	rks
			Hours	6	
		Theory Examination	2 Hrs.		
E	aluation System	Internal		4	
		Internal	Bloom's		PO
CO	Course Outcomes		Taxonomy	to a	
By th	Framework, Lightwo	eight Container and Depender	Applying	ing ling &	1, 3, 5
2	Injection with Spring		and Applying lbc		
	Template and Spring	W. h. Application and Spring	Applying Creating	and	2, 3,
3	Boot RESTful Webs	Services and Develop spect Oriented Programming			

	1 - 1	Semes	ter – V
B. Sc (Information Technology) Course Name: ASP.NET CORE Practical		Course Code	: 21UBIT511
Course Name: AS	P.NET CORE Fractical Powind is 50 minutes)		5
Lectures per week (1	Period is 50 minutes)		2
Cr	edits	Hours	Marks
	Theory Examination	2 Hrs.	HEAD
Evaluation System	Internal		Department
		Info	tmation Techni

Information Technology

course Outcome:

CO By th	Course Outcomes	Bloom's Taxonomy	PO
1	To remember and understand the concepts of .NET core framework	Remembering & Understanding	1, 2, 3
3	Develop robust ASP .NET Core application	Creating	2, 3, 5, 8
_	Evaluating the performance of application with integrated tools and services	Evaluation	2, 4, 5

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B. Sc (Informa	ation Technology)	Semeste	i (West), Mum e r – V
Course N	ame: Project	Course Code:	21UBIT516
Lectures per week (1 Period is 50 minutes)		5	
Cro	edits	4	ly
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

Course Outcome:

	Course Outcomes	Bloom's Taxonomy	PO
By the	e end of this course, learner will be able to:		
2	Students will be able to communicate with Clients and define the requirements based on problems in the existing system.	Understanding, Analysing &	1, 2, 4, 5, 6, 7, 10
	Students will be able to design, develop and deploy solution to meet all the user and system requirements.	Understanding, Applying, Analysing &	2, 4, 5, 6, 8, 9, 10, 11

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Students will be able to design use cases and test cases to evaluate the performance of system & estimate the		2, 3, 4, 5,
	Evaluating	10, 11, 12



SEMESTER 6

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B. Sc (Informati	on Technology)	Semeste Course Code	211/BIT60
Course Name: Geogra	phical Information System	Course Code	ZICD
Lectures per week (1	Period is 50 minutes)		3
	edits	Manne	Marks
		Hours	60
	Theory Examination	2 Hrs.	40
Evaluation System	Internal		40

	ion Technology)	Semeste	er - V1
B. Sc (Information Technology) Course Name: Geographical Information System Practical		Course Code: 21UBIT608	
Cre	edits	Hours	Marks
	Theory Examination	2 Hrs.	60
Evaluation System	Internal		40

CO	Course Outcomes	Bloom's Taxonomy	РО
By the	e end of this course, learner will be able to: Understand the concept of maps, coordinate system basics, cartography and principles of GIS.	Remembering & Understanding	1
2	Designing and developing Maps based Real world		3, 5
3	Analyze spatial data, using GIS analysis tools.	Analyzing of Of Techn	2,5



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B. Sc (Information Technology)		Semester – VI	
Course Name:	Software Testing	Course Code	: 21UBIT602
Lectures per week (1 Period is 50 minutes)		5	
Cre	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Informa	tion Technology)	Semester – VI Course Code: 21UBIT60	
	esting & Quality Assurance		
Lectures per week (1 Period is 50 minutes) Credits		5	
Evaluation System	Theory Examination	2 Hrs.	60
Diametron System	Internal		40

	se Outcome:	Bloom's	PO
CO	Course Outcomes	Taxonomy	
By th	ne end of this course, learner will be able to:		
1	Study principles of Software testing and Quality Assurance	Remembering & Understanding	1, 2, 3, 4
2	Identify Levels of testing, classify types of testing and understand & apply techniques of testing & create and communicate the test report	Understanding, Applying, Analysing and Evaluating	1, 2, 3, 4, 5, 6, 8, 9,
3	Explore various software testing tools and implement the tool for testing software components and system throughout the software development process	Applying, Analysing, Evaluating and Creating HEAD Department	1, 2, 5, 6, 7, 8, 9, 10,

Information Technology

B. Sc (Information Technology)		Semester - VI					
Lectures per week (1 Period is 50 minutes) Credits		Course Code: 21UBIT603 5 3					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40				

B. Sc (Information Technology)		Semester - VI	
Course Name: User Experience & User Design Practical		Course Code: 21UBIT61	
Lectures per week (1 Period is 50 minutes)			5
Credits		3	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

Course Outcome: Bloom's			PO	
CO	Course Outcomes	Taxonomy	<u> </u>	
By th	e end of this course, learner will be able to:	Remembering	&	1
1	Understand and create interest in User Experience	Understanding		2, 3, 5
2	Apply prototyping and problems solving term			2, 3
3	Analyze the framework and methodological approach for user experience design			

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B. Sc (Information Technology)	Semester - VI
Course Name: Stegnography and Digital Watermarking	Course Code:21UBIT604
Lectures per week (1 Period is 50 minutes)	PERD
Credits	Information Technology



		Hours	Marks
System System	Theory Examination	2 Hrs.	60
Galuation System	Internal		40

B. Sc (Information Technology)		Semester - VI					
Course Name: Steganography and Digital Watermarking Practical Lectures per week (1 Period is 50 minutes) Credits		Course Code:21UBIT611 5 3					
				Creation		Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
Internal		40					

CO	Course Outcomes	Bloom's Taxonomy	PO
	e end of this course, learner will be able to: Describe various finger printing techniques	Remembering &	1
1	and and	Understanding Applying	2, 3, 5
2	Implement algorithms for steganography		2, 3
3	Evaluate steganography and watermarking algorithms for robustness		

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So (Informat	ion Technology)	Semester - VI					
B. Sc (Information Technology) Course Name: Linux Lectures per week (1 Period is 50 minutes) Credits		Course Code: 21UBIT605 5 3					
						Hours	Marks
				Cyctem	Theory Examination	2 Hrs.	60
valuation System	Internal		40				

B. Sc (Informati	ion Technology)		ter – VI
AND THE RESERVE TO SERVE THE PARTY OF THE PA		Course Code	e: 21UBIT61
Course Name: Linux Practical Lectures per week (1 Period is 50 minutes)			5
Credits			3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to: Understand and remember the concepts of Linux environment, its shell and shell programming environment.	Remembering & Understanding Applying	2, 3, 5
2	Install appropriate service on Email requirement and Develop Linux based systems and maintain	Analyzing	3
3	maintain Analyse and compare the computer resources utilization in Linux Environment and windows environment		

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B. Sc (Information Technology) Course Name: Android		Semester – VI Course Code: 21UBIT606	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Informat	ion Technology)	Semest	ter – VI				
Course Name: Android Practical Lectures per week (1 Period is 50 minutes) Credits		Course Code: 21UBIT613 5 3					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40				

Course Outcome:

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Demonstrate Android activities life cycle	Remembering & Understanding	1
2	Apply proficiency in coding on a mobile programming platform	Applying	5
3	Design and develop innovative android applications	Analyzing	3

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B. Sc (Information Technology)	Semester - VI	
Course Name: Project	Course Code: 21UBIT607	
Lectures per week (1 Period is 50 minutes)	5 HEAD	
Credits	P epartment	



gation System

	Hours	Marks
IMPLEMENTATION & VIVA VOCE	2 Hrs.	60
PROJECT REPORT		40

1	Outcome: Course Outcomes	Bloom's Taxonomy	PO
by the	Students will be able to communicate with Clients and define the requirements based on problems in the existing system. Students will be able to design, develop and deploy solution to meet all the user and system requirements.	Remembering, Understanding, Analysing & Evaluating Understanding, Applying, Analysing & Creating	1, 2, 4, 5 6, 7, 10 2, 4, 5, 6 8, 9, 10 11
	Students will be able to design use cases and test cases to evaluate the performance of system & estimate the cost and efforts.	Applying, Analysing and Evaluating	2, 3, 4, 5 6, 7, 8, 9 10, 11, 11

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Programme: Bachelor of Science Specialization: Data Science

Program Outcomes

Sr no.	Programme Outcome
PO1.	Scientific knowledge: Apply the knowledge of mathematics, science and
101.	computing to the solution of codmplex scientific problems
PO2	Problem analysis: Identify, formulate, research literature, and analyse complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and applied sciences.
PO3	Design/development of solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tools usage: Create, select, and apply appropriate techniques, resources, and modern computing and IT tools including prediction and modelling to complex scientific activities with an understanding of the limitations.
PO6	The software engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional practice.
PO7	Environment and sustainability: Understand the impact of the professional software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.
PO9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management: Demonstrate knowledge understanding of the scientific and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

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CRITERIA — II
Teaching-learning and

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Program Specific Outcomes

Programme	Programme Specific Outcomes
B.Sc. Data Science	A graduate with a B.Sc. in Data Science will have the ability to PSO1. Demonstrate mastery of Data Science in the following core knowledge areas:
	 Statistics, Data Structures and Programming Languages Databases, Big data, and cloud computing, Computer networking Artificial Intelligence, Machine Learning, Deep Learning, Data Visualization
	PSO2. Apply problem-solving skills and the knowledge data Science and computing fundamentals to solve real world problems.
	PSO3. Develop technical project reports and present them orally

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Programme Structure

(To be implemented from Academic Year- 2020 - 2021)

F.Y.B.Sc. (Data Science)

		Semester – I		
Sr. No.	Course Code	Course Title	Course Type	Credits
1	20UBDS101	Professional Communication Skill	Ability Enhancement Course	2
2	20UBDS102	Foundation Course	Ability Enhancement Course	2
3	20UBDS103	Database Management System	Core Course	2
4	20UBDS104	Descriptive Statistics	Core Course	2
5	20UBDS105	Digital Computer Fundamentals	Core Course	
6	20UBDS106	Introduction to programming with C++	Skill Enhancement Course	2
7	20UBDS107	Database Management System Practical	Core Course Practical	2
8	20UBDS108	Descriptive Statistics Practical	Core Course Practical	2
9	20UBDS109	Digital Computer Fundamentals Practical	Core Course Practical	2
10	20UBDS110	Introduction to programming with C++ Practical	Skill Enhancement Course Practical	2
		Total		20

		Semester – II		T 10.
Sr.	Course	Course Title	Course Type	Credits
No.	Code	Environmental Studies	Ability Enhancement	2
1	20UBDS201	Environmentar State	Course	1
2	20UBDS202	Advance Database	Core Course	2
	20UBDS203	Management System Introduction to Data Science	Core Course	2
3		and Analytics Theory of Probability	Core Course	2
4	20UBDS204	Python Programming	Skill Enhancement	
5	20UBDS205	Python Programming	Course	1
	20UBDS206	Web Programming	Skill Enhancement Course	2
6		Advance Database	Core Course Practical	2
7	20UBDS207	ament System Practical	G Practical	2
0	20UBDS208	of Probability Flactical	Core Course Practical Skill Enhancement	2
8	20UBDS209	Python Programming Practical	Course Practical	2
9		Web programming Practical	Skill Enhancement Course Practical	4
10	20UBDS210	web programme	Course Fraction	20
		Total	PRINCIPAL	

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B. Sc (Da	ta Science)	Semes	ster – I
Course Name: Professional Communication Skills Lectures per week (1 Period is 50 minutes)		Course Code: 20UBDS101	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy	РО
By th	e end of this course, learner will be able to:		1.2
1	Remember and understand how to make their communication more effective	Remembering & Understanding	1, 2, 10
2	Write an impactful resume and job application letter and handle basic business correspondence confidently	Applying	3, 5
3	Analyse the ways to make their communication more effective	Analyzing	4, 10

B Sc (Da	ta Science)	Semes	ster – I
	oundation Course	Course Code	: 20UBDS102
	Period is 50 minutes)		5
Credits	3		
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:	Remembering &	1
1	Recall and understand the diverse but united culture of India	Understanding	0
2	Develop the empathy towards various social problems of	Applying	8
	the country Value their fundamental rights and duties s a citizen of the		12
3	Value their fundamental rights		

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B. Sc (Data Science) Course Name: Database Management System Lectures per week (1 Period is 50 minutes) Credits		Semes	ster – I	
		Course Name: Database Management System Course Code: 20UBDS		: 20UBDS103
		5		
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal		40	

B. Sc (Data Science)		Semes	ster – I
Course Name: Database Management System Practical		Course Code	: 20UBDS107
Lectures per week (1 Period is 50 minutes)			5
Credits		3	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Understand database concepts and database management system software	Remembering & Understanding	1, 2
2	Model an application's data requirements using conceptual modelling tools like ER diagrams and design database schemas based on the conceptual model	Applying	5
3	Evaluate business information and find the requirements of a problem in terms of data	Evaluation	4, 6

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B. Sc (Da	B. Sc (Data Science)		B. Sc (Data Science) Semester - I		ster – I		
Course Name: Descriptive Statistics Lectures per week (1 Period is 50 minutes) Credits		Lectures per week (1 Period is 50 minutes) 5					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40				

B. Sc (Data Science)		B. Sc (Data Science) Semester			
Course Name: Descriptive Statistics Practical Lectures per week (1 Period is 50 minutes)		Course Name: Descriptive Statistics Practical		Course Code	: 20UBDS108
		5			
Credits		3			
		Hours	Marks		
Evaluation System	Theory Examination	2 Hrs.	60		
	Internal		40		

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	ne end of this course, learner will be able to:		
1	Study and understand the terminology and special notation of statistical analysis.	Remembering & Understanding	1, 2
2	Evaluate and interpret the various measures of central tendency, dispersion skewness, Kurtosis,	Understanding and Evaluating	1,2,3
3	Use R Studio for descriptive Statistics analysis	Applying and Analysing	2,3,5

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B. Sc (Data Science) Course Name: Digital Computer Fundamental Lectures per week (1 Period is 50 minutes) Credits		ourse Name: Digital Computer Fundamental Course Code: 20UBDS105 Lectures per week (1 Period is 50 minutes) 5					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
					Internal		40

B. Sc (Data Science)		B. Sc (Data Science) Semes		ster – I
Course Name: Digital Computer Fundamental Practical		Course Code	: 20UBDS109	
Lectures per week (1 Period is 50 minutes) Credits		5		
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal		40	

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Understand the structure of various number systems and its application in digital design	Remembering & Understanding	1,2
2	Apply digital logic it to solve real life problems.	Applying	3
3	Analyse, design and implement digital electronic circuits, combinational logic circuits, sequential circuits, multiplexers and demultiplexers & Construct digital circuits using various types of gates	Analyzing	4

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B. Sc (Da	B. Sc (Data Science)		ster – I	
Course Name: Introduction to Programming with C++ Lectures per week (1 Period is 50 minutes)		0		: 20UBDS106
		5		
Credits		3		
		Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal		40	

B. Sc (Data Science) Course Name: Introduction to Programming with C++ Practical Lectures per week (1 Period is 50 minutes)		B. Sc (Data Science) Semester – I		ster – I
		: 20UBDS110		
		5		
Credits		3		
TELLIS FERRINGE	Hours	Marks		
Theory Examination	2 Hrs.	60		
Internal		40		
	ion to Programming with ractical Period is 50 minutes) dits Theory Examination	cion to Programming with ractical Period is 50 minutes) dits Hours Theory Examination 2 Hrs.		

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Recall and Understand the concept of algorithms based on which they can draw flowcharts for solving Mathematical and Engineering problems.	Remembering & Understanding	1, 2
2	Apply an algorithm for solving Mathematical and Engineering problems.	Applying	3
3	Analyze and solve the issues in file organization and the usage of file systems	Analyzing	4
4	Develop C++ applications using C++ programming language	Creating	3, 5

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SEMESTER II

B. Sc (Data Science)		Semester – II	
Course Name: Environmental Studies		nvironmental Studies Course Code: 20UBDS2	
Lectures per week (1 Period is 50 minutes)		5	
Cre	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy	РО
By th	e end of this course, learner will be able to:		
1	Understand the various environmental problems of the world	Remembering & Understanding	7
2	Demonstrate their fundamental rights and duties as a citizen for conservation of natural and man-made resources	Applying	8
3	Examine their fundamental rights and duties as a citizen for conservation of natural and man-made resources	Analyzing	8, 12

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B. Sc (Data Science)		Semester - II	
Course Name: Advance Database Management System		Course Code: 20UBDS2	
Lectures per week (1 Period is 50 minutes) Credits		5	
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Data Science)		Semester – II	
Course Name: Advance Database Management System Practical		Course Code: 20UBDS2	
Lectures per week (1	Period is 50 minutes)	5	
Credits		3	
	The state of the s	Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Understand advanced database concepts distributed, parallel and object-oriented databases.	Remembering & Understanding	1, 2, 5
2	Understand and apply the concept of data warehousing.	Understanding & Applying	1, 2, 5
3	Understand and apply the concept of data mining and differentiate between classification and clustering methods.	Understanding, Applying and Analyzing	1, 2, 5

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Course Name: Introduction to Data Science and Analytics Course Cod		urse Name: Introduction to Data Science and Course Code: 20UBDS203						
				Cr	Credits		3	
						Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60					
	Internal		40					

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	ne end of this course, learner will be able to:		
1	Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.	Remembering & Understanding	
2	Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NOSQL in big data analytics and Interpret business models, scientific computing paradigms, and apply software tools for big data analytics.	Applying and Analyzing	1, 2, 3, 4
3	Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.	Understanding, Applying	2, 3, 5

B. Sc (Data Science)		Data Science) Semester – II	
Course Name: Th	neory of Probability	Course Code: 20UBDS	
Lectures per week (1 Period is 50 minutes) Credits		5	
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Data Science)		Semester – II	
Course Name: Theory	of Probability Practical	robability Practical Course Code: 20UBDS2	
Lectures per week (1	Period is 50 minutes)	5	
Cr	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

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co	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Articulate the axioms (laws) of probability; Define event, outcome, trial, simple event, sample space and calculate the probability that an event will occur.	Remembering Understanding	&	1, 2, 3
2	Apply probability distributions and recognize them in applications	Remember, Applying		1, 2, 3, 4
3	Learn and develop complex mathematical reasoning	Applying Analyzing	&	2, 3,4

B. Sc (Data Science)		Semester – II					
Course Name: Python Programming Lectures per week (1 Period is 50 minutes) Credits		Course Code: 20UBDS205 5 3					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40				

B. Sc (Data Science) Course Name: Python Programming Practical Lectures per week (1 Period is 50 minutes)		Semester – II Course Code: 20UBDS209 5					
				Cr	edits		3
						Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60				
	Internal		40				

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Explain basic principles of Python programming language	Remembering Understanding	&	1
2	Apply object-oriented concepts	Applying		2, 5
3	Design and implement a project to solve a real-world problem using the language idioms, data structures, and standard library of Python	Analysing Creating	&	3, 5

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B. Sc (Da	B. Sc (Data Science) Course Name: Web Programming		Semester – II	
Course Name: V			: 20UBDS206	
Lectures per week (1 Period is 50 minutes)		5		
Cr	edits		3	
		Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal		40	

B. Sc (Data Science)		Semes	ter – II
Course Name: Web	Programming Practical	Course Code	: 20UBDS210
Lectures per week (1	Period is 50 minutes)		5
Cr	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Explain aesthetics and formal concepts of layout and organization to design websites that effectively communicate using visual elements	Understanding & Evaluating	1, 2, 3
2	Select and apply markup languages for processing, identifying, and presenting of information in web pages		5
3	Create websites using appropriate security principles, focusing specifically on the vulnerabilities inherent in common web implementations	Creating	3, 11

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Programme Structure

(To be implemented from Academic Year- 2021 - 2022)

S.Y.B.Sc. (Data Science)

		Semester – Il		
Sr. No.	Course Code	Course Title	Course Type	Credits
1	21UBDS301	Java	Ability Enhancement Course	2
2	21UBDS302	Data Structure	Ability Enhancement Course	2
3	21UBDS303	Inferential Statistics	Core Course	2
4	21UBDS304	Artificial Intelligence	Core Course	2
5	21UBDS305	Data Science with Python	Core Course	2
6	21UBDS306	Java Practical	Skill Enhancement Course	2
7	21UBDS307	Data Communication & Networking Practical	Core Course Practical	2
8	21UBDS308	Inferential Statistics Practical	Core Course Practical	2
9	21UBDS309	Artificial Intelligence Practical	Core Course Practical	. 2
10	21UBDS310	Data Science with Python Practical	Skill Enhancement Course Practical	2
		Total		20

		Semester – I	V	
Sr. No.	Course Code	Course Title	Course Type	Credits
1	21UBDS401	Advanced Web Programming	Ability Enhancement Course	2
2	21UBDS402	Fundamentals of Data Science	Core Course	2
3	21UBDS403	Industrial Statistics	Core Course	2
4	21UBDS404	R Programming	Core Course	2
5	21UBDS405	Data Communication & Networking	Skill Enhancement Course	2
6	21UBDS406	Advanced Web Programming Practical	Skill Enhancement Course	2
7	21UBDS407	Fundamentals of Data Science Practical	Core Course Practical	2
8	21UBDS408	Industrial Statistics Practical	Core Course Practical	2
9	21UBDS409	R Programming Practical	Skill Enhancement Course Practical	2
10	21UBDS410	Data Structure Practical	Skill Enhancement Course Practical	2
		Total		20

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Programme Structure (To be implemented from Academic Year- 2021 - 2022)

S.Y.B.Sc. (Data Science)

		Semester – II		
Sr. No.	Course Code	Course Title	Course Type	Credits
1	21UBDS301	Java	Ability Enhancement Course	2
2	21UBDS302	Data Structure	Ability Enhancement Course	2
3	21UBDS303	Inferential Statistics	Core Course	2
4	21UBDS304	Artificial Intelligence	Core Course	2
5	21UBDS305	Data Science with Python	Core Course	2
6	21UBDS306	Java Practical	Skill Enhancement Course	2
7	21UBDS307	Data Communication & Networking Practical	Core Course Practical	2
8	21UBDS308	Inferential Statistics Practical	Core Course Practical	2
9	21UBDS309	Artificial Intelligence Practical	Core Course Practical	2
10	21UBDS310	Data Science with Python Practical	Skill Enhancement Course Practical	2
		Total		20

		Semester – IV		
Sr. No.	Course Code	Course Title	Course Type	Credits
1	21UBDS401	Advanced Web Programming	Ability Enhancement Course	2
2	21UBDS402	Fundamentals of Data Science	Core Course	2
3	21UBDS403	Industrial Statistics	Core Course	2
4	21UBDS404	R Programming	Core Course	2
5	21UBDS405	Data Communication & Networking	Skill Enhancement Course	2
6	21UBDS406	Advanced Web Programming Practical	Skill Enhancement Course	2
7	21UBDS407	Fundamentals of Data Science Practical	Core Course Practical	2
8	21UBDS408	Industrial Statistics Practical	Core Course Practical	2
9	21UBDS409	R Programming Practical	Skill Enhancement Course Practical	2
10	21UBDS410	Data Structure Practical	Skill Enhancement Course Practical	2
		Total		20

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SEMESTER III

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B. Sc (Data Science) Course Name: Java Lectures per week (1 Period is 50 minutes)		Semes	ter – III
		Course Code: 21UBDS30	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
*	Internal		40

B. Sc (Data Science) Course Name: Java Practical Lectures per week (1 Period is 50 minutes)			ter – III
		Course Code: 21UBDS30	
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
2741444	Internal		40

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	Define Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building	Remembering Understanding	&	1
2	activity. Demonstrates and explain how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be	Understanding Evaluating	&	2, 5
3	achieved. Develop Java based Application and use of different exception handling mechanisms and concept of multithreading, applets, exception handling for robust faster and efficient application development.	Creating	&	3, 5

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B. Sc (Data Science) Course Name: Data Structure Lectures per week (1 Period is 50 minutes)		Semester – III Course Code: 21UBDS302 5					
				Cre	edits		2
						Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60				
	Internal		40				

B. Sc (Data Science)		Semester – IV	
Course Name: Data Structure Practical		Course Code	: 21UBDS307
Lectures per week (1 Period is 50 minutes)		3	
Cr	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	ne end of this course, learner will be able to:		
1	Understand and implement various data structures along with their application	Remembering & Understanding	1, 3
2	Students will be able to develop and implement Linear and Non-Linear data structures	Applying	3, 5
3	Choose the appropriate data structure for modeling a given problem	Analyzing	3

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B. Sc (Da	B. Sc (Data Science)		ter – III
Course Name: Inferential Statistics Lectures per week (1 Period is 50 minutes)		Course Code: 21UBDS303	
PURSING R. TAILS		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Data Science) Course Name: Inferential Statistics Practical Lectures per week (1 Period is 50 minutes)		Semester – III Course Code: 21UBDS30					
					edits		2
						Hours	Marks
	Practical Examination	2 Hrs.	50				
Evaluation System			40				
	Internal						

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	Apply probabilistic and statistical reasoning to describe and analyze essential features of data sets	Remembering, Understanding & Applying	1, 2, 3
2	Understand statistical techniques to estimate the population mean, proportion and variance, Use and	Understanding & Applying	
3	applications in real-life business situations. Acquire techniques to test hypothesis with an assumption on the population means, proportions and variances under different circumstances.	Analyzing and Evaluating	2, 3, 5

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	B. Sc (Data Science)		Semester – III	
Course Name: Artificial Intelligence Lectures per week (1 Period is 50 minutes)		Course Code: 21UBDS304		
				Cre
		Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal		40	

B. Sc (Data Science) Course Name: Artificial Intelligence Practical Lectures per week (1 Period is 50 minutes)		ter – III
		e: 21UBDS309
		3
edits		2
	Hours	Marks
Practical Examination	2 Hrs.	50
		40
	Period is 50 minutes) edits Practical Examination	ial Intelligence Practical Period is 50 minutes) edits Hours

СО	Course Outcomes	Bloom's Taxonomy		PO
	e end of this course, learner will be able to: Understand Artificial Intelligence, its components	Luing	&	1,2,3
1	and influence on business.	Understand	&	2, 3,4
2	and influence on business. Comprehend the impact of Artificial Intelligence in marketing, understand its implications, determine how to optimize AI in this field and apply the	Applying		
	learnings to use cases.	Applying Analysing	&	2, 3, 4, 6
3	Develop an understanding of the fore of an all the Human Resources and Finance especially the forecasting techniques, predictive analytics and leveraging optimization techniques and apply the	Analysing		

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B. Sc (Data Science) Course Name: Data Science with Python Lectures per week (1 Period is 50 minutes)		Semester – III Course Code: 21UBDS305					
				Cr	edits		2
						Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60				
	Internal	(1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	40				

B. Sc (Data Science)		Semester – III	
Course Name: Data Science with Python Practical		Course Code	: 21UBDS310
Lectures per week (1 Period is 50 minutes)		3	
Cr	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to: Explain basic principles of Python programming	Remembering	&	1
1	language	Onderstarrang		2.2.5
2	Apply object-oriented concepts and Use database and	Applying		2, 3, 5
	GUI Technique in Python application development.	Analysing	&	3, 5
3	Design and implement a project to solve a real-world problem using the language idioms, data structures, and standard library of Python			

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SEMESTER IV

B. Sc (Data Science)

Semester - IV

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Course Name: Advance Web Programming Lectures per week (1 Period is 50 minutes) Credits		Course Code: 21UBDS401 5 2					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40				

B. Sc (Data Science) Course Name: Advance Web Programming Practical Lectures per week (1 Period is 50 minutes) Credits		Semester – III Course Code: 21UBDS406					
						Hours	Marks
				Evaluation System	Practical Examination	2 Hrs.	50
					Internal		40

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Understand and apply markup languages for processing, identifying, and presenting of information in web pages.	Remembering, Understanding & Applying	1
2	Explain aesthetics and formal concepts of layout and organization to design websites that effectively communicate using visual elements.	Applying	2, 5
3	Create websites using appropriate security principles, focusing specifically on the vulnerabilities inherent in common web implementations.	Analysing & Creating	3, 5

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B. Sc (Data Science) Course Name: Fundamentals of Data Science Lectures per week (1 Period is 50 minutes) Credits		Semester – IV Course Code: 21UBDS402 5 2					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
					Internal		40

B. Sc (Data Science) Course Name: Fundamentals of Data Science Practical		Semester – IV Course Code: 21UBDS407	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to: Understand Big Data and its associated technologies and explore the applications of Big Data is solving	Remembering & Understanding	1
2	business problems. Apply the principles of virtualization and cloud computing to solve Big Data problems	Applying	2, 5
3	Use Map Reduce tools to handle big Data problems and Identify the Technologies for handling Big Data	Understanding & Applying	1, 3, 5

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B. Sc (Da	ta Science)	Semes	ter – IV				
Course Name: Industrial Statistics Lectures per week (1 Period is 50 minutes) Credits		Course Code: 21UBDS403 5 2					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40				

B. Sc (I	Data Science)	Semester – IV	
Course Name: Ind	ustrial Statistics Practical		rse Code: BDS408
Lectures per week (1 Period is 50 minutes) Credits			3
		2	
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:	Downharing	&	1
1	Define the different terminologies used Statistical quality control and PERT/CPM	Remembering Understanding	a	
2	Understand the basic tools of SPC and statistical basis of Shewhart control charts	Understanding Applying.	&	2, 5
3	Construct and interpret different control charts and compute the critical path and the project completion time.	Applying Analyzing	&	1, 3, 5

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B. Sc (Data Science)		Semester – IV	
Course Name: R Lectures per week (1 Period is 50 minutes)		Course Code: 21UBDS404	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

B. Sc (Data Science) Course Name: R Practical Lectures per week (1 Period is 50 minutes) Credits		Semester – IV Course Code: 21UBDS409 3 2					
				Evaluation System		Hours	Marks
					Practical Examination	2 Hrs.	50
					Internal		40

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	Demonstrate various probability distribution technique using R and mapping with purr	Remembering & Understanding	1
2	Implement regression technique in R Build own package in R	Applying Create	2, 5 1, 3, 5

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B. Sc (Data Science) Course Name: Data Communication & Networking Lectures per week (1 Period is 50 minutes) Credits		Semester – IV Course Code: 21UBDS405 5 2					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
					Internal		40

B. Sc (Data Science)		Semes	ter – III
Course Name: Data Communication & Networking Practical		Course Code: 21UBDS410	
Lectures per week (1 Period is 50 minutes)			3
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		1.0
1	Understand and apply the terminology and concepts of the OSI reference model and the TCP-IP reference model	Remembering Understanding & Applying	1,2
2	Experience with wireless networking concepts	Applying	5
3	Analyse contemporary issues in networking technologies		3

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Programme: Master of Science Specialization: Information Technology

Program Outcomes

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Sr no.	Programme Outcome
PO1.	Scientific knowledge: Apply the knowledge of mathematics, science, and computing to the solution of complex scientific problems.
PO2	Problem analysis: Identify, formulate, research literature, and analyse complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and applied sciences.
PO3	Design/development of solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tools usage: Create, select, and apply appropriate techniques, resources, and modern computing and IT tools including prediction and modelling to complex scientific activities with an understanding of the limitations.
PO6	The software engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional practice.
PO7	Environment and sustainability: Understand the impact of the professional software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.
PO9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management: Demonstrate knowledge understanding of the scientific and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

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Program Specific Outcomes

Programme	Programme Specific Outcomes	
M.Sc. Information Technology	A graduate with a M.Sc. in Information Technology will have the ability to PSO1. Communicate Information Technology concepts, research, designs, and solutions effectively and professionally PSO2. Apply knowledge of computing to produce effective designs and solutions for specific problems PSO3. Use software development tools, software systems, and modern	

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Programme Structure

(To be implemented from Academic Year- 2020-2021)

M.Sc Part I (Information Technology)

	Semester – I				
Sr. No.	Course Code	Course Title	Course Type	Credits	
1	20PMIT101	Research Methodology	Skill Enhancement Course	4	
2	20PMIT102	Internet of Things	Core Course	4	
3	20PMIT103	Cloud Computing	Core Course	4	
4	20PMIT104	Soft Computing Techniques	Core Course	4	
5	20PMIT105	Research Methodology Practical	Skill Enhancement Practical	2	
6	20PMIT106	Internet of Things Practical	Core Course Practical	2	
7	20PMIT107	Cloud Computing Practical	Core Course Practical	2	
8	20PMIT108	Soft Computing Techniques Practical	Core Course Practical	2	
		Total		24	

Semester – II						
Sr. No.	Course Code	Course Title	Course Type	Credits		
1	20PMIT201	Theory of Computation	Core Course	4		
2	20PMIT202	Big Data Analytics	Core Course	4		
3	20PMIT203	Wireless Sensor Network	Core Course	4		
4	20PMIT204	Storage Area Network	Skill Enhancement Course	4		
5	20PMIT205	Theory of Computation Practical	Core Course Practical	2		
6	20PMIT206	Big Data Analytics Practical	Core Course Practical	2		
7	20PMIT207	Wireless Sensor Network Practical	Core Course Practical	2		
8	20PMIT208	Storage Area Network Practical	Skill Enhancement Practical	2		
n E		Total		24		

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Programme Structure (To be implemented from Academic Year- 2021-2022)

M.Sc Part II (Information Technology)

Semester – III					
Sr. No.	Course Code	Course Title	Course Type	Credits	
1	21PMIT301	Machine Learning	Skill Enhancement Course	4	
2	21PMIT302	Amazon Web Services	Core Course	4	
3	21PMIT303	Network Security	Discipline Specific Elective 1		
4	21PMIT304	Computer Forensics	Discipline Specific Elective 1	4	
.5	21PMIT305	Game Programming	Discipline Specific Elective 2		
6	21PMIT306	Augmentation & Virtual Reality	Discipline Specific Elective 2	4	
7	21PMIT307	Machine Learning Practical	Skill Enhancement Practical	2	
8	21PMIT308	Amazon Web Services Practical	Core Course Practical	2	
9	21PMIT309	Network Security Practical	Discipline Specific Elective 1 Practical		
10	21PMIT310	Computer Forensics Practical	Discipline Specific Elective 1 Practical	2	
11	21PMIT311	Game Programming Practical	Discipline Specific Elective 2 Practical		
12	21PMIT312	Augmentation & Virtual Reality Practical	Discipline Specific Elective 2 Practical	2	
		Total		24	

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		Semester	-IV	
Sr. No.	Course Code	Course Title	Course Type	Credits
1	21PMIT401	Blockchain Technology	Core Course	4
2	21PMIT402	Computer Vision	Discipline Specific Elective 1	4
3	21PMIT403	Quantum Computing	Discipline Specific Elective 1	4
4	21PMIT404	Cryptography & Security Assessment and Testing	Discipline Specific Elective 2	4
5	21PMIT405	Ethical Hacking	Discipline Specific Elective 2	
6	21PMIT406	Project	Skill Enhancement Practical	6
7	21PMIT407	Blockchain Technology	Core Course Practical	2
8	21PMIT408	Computer Vision	Discipline Specific Elective 1 Practical	2
9	21PMIT409	Quantum Computing	Discipline Specific Elective 1 Practical	2
10	21PMIT410	Cryptography & Security Assessment and Testing	Discipline Specific Elective 2 Practical	2
11	21PMIT411	Ethical Hacking	Discipline Specific Elective 2 Practical	2
		Total		24

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SEMESTER I

M. Sc (Information Technology)	Semester – I		
Course Name: Research Methodology	Course	e Code: 20PM	IT101
Lectures per week (1 Period is 60 minutes)	5		
Credits	4		
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

B. Sc (Information Technology)		Semester – I	
Course Name: R	esearch Methodology	Course Code	: 20PMIT105
Lectures per week (1 Period is 50 minutes)		3	
Cr	redits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Define research and describe the research process and research methods, follow research ethics	Remembering Understanding	&	1, 2, 3, 4, 6, 7, 8
2	Understand and apply basic research methods including research design, data analysis, and interpretation	Applying Analyzing	&	1, 2, 3, 4, 5, 6, 7
3	Assess the basic function and working of analytical instruments used in research and propose the required numerical skills necessary to carry out research and prepare report/ dissertation/ thesis	Applying, Analyzing, Evaluating Creating	&	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

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M. Sc (Information Technology)	Semester – II			
Course Name: Internet of Things	Course	Course Code: 20PMIT102		
Lectures per week (1 Period is 60 minutes)	5			
Credits	4			
Evaluation System		Hours	Marks	
	Theory Examination	2 Hrs.	60	
	Internal		40	
	Total M	arks	100	

B. Sc (Information Technology)		Semester – I		
Course Name: Internet of Things Practical Lectures per week (1 Period is 50 minutes)		Course Code: 20PMDIT10		
		Hours	Marks	
Evaluation System	Practical Examination	2 Hrs.	50	
	Internal			

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Acquire good understanding of the Internet of Things concept and systems architecture	Remembering Understanding	&	1, 3
2	Conceptualize the standard security and privacy preserving mechanisms, and understand different cloud integration methods	Understanding	&	2, 5
3	Operate with wireless technologies and networking protocols specific to IoT systems & Design, implement, test and create IoT system equipped with sensors and wireless transceivers to help the society	Applying Evaluating Creating	and	2, 3, 5, 6, 7
		M		0

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M. Sc (Information Technology)	Semester – I		
Course Name: Cloud Computing	Course	Code: 20PM	IT103
Lectures per week (1 Period is 60 minutes)	5		
Credits		4	
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

B. Sc (Information Technology)		Semester – I	
Course Name: Clou	d Computing Practical	Course Code	: 20PMIT107
Lectures per week (1 Period is 50 minutes)		3	
	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		T
1	Understand virtualization of clusters and Data centers along with various cloud computing and Service Models-PaaS, SaaS, IaaS.	Remembering & Understanding	
2	Design of computer clusters for scalable parallel	Applying	2, 3, 4
3	Apply and evaluating various aspects of security to	Applying & Evaluating	2, 3, 5

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M. Sc (Information Technology)	Semester – I		
Course Name: Soft Computing Techniques	Course Code: 20PMIT104		
Lectures per week (1 Period is 60 minutes)		5	at:
Credits		4	
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

M. Sc (Information Technology)		Semes	ster – I
Course Name: Soft	Computing Techniques	Course Code	: 20PMIT108
Lectures per week (Period is 50 minutes)		3
	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	ne end of this course, learner will be able to:			
1	Understand fuzzy logic, supervised machine learning and genetic algorithm	Remembering Understanding	&	1, 2, 3
2	Apply and evaluate genetic Algorithm on applications	Applying Evaluating	&	2, 3, 4
3	Apply, evaluate and analyse various aspects of security to cloud clusters	Applying, Analyzing Evaluating	&	2, 3, 5

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SEMESTER II

M. Sc (Information Technology)		C	
Course Name: Theory of Computation	Semester – II Course Code: 20PMIT201		
Lectures per week (1 Period is 60 minutes)		5	
Credits	1		
Credits Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

M. Sc (Information Technology)		Semester – II		
Course Name: Theory	of Computation Practical			
Lectures per week (1 Period is 50 minutes)		3		
Credits		2		
		Hours	Marks	
Evaluation System	Practical Examination	2 Hrs.	50	
	Internal			

CO	Course Outcomes	Bloom's Taxonomy		PO	
By the end of this course, learner will be able to:					
1	Identify the central concepts in theory of computation and differentiate between deterministic and nondeterministic automata, also obtain equivalence of NFA and DFA.	Remembering Understanding	&	1, 2, 3	
2	Infer the equivalence of languages described by finite automata and regular expressions and design regular, context free grammars while recognizing the strings and tokens	Applying Evaluating	&	2, 3, 4	
3	Design pushdown automata to recognize the language and develop an understanding of computation through Turing Machine	Applying Creating	&	2, 3, 5	

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M. Sc (Information Technology)	Semester – II		
Course Name: Big Data Analytics	Course Code: 20PMIT202		
Lectures per week (1 Period is 60 minutes)		5	
Credits		4	
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	larks	100

B. Sc (Informa	tion Technology)		ter – II
	ata Analytics Practical	Course Code	: 20PMIT206
	Period is 50 minutes)	RIE WY	3
	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to: Understand the key issues in big data management and its associated applications in intelligent business	Remembering Understanding	&	1, 2
2	and scientific computing. Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and Big SQL in big data analytics.	Understanding, Analyzing Evaluating	&	2, 3, 4
3	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.	Applying		1, 2, 3, 5

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M. Sc (Information Technology)	Semester – II		
Course Name: Wireless Sensor Network	Course Code: 20PMIT203		
Lectures per week (1 Period is 60 minutes)		5	
Credits		4	
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	larks	100

M. Sc (Informa	tion Technology)	Semes	ter – II
	Sensor Network Practical	Course Code	: 20PMIT207
	1 Period is 50 minutes)		3
	redits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

CO	Course Outcomes	Bloom's Taxonomy		РО
By th	e end of this course, learner will be able to: understand various applications of wireless sensor	Remembering Understanding	&	1, 2
2	networks. describe the concepts, protocols, and differences underlying the design, implementation, and use of wireless sensor networks.	Understanding Analyzing	&	2, 3, 4
3	Implement and evaluate new ideas for solving wireless sensor network design issues.	Applying Evaluating	&	1, 2, 3, 5

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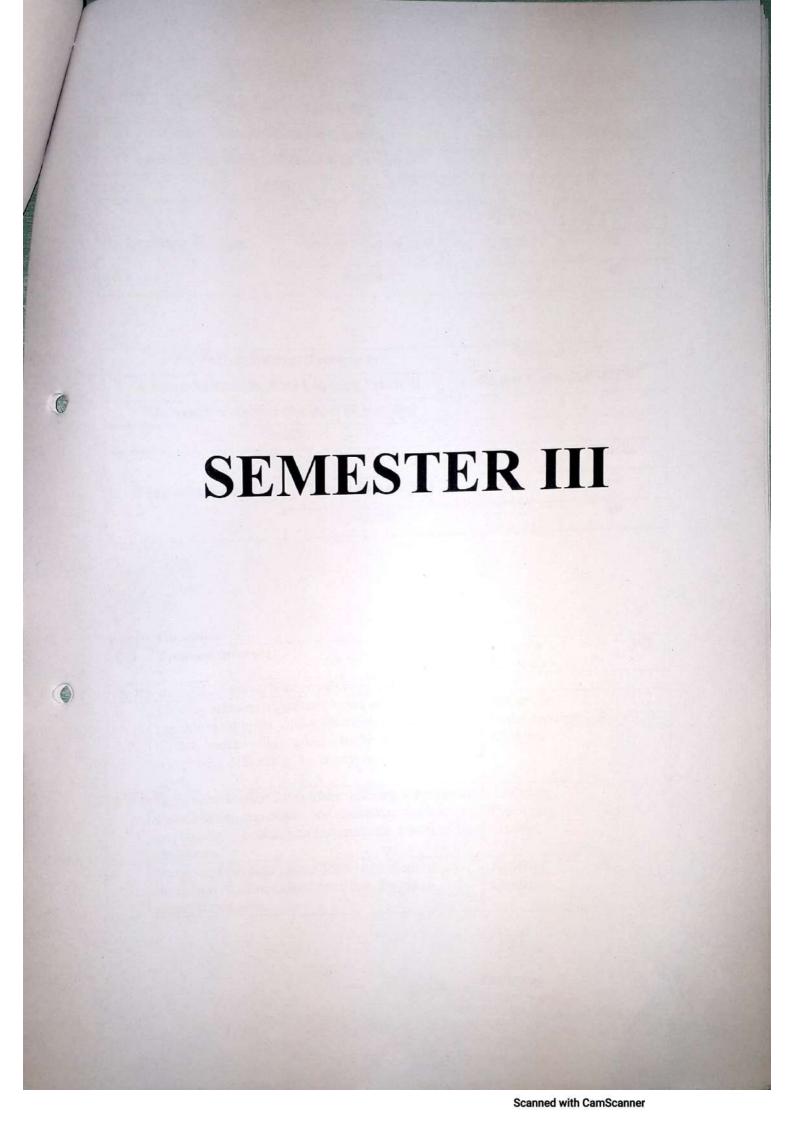
M. Sc (Information Technology)	Semester - II		
Course Name: Storage Area Network	Course Code: 20PMIT204		T204
Lectures per week (1 Period is 60 minutes)	5		
Credits		4	The state
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	larks	100

B. Sc (Informat	ion Technology)	Semes	ter – II
Course Name: Sto	orage Area Network	Course Code	: 20PMIT208
	Period is 50 minutes)		3
	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

СО	Course Outcomes	Bloom's Taxonomy		PO
Dyth	e end of this course, learner will be able to:			
1	Understand, interpret and examine various SAN technologies and describe and sketch the SAN architecture and its uses.	Remembering Understanding	&	1, 2
2	Classify the applications as per their requirements and select relevant SAN solutions and design case studies on NAS, SAN and SAN/NAS	Analyzing Creating	&	2, 3, 4
3	Analyze the limitations of the client-server architecture and evaluate the need for data protection and storage centric architectures such as Intelligent storage system.	Analyzing Evaluating	&	1, 2, 3, 5

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M. Sc (Information Technology)		Semes	ster – 3
Course Name: Machine Learning		Course Code	: 21PMIT301
Lectures per week (1 Period is 50 minutes)		5	
Cre	edits		4
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc (Informa	M. Sc (Information Technology)		ster – 3
Course Name: Mach	ine Learning Practical	Course Code	: 21PMIT307
Lectures per week (1	Period is 50 minutes)		5
Cr	edits	5	2
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

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СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Develop learning algorithms based on logistic regression, Support Vector Machines to predict discrete-valued output given a training data comprising of features and corresponding class labels.	Remember, Understanding Applying	&	1, 2, 3, 4
2	Design and implement machine learning solutions to classification, regression, and clustering problems; and be able to evaluate and interpret the results of the algorithms.	Analyzing, Evaluating Creating	&	2, 3, 4, 5
3	Design and develop Linear Models for Regression using Bias-Variance Decomposition, Bayesian Linear Regression.	Applying Creating	&	2, 3, 4, 5

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M. Sc (Information Technology)		Semes	ter-3
Course Name: AMAZON WEB SERVICES Lectures per week (1 Period is 50 minutes)		Course Code: 21PMIT3	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

ion Technology)	Semes	ter - 3
TON WED SERVICES	Course Code	: 21PMIT308
ZON WEB SERVICES		5
Period is 50 minutes)		2
	Hours	Marks
		60
Theory Examination	2 Hrs.	00
Internal		40
	ion Technology) ZON WEB SERVICES Period is 50 minutes) edits Theory Examination	ZON WEB SERVICES Period is 50 minutes) edits Theory Examination Course Code Hours 2 Hrs.

СО	Course Outcomes	Bloom's Taxonomy	ro
By th	e end of this course, learner will be able to: Understand architecture of AWS	Remember, Understanding	1, 2, 3,
2	Analyze various Configuration file and manage Virtual private network	Applying & Analyzing	2, 3, 4, 5
3	Create Internet Gateway, Security Group, NAT	Creating	2, 3, 4, 5

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M. Sc (Information Technology)		Semes	ster – 3
Course Name: NETWORK SECURITY Lectures per week (1 Period is 50 minutes)		Course Code: 21PMIT3 5	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M So (Informa	tion Technology)	Semes	ster – 3
Course Name: NE	TWORK SECURITY	Course Code	: 21PM11303
Lectures per week (1	Period is 50 minutes)		2
Cr	edits	Hours	Marks
Evaluation System			60
	Theory Examination	2 Hrs.	00
Evaluation System	Internal		40

CO	Course Outcomes	Bloom's Taxonomy		
By th	e end of this course, learner will be able to: Compute hash and digital signature for the given	Remember, Understanding		1, 2, 3
2	message to provide integrity and non-repudiation. Examine the strength of any cryptographic algorithm by crypt analysis using Open SSL.		&	2, 3, 4, 5
3	Explain and the working principle of security protocols and analyze threats and vulnerabilities of information systems	Applying Analyzing	&	2, 3, 4, 5

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M. Sc (Information Technology) Course Name: Computer Forensics Lectures per week (1 Period is 50 minutes)		Semester - 3 Course Code: 21PMIT30 5					
					edits		4
				Cit	- Cares	Hours	Marks
		2 Hrs.	60				
Evaluation System	Theory Examination	Z HIS.					
	T-townell	<u> </u>	40				
	Internal						

Course Name: C	computer Forensics Period is 50 minutes)	Seme Course Code	ster – : 21PMIT31
Cro	edits	Hours	Marks
E Lection System	Theory Examination	2 Hrs.	60
Evaluation System	Internal		40

CO	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to: Utilizing the knowledge for investigations in order to	Remember Understanding	&	1, 2,
2	solve computer crime	Applying		2, 3, 4, 5
3	best practices for incidence response Apply computer forensic tools for investigation, evaluation and analysis	Applying, Analyzing Evaluating	&	2, 3, 4, 5

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M. Sc (Informat	ion Technology)	Semes	iter – 3
Course Name: GAME DEVELOPEMENT		Course Code: 21PMIT3	
Lectures per week (1			5
	edits		4
		Hours	Marks
T. 1 dia Gustom	Theory Examination	2 Hrs.	60
Evaluation System		2	40
	Internal		

		Semes	iter – 3
M. Sc (Informa	tion Technology)	Course Code	. 21PMIT31
(1.1. C.)	TE DEVELOPMENT	Course Code	. 211
Course Name: GAN	IE DEVELOPMENT		5
Lectures per week (1	Period is 50 minutes)		2
	edits		Marks
Cr	Curio	Hours	Marks
		2 1140	60
	Theory Examination	2 Hrs.	All
Evaluation System			40
	Internal		

Course	e Outcomes:	Bloom's	PO
CO	Course Outcomes	Taxonomy	_
By th	e end of this course, learner will be able to: Demonstrate Principles of Game Development	Remember & Understanding	1, 2, 3, 4
2	Understanding Develop multilayered and interactive games	Applying	2, 3, 5
3	Build applications using various components of Game development	Applying & Creating	2, 3, 4, 5

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320000000000000000000000000000000000000	ster – 3
UGMENTATION & VIRTUAL Course Code: 21PM REALITY	
	5
4	1
Hours	Marks
on 2 Hrs.	60
	40
	Hours

	tion Technology)	Semes	ter - 3
M. Sc (Information Technology) Course Name: AUGMENTATION & VIRTUAL REALITY		Course Code	: 21PMIT312
REA	Period is 50 minutes)		5
Cr	edits	Hours	Marks
D. L. Hon System	Theory Examination	2 Hrs.	60
Evaluation System	Internal		40

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CO	Course Outcomes	Bloom's Taxonomy	PO
By th	ne end of this course, learner will be able to: Understand trends and technology future VR experiences.	Remember & Understanding	1, 2, 3, 4
2	Apply the concepts of Virtual and Augmented Reality to various problems	Analyzing,	2, 3, 4, 5
3	Evaluate Virtual Reality Systems.	Evaluating	2, 3, 4

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SEMESTER IV

ion Technology)	Semes	ster - 4
Period is 50	Course Code	: 20PMIT401
dits		5
The	Hours	Marks
	2 Hrs.	60
Internal Total Marks		40
	Theory Examination Internal	Period is 50 minutes) dits Hours Theory Examination 2 Hrs. Internal

M. Sc (Information Technology) Course Name: Blockchain Technology Practical		Semester – 4 Course Code: 20PMIT40	
	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

CO	Course Outcomes	Bloom's Taxonomy		РО
By th	challenges, and future directions & to Understand emerging abstract models for Blockchain Technology	Remembering Understanding	&	1, 2
2	Understand and Apply Cryptographic concept,	Applying	&	2, 3, 4, 5
3	Identify major research challenges and technical gaps existing between theory and practice in cryptocurrency domain. And Design, build, and deploy applications based on Blockchain Technology	Analysing, Evaluate Applying	&	4, 5, 6

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M. Sc (Information Technology) Course Name: Computer Vision Lectures per week (1 Period is 50 minutes) Credits		Semester - 4 Course Code: 21PMIT402 5 4					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
					Internal		40

tion Technology)	Semes	ter - 4
Course Name: Computer Vision Practical		: 21PMIT408
Lectures per week (1 Period is 50 minutes)		5
		Marks
Credits	Hours	Marks
Theory Examination	2 Hrs.	60
		40
		puter Vision Practical Period is 50 minutes) edits Theory Examination Course Code Hours 2 Hrs.

CO	Course Outcomes	Bloom's Taxonomy	10
By th	e end of this course, learner will be able to: Explain low level processing of image and transformation techniques applied to images.	Remember, Understanding	1, 2, 3, 4
2	Apply ANN Model for diagnosing the computer vision problems, and identify the supervised and semi supervised techniques applicable to real word	Applying & Analyzing	2, 3, 4
3	problems. Apply vision techniques to real time applications and cognitive vision application to track the driver eye movement.	Applying & Evaluating	2, 3, 4, 5

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M. Sc (Informa	tion Technology)	Semester – 4					
Course Name: Quantum Computing Lectures per week (1 Period is 50 minutes) Credits		er week (1 Period is 50 minutes) 5					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
Internal		40					

M. Sc (Informa	tion Technology)		ster – 4
Course Name: Quantum Computing Practical Lectures per week (1 Period is 50 minutes)		Course Code: 21PMIT4	
		Hours	Marks
	Examination	2 Hrs.	60
Evaluation System	Theory Examination		40
	Internal		

CO	Course Outcomes	Bloom's Taxonomy	1	
By th	e end of this course, learner will be able to: Understand basic principles and components of Quantum Computing and identify classes of problems that can be solved using Quantum Computing	Remember Understanding	&	1, 2, 3, 4
2	Apply and analyze Quantum Computing algorithms	Applying Analyzing	&	2, 3, 4,
3	Design programs to perform basic Quantum Computing operations	Creating		1, 2, 3, 5

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M. Sc (Information Technology) Course Name: Cryptography & Security Assessment and Testing		graphy & Security Assessment and Course Code:	
	Credits		4
	* * * * * * * * * * * * * * * * * * * *	Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		1 1/2

M. Sc (Information Technology)		Semes	ter – 4
Course Name: Cryptography & Security Assessment and Testing Practicals		Course Code: 21PMIT410	
Lectures per week (1 Period is 50 minutes)		3	
	Credits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

СО	Course Outcomes	Bloom's Taxonomy	10
By th	e end of this course, learner will be able to: Define, Understand and Classify various	Remembering & Understanding	1, 2, 8
2	cryptographic terms Understand and Apply Various symmetric and	Understanding &	1, 2, 3
3	asymmetric key cryptography and Mode of operations Understand and Evaluate various cryptographic algorithm & various TCP – IP threats and vulnerabilities	Understanding &	2, 4, 6, 8

M So (Informs	tion Technology)	Semes	ter – 4
Course Name:	Ethical Hacking	Course Code	: 21PMIT405
Lectures per week (Period is 50 minutes)		5
	edits		4
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal	1xt-	40
		AV	^

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M. Sc (Information Technology)		Semester - 4	
Course Name: Ethical Hacking Practicals Lectures per week (1 Period is 50 minutes)		Course Code: 21PMIT41 5	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
			40
	Internal		No. Carlo

CO	Course Outcomes	Bloom's Taxonomy	
By th	e end of this course, learner will be able to: Recall the networking, sql, and encryption algorithm concepts to further study ethical hacking techniques, threats, tools and prevention against attacks.	Remember, Understanding	1, 2, 3, 4
2	Understand ethical hacking concepts, cases, ethics and cyberlaws and apply available hacking tools to find a solution to a given hacking issue.	Understanding & Applying	2, 3, 4, 5
3	Analyze and classify the real-world hacking cases and situations	Analyzing	2, 3, 4, 5



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M. Sc (Information Technology)		Semester - 4	
Course Name: PROJECT Lectures per week (1 Period is 50 minutes) Credits		Course Code: 21PMIT40	
			Cuits
Evaluation System	IMPLEMNTATION & VIVA VOCE	2 Hrs.	60
	PROJRCT REPORT		40

	See 1 St. Co.	
Course	Outcome:	

Course Outcome:		Bloom's	10
CO	Course Outcomes	Taxonomy	
By th	e end of this course, learner will be able to: Students will be able to communicate with Clients and define the requirements based on problems in the existing system. Students will be able to design, develop and deploy solution to meet all the user and system requirements.	Remembering, Understanding, Analysing & Evaluating Understanding, Applying, Analysing &	1, 2, 4, 5, 6, 7, 10 2, 4, 5, 6, 8, 9, 10, 11
3	Students will be able to design use cases and test cases to evaluate the performance of system & estimate the cost and efforts.	Creating Applying, Analysing and Evaluating	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12



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B. K. Shroff College of Arts &
M. D. Shroff College of Commerce
Bhulabr u Desai Road,

Kandiva (West), Mumbal-67.

Programme: Master of Science Specialization: Data Science

Outcomes

Sr no.	Programme Outcome			
PO1.	Scientific knowledge: Apply the knowledge of mathematics, science, and computing to the solution of complex scientific problems.			
PO2	scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and applied sciences.			
PO3	Design/development of solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.			
PO5	and modern computing and IT tools including prediction and modelling to			
PO6	The software engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional practice.			
PO7	Environment and sustainability: Understand the impact of the professional software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.			
PO9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
PO10	Communication: Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.			
PO11	Project management: Demonstrate knowledge understanding of the scientific and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments			
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change			

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Bhulston Doct Description Technology

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Department

Program Specific Outcomes

Programme	Programme Specific Outcomes		
M.Sc. Data	A graduate with a M.Sc. in Data Science will have the ability to		
Science	PSO1. Demonstrate mastery of Data Science in the following core knowledge areas:		
	 Communicate data science concepts, research, designs, and solutions effectively and professionally Statistics, Programming Languages Databases, Big data, and cloud computing Artificial Intelligence, Machine Learning, Deep Learning, Data Visualization 		
	PSO2. Apply knowledge of computing to produce effective designs and solutions for specific problems PSO3. Use software development tools, software systems, and modern computing platforms		



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M. H. Shroff College of Commerce
Black and Desai Road,
Bankavii (West), Mumbal-67,

Programme Structure (To be implemented from Academic Year- 2020-2021)

M.Sc Part I (Data Science)

	Semester – I					
Sr. No.	Course Code	Course Title	Course Type	Credits		
1	20PMDS101	Python Programming	GI III F			
2	20PMDS102	Advance Database	Skill Enhancement Course	4		
		Management System	Core Course	4		
3	20PMDS103	Statistics I	0- 0			
4	20PMDS104	Research Methodology	Core Course	4		
5	20PMDS105	Prother P	Skill Enhancement Course	4		
-		Python Programming Practical	Skill Enhancement Course Practical	2		
6	20PMDS106	Advance Database Management System Practical	Core Course Practical	2		
7	20PMDS107	Statistics I Practical	Core Course Practical	2		
8	20PMDS108	Research Methodology		2		
		Practical	Skill Enhancement Course Practical	2		
-		Total		24		

Semester – II				
Sr. No.	Course Code	Course Title	Course Type	Credits
1	20PMDS201	Data Science with Python	Core Course	4
2	20PMDS202	Big Data Analytics	Skill Enhancement Course	4
3	20PMDS203	Statistics II	Core Course	4
4	20PMDS204	Artificial Intelligence	Skill Enhancement Course	4
5	20PMDS205	Data Science with Python Practical	Core Course Practical	2
6	20PMDS206	Big Data Analytics Practical	Skill Enhancement Course Practical	2
7	20PMDS207	Statistics II Practical	Core Course Practical	2
8	20PMDS208	Artificial Intelligence Practical	Skill Enhancement Course Practical	2
		Total		24

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Bhiliamhai Desai Road,

Kandivii (West), Mumbal-67

Programme Structure

(To be implemented from Academic Year- 2021 - 2022)

M.Sc. (Data Science)

Semester – III				
Sr. No.	Course Code	Course Title	Course Type	Credits
1	21PMDS301	Machine Learning	Ability Enhancement Course	4
2	21UBDS302	Data Visualization	Ability Enhancement Course	4
3	21UBDS303	Cloud Computing	Core Course	4
4	21UBDS304	Information Retrieval	Core Course	4
5	21UBDS305	Machine Learning Practical	Skill Enhancement Course	2
6	21UBDS306	Data Visualization Practical	Core Course Practical	2
7	21UBDS307	Cloud Computing Practical	Core Course Practical	2
8	21UBDS308	Information Retrieval Practical	Core Course Practical	2
		Total		24

	Semester – IV					
Sr. No.	Course Code	Course Title	Course Type	Credits		
1	21UBDS401	Deep Learning	Ability Enhancement Course	4		
2	21UBDS402	Social Network Analysis	Core Course	4		
3	21UBDS403	Natural Language Processing	Core Course	4		
4	21UBDS404	Project	Core Course	6		
5	21UBDS405	Deep Learning Practical	Skill Enhancement Course	2		
6	21UBDS406	Social Network Analysis Practical	Core Course Practical	2		
7	21UBDS407	Natural Language Processing Practical	Core Course Practical	2		
		Total		24		

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Kandiva (West), Mumbal-67.

SEMESTER I

M.Sc (Data Science)		Semester - I	
Course Name: Python Programming Lectures per week (1 Period is 50 minutes)		Course Code: 20PMDS	
		5	
Cr	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc (Data Science)		M. Sc (Data Science) Semester – I	
Course Name: Python Programming Practical Lectures per week (1 Period is 50 minutes)		Course Code: 20PMDS10	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Demonstrate the use of built-in objects of Python	Remembering Understanding	&	1, 2
2	Use significant experience with python program development environment and apply the concept for solution building	Understanding Applying	&	2, 3, 5
3	Implement numerical programming, data handling and visualization through NumPy, Pandas and MatplotLib modules.	Applying Analyzing	and	1, 2, 3, 5

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M. Sc (Data Science)		Semester - I	
Course Name: Advance Database Management System Lectures per week (1 Period is 50 minutes)		Course Code: 20PMDS102	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc (Data Science) Course Name: Advance Database Management System Practical		Semes	ster – I
		Course Code: 20PMDS10	
Lectures per week (1 Period is 50 minutes)		5	
Credits		3	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Understand advanced database concepts distributed, parallel and object-oriented databases.	Remembering & Understanding	1, 2, 5
2	Understand and apply the concept of data warehousing.	Understanding & Applying	1, 2, 5
3	Understand and apply the concept of data mining and differentiate between classification and clustering methods.	Understanding, Applying and Analyzing	1, 2, 5

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M. Sc (Data Science)		Semester - I	
Course Name: Statistics I Lectures per week (1 Period is 50 minutes)		Course Code: 20MSDS103	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc (Data Science)		Semester – I	
Course Name: Statistics I Practical		Course Code: 20MSDS	
Lectures per week (1 Period is 50 minutes)		5	
Control of the Contro	edits		3
	NINE SERVICE	Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy		РО
By th	e end of this course, learner will be able to:			
1	Understand the terminology and special notation of statistical analysis.	Remembering Understanding	&	1, 2, 3
2	Apply and interpret the various measures of central tendency, dispersion skewness, Kurtosis	Applying Analyzing	&	1, 2, 3
3	Classify correlation coefficient, linear regression equation and use R Studio for descriptive Statistics	Understanding, Applying Analyzing	&	2, 4,

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M. Sc (Data Science)		Semester – I	
Course Name: Research Methodology Lectures per week (1 Period is 50 minutes)		Course Code: 20PMDS104	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc (Data Science)		Semester – I	
Course Name: R Pr	ogramming Practical	Course Code: 20PMDS1	
Lectures per week (1 Period is 50 minutes)		5	
Cre	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy		PO		
By the end of this course, learner will be able to:						
1	Define research and describe the research process and research methods, follow research ethics	Remembering Understanding	&	1, 2, 3, 4, 6, 7, 8		
2	Understand and apply basic research methods including research design, data analysis, and interpretation	Applying Analyzing	&	1, 2, 3, 4, 5, 6, 7		
3	Assess the basic function and working of analytical instruments used in research and propose the required numerical skills necessary to carry out research and prepare report/ dissertation/ thesis	Applying, Analyzing, Evaluating Creating	&	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12		

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SEMESTER II Scanned with CamScanner

M.Sc (Data Science) Course Name: Data Science with Python		Semester – II Course Code: 20PMDS20	
Cr	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc (Da	M. Sc (Data Science)		ter – II
Course Name: Data Science with Python Practical Lectures per week (1 Period is 50 minutes)		Course Code: 20PMDS20	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Understand and conceptualize basics of Data Science.	Remembering Understanding	&	1, 2
2	Understand machine learning concept and classify the various techniques in machine learning.	Understanding, Analyzing Evaluating	&	2, 3, 4
3	Apply pyhton concept to design solution for machine learning problems.	Applying		1, 2, 3, 5

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M. Sc (Data Science) Course Name: Big Data Analytics Lectures per week (1 Period is 50 minutes)		Semes	ter – II
		Course Code: 20PMDS202	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc (Data Science)		Semes	ter – II
Course Name: Big Da	Course Name: Big Data Analytics Practical		: 20PMDS206
Lectures per week (1	Period is 50 minutes)		5
Cre	edits		3
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy		РО
By th	e end of this course, learner will be able to:			
1	Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.	Remembering Understanding	&	1, 2
2	Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and Big SQL in big data analytics.	Understanding, Analyzing Evaluating	&	2, 3, 4
3	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.	Applying		1, 2, 3, 5

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M. Sc (Data Science) Course Name: Statistics II Lectures per week (1 Period is 50 minutes)		Semest	er – II	
		Course Code: 20PMDS20.		
HARLES AND AND THE		Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal		40	

M. Sc (Data Science) Course Name: Statistics II Practical Lectures per week (1 Period is 50 minutes)		Semest	er – II
		Course Code: 20PMDS20	
		5	
Cr	edits	3	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	ne end of this course, learner will be able to:		
1	Apply probabilistic and statistical reasoning to describe and analyse essential features of data sets and problems in real-life business situations	Remembering & Understanding	1, 2, 3
2	Understand statistical techniques to estimate the population mean, proportion and variance, and acquire techniques to test hypothesis with an assumption on the population means, proportions and variances under different circumstances.	Understanding, Analyzing	2, 3, 4, 6, 7
3	Use and extend knowledge of inferential statistics and their applications in real-life business situations.	Applying Analyzing	1, 2, 3, 5, 6,7

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M. Sc (Data Science)		Semester – II	
Course Name: Artificial Intelligence		Course Code: 20PMDS2	
Lectures per week (1 Period is 50 minutes)		5	
Cr	edits		2
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40
	Total Marks		100

M. Sc (Da	ta Science)	Semeste	er – II
Course Name: Artificial Intelligence		Course Code: 20PMDS	
Lectures per week (1 Period is 50 minutes)		3	
	edits	2	
C.		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
District Officer	Internal		

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		1
1	Define & Understand knowledge of the building blocks of AI as presented in terms of intelligent agents	Remembering & Understanding	
2	Study and apply various searching algorithms, Understand concept of propositional and first order	Applying &	
3	Analyze and formalize the problem based on different techniques to solve them	Analysing	2, 3

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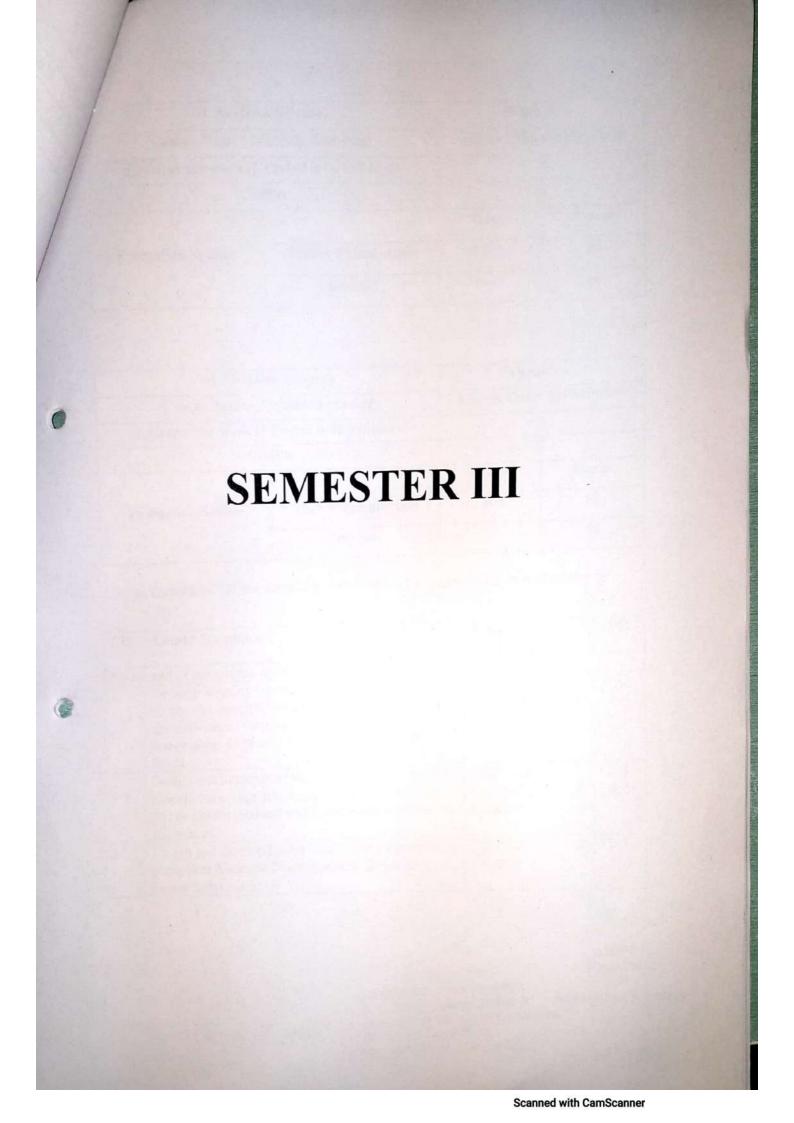
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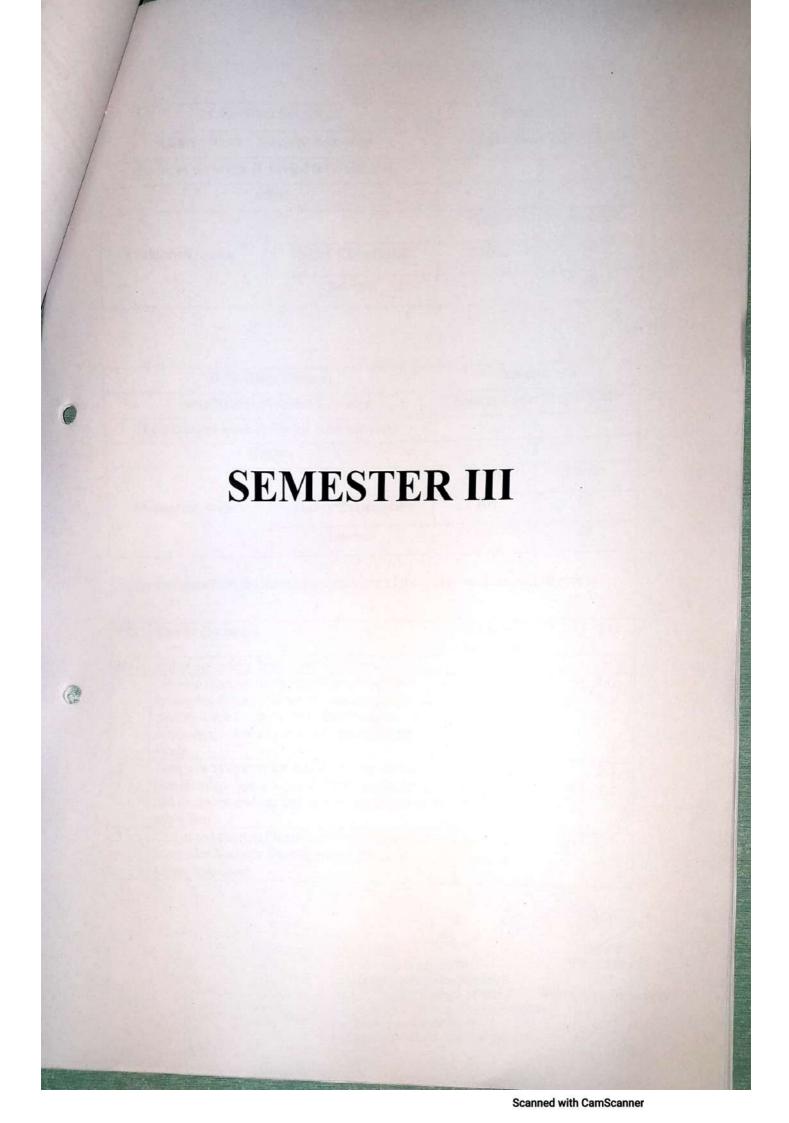
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M. Sc (Data Science)		Semester - 3					
Course Name: Machine Learning Lectures per week (1 Period is 50 minutes) Credits		Course Code: 21PMDS301 5 4					
						Hours	Marks
				Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40				

M. Sc (Da	M. Sc (Data Science)		ster – 3
	Machine Learning	Course Code	: 21PMDS305
Lectures per week (1 Period is 50 minutes)		5	
	edits		2
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
Evaluation System	Internal		40

Course Outcomes: On the successful completion of the course, students will be able to

СО	Course Outcomes	Bloom's Taxonomy		PO	
By the end of this course, learner will be able to: 1 Develop learning algorithms based on logistic regression, Support Vector Machines to predict discrete-valued output given a training data comprising of features and corresponding class Solution Property Property					
2	Design and implement machine learning solutions to classification, regression, and clustering problems; and be able to evaluate and interpret the results of the algorithms.	Analyzing, Evaluating Creating	&	2, 3, 4, 5	
3	Design and develop Linear Models for Regression using Bias-Variance Decomposition, Bayesian Linear Regression.	Applying Creating	&	2, 3, 4, 5	

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M. Sc (Data Science) Course Name: DATA VISUALIZATION Lectures per week (1 Period is 50 minutes)		Semester – 3 Course Code: 21PMDS302 5					
				Cre	edits		4
						Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60				
	Internal		40				

M. Sc ((Data Science)		Semes	ster – 3
	A VISUALIZATION	Course Code	: 21PMDS306
Lectures per week (1 Period is 50 minutes)		5	
Cr	edits		2
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to: Understand the importance of data visualization and the design and use of many visual components.	Remembering Understanding	&	1, 2
2	Apply visualizations techniques for different types of data sets and application scenarios and basics of colors, views, and other popular and important visualization-based issues.	Understand Applying	&	2, 3, 4
3	Apply visualization structures such as tables, spatial data, time-varying data, tree and network and Analyze the basic algorithms in data visualization	Applying Analyzing	&	2, 3, 5

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M. Sc (Da	M. Sc (Data Science)		ster – 3
Course Name: Cloud Computing		Course Code: 21PMD	
Lectures per week (1	Period is 50 minutes)		5
	edits		4
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
Evan-	Internal		40

M. Sc (Da	ta Science)	Seme	ster - 3
	Cloud Computing	Course Code	: 21PMD530
	Period is 50 minutes)		2
	edits	Hours	Marks
	Theory Examination	2 Hrs.	60
Evaluation System	Internal		40

CO	Course Outcomes	Bloom's Taxonomy		ro
10000000	e end of this course, learner will be able to: Understand virtualization of clusters and Data orders along with various cloud computing and	Remembering Understanding	&	1, 2, 3
2	Service Models-PaaS, SaaS, IaaS. Design of computer clusters for scalable parallel	Applying		2, 3, 4
3	computing. Apply and evaluating various aspects of security to cloud clusters	Applying Evaluating	&	2, 3, 5

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M. Sc (Da	M. Sc (Data Science)		ster – 3
Course Name: INFOR	Course Name: INFORMATION RETRIEVAL		e: 21PMDS304
Lectures per week (1 Period is 50 minutes) Credits		5	
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M Sc (Da	ta Science)		ster – 3
- Annual Control of the Control of t		Course Code	: 21PMDS308
Course Name: INFORMATION RETRIEVAL Lectures per week (1 Period is 50 minutes)		5	
			2
Cr	edits	Hours	Marks
	• * *	2 Hrs.	60
Evaluation System	Theory Examination		40
	Internal		

CO	e Outcomes: Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to: Explain and describe principles of Information Retrieval, the pre-processing methods for Information Retrieval.	Remembering & Understanding	1, 2
2	Apply appropriate compression techniques for dictionary files, posting files, and text data and examine the performance of IR system with various metrics like precision, recall and F-Measure.	Applying and Evaluating	2, 3, 4. 5
3	Construct and parse XML documents for a given real time scenario.	Applyng & Creating	2, 3, 5

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	ta Science)	Semester - 4	
	EEP LEARNING	Course Code: 21PMDS	
	Period is 50 minutes)	5 4	
Cro	edits		1
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc ((Da	ita Science)	Semes	ster – 4	
Course Name: D	EEP LEARNING	Course Code	:: 21PMDS405 5	
Lectures per week (1	Period is 50 minutes)	2		
Cr	edits		2	
		Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal		40	

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to: Demonstrate concepts, architectures and algorithms Demonstrate concepts, architectures and algorithms	Remembering & Understanding	1, 2
2	of Neural Networks to solve real world problems. Identify deep feed-forward networks and different regularization techniques used in Deep Learning and challenges in Neural Network optimization and different optimization algorithms used in Deep	Applying	2, 3, 4, 5
3	learning models Analyze deep learning algorithms which are more appropriate for various types of learning tasks in various domains	Analyzing	2, 3, 4

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M. Sc (Dat	ta Science)	Seme	ester –
Course Name: SOCIAL	NETWORK ANALYSIS	Course Code: 21PMDS	
Lectures per week (1	Period is 50 minutes)		5
Cre	edits		4
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc ((Da	ata Science)	Seme	ester –	
Course Name: SOCIAL NETWORK ANALYSIS		Course Code: 21PMDS40		
	r week (1 Period is 50 minutes)		5	
	edits	2	2	
		Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal		40	

On the successful completion of the course, students will be able to

1)			
1)			

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Represent knowledge using ontology.	Remembering Understanding	&	1, 2
2	Develop semantic web related applications.	Understand Applying	&	2, 3, 4
3	Predict human behavior in social web and related communities. Visualize social networks	Analyzing Creating	&	2, 3, 4, 5

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M. Sc (Da	ta Science)	Semes	ster – 4
Course Name: Natura	Course Code: 21PMDS		
Lectures per week (1	Period is 50 minutes)		5
Cre	edits		4
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

M. Sc (Da	ta Science)	Semes	ster – 4
Course Name: Natura	al Language Processing	Course Code: 21PMDS	
Lectures per week (1	Period is 50 minutes)	5	
	edits	2	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy		PO
By th	ne end of this course, learner will be able to:			
1	Explain and understand NLP syntax, semantics and concepts of morphology, syntax, semantics and pragmatics of the language.	Remembering Understanding	&	1, 2, 3
2	Apply machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars and analyze the current methods for statistical approaches to machine translation.	Applying Analyzing	&	2, 3, 4, 5
3	Compare and contrast the clustering and unsupervised methods, log-linear and discriminative models and the EM algorithm as applied within NLP.	Evaluating		2, 3, 5

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M. Sc (D	ata Science)	Semes	ster – 4	
Course Na	me: Project	Course Code	: 21PMDS404	
Lectures per week (1 Period is 50 minutes)		5	
Cı	redits	(5	
		Hours	Marks	
Evaluation System	IMPLEMNTATION & VIVA VOCE	2 Hrs.	60	
	PROJRCT REPORT		40	

СО	Course Outcomes	Bloom's Taxonomy	PO
By th	e end of this course, learner will be able to:		
1	Students will be able to communicate with Clients and define the requirements based on problems in the existing system.	Remembering, Understanding, Analysing & Evaluating	1, 2, 4, 5, 6, 7, 10
2	Students will be able to design, develop and deploy solution to meet all the user and system requirements.	Understanding, Applying, Analysing & Creating	2, 4, 5, 6, 8, 9, 10, 11
3	Students will be able to design use cases and test cases to evaluate the performance of system & estimate the cost and efforts.	Applying, Analysing and Evaluating	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

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Programme: Master of Science Specialization: Artificial Intelligence

Program Outcomes

Sr no.	Programme Outcome
PO1.	Scientific knowledge: Apply the knowledge of mathematics, science, and computing to the solution of complex scientific problems
PO2	scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and applied sciences.
PO3	design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO4	and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO5	Modern tools usage: Create, select, and apply appropriate techniques, resources, and modern computing and IT tools including prediction and modelling to complex scientific activities with an understanding of the limitations.
PO6	The software engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional practice.
PO7	Environment and sustainability: Understand the impact of the professional software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.
PO9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management: Demonstrate knowledge understanding of the scientific and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

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Program Specific Outcomes

Programme	Programme Specific Outcomes
M.Sc. Artificial Intelligence	A graduate with a M.Sc. in Artificial Intelligence will have the ability to PSO1. Demonstrate mastery of Artificial Intelligence in the following core knowledge areas:
	Communicate artificial intelligence concepts, research, designs, and solutions effectively and professionally Mathematics & Statistics Programming Associations
	Mathematics & Statistics, Programming Languages Big data, data security
	 Artificial Intelligence, Machine Learning, Deep Learning, sentiment analysis, speech recognition, robotic process automation
	PSO2. Apply knowledge of computing to produce effective designs and solutions for specific problems

Eligibility

Master of Science (Artificial Intelligence) M.Sc. (A.I.)

The Bachelor's degree in the Faculty of Science/ Technology of this University or equivalent degree of recognized Universities with major and ancillary Subjects at undergraduate level as detailed below:

Major	Ancillary
Mathematics	
Physics	Mathematics (4 Units)
Statistics	Mathematics (4 Units)
Life Sciences	Biochemistry or Chemistry with Mathematics or Statistics in first and second year OR Computer Sciences OR Information Technology up to second year of Bachelor's Degree
Bachelor's Degree in Technology (B.Tech./B.E.) in Engineering/ Computer Sciences/ Information Technology Bachelor's Degree in Computer Sciences B.C.A/B.C.S/Information	PRINCIPAL Kandivi Education Society

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Department of Information Technology

Programme Structure (To be implemented from Academic Year- 2020-2021)

M.Sc Part I (Artificial Intelligence)

	Semester-I				
Sr. No.	Course Code	Course Title	Course Type	Credits	
1	21PMAI101	Python Programming	Skill Enhancement Course	4	
2	21PMAI102	Internet of Things	Core Course	4	
3	21PMAI103	Maths and Stats	Core Course	4	
4	21PMAI104	Data Warehouse & Data Mining	Core Course	4	
5	21PMAI105	Python Programming Practical	Skill Enhancement Practical	2	
6	21PMAI106	Internet of Things Practical	Core Course Practical	2	
7	21PMAI107	Maths and Stats Practical	Core Course Practical	2	
8	21PMAI108	Data Warehouse & Data Mining Practical	Core Course Practical	2	
		Total		24	

Semester – II					
Sr. No.	Course Code	Course Title	Course Type	Credits	
1	21PMAI201	Machine Learning and Pattern Recognition	Core Course	4	
2	21PMAI202	Information Retrieval	Core Course	4 .	
3	21PMAI203	Artificial Intelligence for Real World application	Core Course	4	
4	21PMAI204	Research Methodology	Skill Enhancement Course	4	
5	21PMAI205	Machine Learning and Pattern Recognition Practical	Core Course Practical	2	
6	21PMAI206	Information Retrieval Practical	Core Course Practical	2	
7	21PMAI207	Artificial Intelligence for Real World application Practical	Core Course Practical	2	
8	21PMAI208	Research Methodology Practical	Skill Enhancement Practical	2	
		Total		24	

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Programme Structure

(To be implemented from Academic Year- 2020-2021)

M.Sc Part II (Artificial Intelligence)

Semester – III					
Sr. No.	Course Code	Course Title	Course Type	Credits	
1	22PMAI301	Application of Deep Learning and Neural Networks	Skill Enhancement Course	4	
2	22PMAI302	Design Thinking	Core Course	4	
3	22PMAI303	Speech Recognition	Core Course	4	
4	22PMAI304	Mixed Reality (Practical on Al related Tool)	Core Course	4	
5	22PMAI305	Application of Deep Learning and Neural Networks Practical	Skill Enhancement Practical	2	
6	22PMAI306	Design Thinking Practical	Core Course Practical	2	
7	22PMAI307	Speech Recognition Practical	Core Course Practical	2	
8	22PMAI308	Mixed Reality (Practical on Al related Tool) Practical	Core Course Practical	2	
		Total		24	

	Semester – IV					
Sr. No.	Course Code	Course Title	Course Type	Credits		
1	22PMAI401	Social Media and Text Analytics	Core Course	4		
2	22PMAI402	Conversational Experiences	Core Course	4		
3	22PMAI403	Robotic Process Automation	Core Course	4		
4	22PMAI404	Project	Skill Enhancement Course	6		
5	22PMAI405	Social Media and Text Analytics Practical	Core Course Practical	2		
6	22PMAI406	Conversational Experiences Practical	Core Course Practical	2		
7	22PMAI407	Robotic Process Automation	Core Course Practical	2		
		Total		24		

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SEMESTER I

M. Sc (Artificial Intelligence)	Semester – I				
Course Name: Python Programming	Course Code: 21PMAI101		AI101		
Lectures per week (1 Period is 60 minutes)	5				
Credits					
Evaluation System		Hours	Marks		
	Theory Examination	2 Hrs.	60		
	Internal		40		
	Total M	larks	100		

M. Sc (AI)		Semester – I	
Course Name: Python Programming Practical Lectures per week (1 Period is 50 minutes)		Course Code: 20PMDS10.	
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40

CO	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Demonstrate the use of built-in objects of Python	Remembering Understanding	&	1, 2
2	Use significant experience with python program development environment and apply the concept for solution building	Understanding Applying	&	2, 3, 5
3	Implement numerical programming, data handling and visualization through NumPy, Pandas and MatplotLib modules.	Applying a Analyzing	and	1, 2, 3, 5

M. Sc (Artificial Intelligence)		Semester – II	
Course Name: Internet of Things	Course Code: 21PMAI102 5		
Lectures per week (1 Period is 60 minutes)			
Credits	4		
Evaluation System		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60

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Internal		40
Total M	arks	100

B. Sc (Information Technology)		Semester – I		
Course Name: Internet of Things Practical		Course Code: 20PMDI		
Lectures per week (1	Period is 50 minutes)	3	3	
Cr	edits		2	
		Hours	Marks	
Evaluation System	Practical Examination	2 Hrs.	50	
	Internal			

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	ne end of this course, learner will be able to:		0	1 2
1	Acquire good understanding of the Internet of Things concept and systems architecture	Remembering Understanding	&	1, 3
2	Conceptualize the standard security and privacy preserving mechanisms, and understand different cloud integration methods	Understanding Applying	&	2, 5
3	Operate with wireless technologies and networking protocols specific to IoT systems & Design, implement, test and create IoT system equipped with sensors and wireless transceivers to help the society	Applying Evaluating Creating	and	2, 3, 5, 6, 7

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M. Sc (Artificial Intelligence)	Semester – I Course Code: 21PMAI103		
Course Name: Mathematics & Statistics			
Lectures per week (1 Period is 60 minutes)	5		
Credits	4		
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	ne end of this course, learner will be able to:			
1	Understand the elements of structured data and data distribution for binary as well as categorical data.	Remembering Understanding	&	1, 3
2	Apply the knowledge of sampling and distribution algorithms to evaluate the real distribution of sampling data.	Understanding Applying	&	2, 5
3	Apply the knowledge of significance testing, use of null value hypothesis to outline the conditions for a particular test and evaluate and analyze the results of confusion matrix.	Applying Evaluating		2, 3, 5, 6, 7

M. Sc (Artificial Intelligence)	Semester – I		
Course Name: Data Warehouse & Data Mining	Course Code: 21PMAI104		
Lectures per week (1 Period is 60 minutes)	5		
Credits	4		
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

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B. Sc (Information Technology)	Semester - I		
Course Name: Data Warehouse & Data Mining Practical	Course Code: 21PMAI108		
Lectures per week (1 Period is 50 minutes)	3		
Credits	2		
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	ne end of this course, learner will be able to:			
1	Understand data warehouse, Knowledge data discovery and mining concept	Remembering Understanding	&	1, 3
2	Classify various clustering and classification techniques and apply the concept for sampling	Applying Evaluating	&	2, 5
3	Understand the use of tools in data warehousing and mining to apply the concept and create cube and dimensions.	Understanding, Applying Creating	&	2, 3, 5, 6, 7



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SEMESTER II

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M. Sc (Artificial Intelligence)	Semester – II		
Course Name: Machine Learning and Pattern Recognition	Course Code: 21PMAI201		AI201
Lectures per week (1 Period is 60 minutes)	5		
Credits	4		
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

M. Sc (Information Technology)		Semes	ter – II
	e Learning and Pattern on Practical	Course Code: 21PMAI	
Lectures per week (1	Period is 50 minutes)		3
	edits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

CO	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to:			
1	Understand the fundamentals of pattern recognition and machine learning and the issue of dimensionality and apply suitable feature extraction methods considering the characteristics of a given problem.	Remembering, Understanding Applying	&	1, 3
2	Apply parametric and non-parametric methods for pattern recognition in real-world problems and create solutions to real-world problems using pattern recognition and machine intelligence algorithms	Applying Creating	&	2, 5
3	Analyze the performance of machine learning algorithms, effect of parameters and tuning of parameters.	Analyzing		2, 3, 5, 6, 7

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M. Sc (Artificial Intelligence)	Semester – II		
Course Name: Information Retrieval	Course	Code: 21PMA	1202
Lectures per week (1 Period is 60 minutes)	5		
Credits	4		
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

B. Sc (Information Technology)		Semes	ter – II
Course Name: Inform	nation Retrieval Practical	Course Code	: 21PMAI206
Lectures per week (1	Period is 50 minutes)		3
Cr	redits		2
		Hours	Marks
Evaluation System	Practical Examination	2 Hrs.	50
	Internal		

On successful completion of course learner/student will be able to

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	ne end of this course, learner will be able to:			
1	Understand Document as Vector and search Engine functionality	Remembering Understanding	&	1, 2
2	Evaluate metric for IR and	Evaluating		2, 3, 4
3	Understand and apply various Supervised and Unsupervised learning Method	Understanding Applying	&	1, 2, 3, 5

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M. Sc (Artificial Intelligence)	Semester – II Course Code: 21PMAI203 5		
Course Name: Artificial Intelligence for Real World application			
Lectures per week (1 Period is 60 minutes)			
Credits			
Evaluation System		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

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M. Sc (Artificial Intelligence)	Semester – II		
Course Name: Research Methodology	Course Code: 21PMAI204		1204
Lectures per week (1 Period is 60 minutes)	5		
Credits	4		
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

M. Sc (AI)		Semester – II	
Course Name: Research Methodology Practical	Course Code: 21PMAI2		A1208
Lectures per week (1 Period is 60 minutes)		3	
Credits		2	
		Hours	Marks
Evaluation System			60
	Theory Examination	2 Hrs.	00
	Internal		40
	Total M	arks	100

CO	Course Outcomes	Bloom's Taxonomy		PO
By th	e end of this course, learner will be able to: Define research and describe the research process and research methods, follow research ethics	Remembering Understanding	&	1, 2, 3, 4, 6, 7, 8
2	Understand and apply basic research methods including research design, data analysis, and	Applying Analyzing	&	1, 2, 3, 4, 5, 6,
3	interpretation Assess the basic function and working of analytical instruments used in research and propose the required numerical skills necessary to carry out research and prepare report/ dissertation/ thesis	Applying, Analyzing, Evaluating Creating	&	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

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SEMESTER III

M. Sc (Informa	tion Technology)	Semes	ter – IV
Course Name: Social	Media and Text Analytics		: 22PMAI401
Lectures per week (1	Period is 50 minutes)	Course Cour	5
	edits		2
		Hours	Marks
Evaluation System	Theory Examination	2 Hrs.	60
	Internal	T	40
	Total Marks		100

CO	Course Outcomes	Bloom's Taxonomy	PO
By th	ne end of this course, learner will be able to:		
1	Explain the text analytics framework, social media and analyze various sources of text data.	Remembering, Understanding & Analyzing	1, 2, 3
2	Interpret the results, gain insights, and recommend possible actions from analytics performed on text data.	Applying, Analyzing	2, 3, 4, 5
3	Collect social media data, develop social media strategy and measure social media campaign effectiveness.	Applying and Evaluating	2, 3, 5, 6, 7

M. Sc (Artificial Intelligence)	Semester – IV Course Code: 22PMAI402		
Course Name: Conversational Experiences Lectures per week (1 Period is 60 minutes)			
	5		
Credits	4		
Evaluation System		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	larks	100

со	Course Outcomes	Bloom's Taxonomy		PO
By th	By the end of this course, learner will be able to:			
1	Study and understand the fundamental concept of conversational system, block programming, node and natural language processing.	Remembering Understanding	& 1	, 2, 3
2	Identify and evaluate lexical knowledge network, and understand the lexical syntax, semantic and part of speech tagging to apply semantic analysis.	Applying, Analyzing & Evaluating	£ 2	, 3, 4
3	Implement concept of natural language processing using python.	Applying	2,	, 3, 5

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M. Sc (Artificial Intelligence)	Semester – III				
Course Name: Application of Deep Learning and Neural Networks	Course Code: 22PMAI301				
Lectures per week (1 Period is 60 minutes)	5				
Credits	4				
Evaluation System		Hours	Marks		
	Theory Examination	2 Hrs.	60		
	Internal		40		
	Total M	arks	100		

со	Course Outcomes	Bloom's Taxonomy	PO
	e end of this course, learner will be able to:		
1	Explain the basic concepts in Neural Networks and applications	Remembering & Understanding	1, 2, 3
2	Distinguish different types of ANN architectures	Understanding & Analyzing	2, 3, 4
3	Explain and apply the deep learning concepts using Back Propagation Network	Understanding & Applying	2, 3, 5

M. Sc (Artificial Intelligence)	Semester – III			
Course Name: Design Thinking	Course Code: 22PMAI302		A1302	
Lectures per week (1 Period is 60 minutes)		5		
Credits		4		
Evaluation System		Hours	Marks	
Evaluation System	Theory Examination	2 Hrs.	60	
	Internal	-	40	
	Total M	arks	100	

со	Course Outcomes	Bloom's Taxonomy	
By th	e end of this course, learner will be able to:		
1	Examine Design Thinking concepts and principles	Remembering & Understanding	1, 2, 3
2	Practice the methods, processes, and tools of Design Thinking	Understanding & Analyzing	2, 3, 4,
3	Apply the Design Thinking approach and model to real world situations	Applying & Analyzing and Creating	2, 3, 5, 6, 7

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M. Sc (Artificial Intelligence)	Semester - III Course Code: 22PMAI303		
Course Name: Speech Recognition			AI303
Lectures per week (1 Period is 60 minutes)		5	
Credits		4	
Course Name: Speech Recognition Lectures per week (1 Period is 60		Hours	Marks
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	arks	100

СО	Course Outcomes	Bloom's Taxonomy		PO
By th	ne end of this course, learner will be able to:	Remembering	&	1, 2, 3
1	Understand the basic concepts of speech and fundamental signal processing approaches to speech	Understanding Understanding	&	2, 3, 4
2	Analyze various features of speech and understand the techniques of extracting the features and pattern	Analyzing		
	comparison techniques. Understand the architecture and various models of	Applying	&	2, 3, 5
3	Understand the architecture and various incoming continuous speech recognition system, apply methods of text to speech synthesis for different applications and Investigate recent developments in speech recognition	Evaluating		

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M. Sc (Artificial Intelligence)	Course	Code: 22PMA	1304
Course Name: Mixed Reality	Course	5	
minutes)		4	
Credits		Hours	Marks
			THE SHOOT BOX OF THE
	Theory Examination	2 Hrs.	60
	Internal		40
	Total M	larks	100

Course Outcome:

CO	Course Outcomes	Bloom's PO Taxonomy
By th	e end of this course, learner will be	PRINCIPAL
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1	Understand the fundamentals of virtual, augmented and mixed reality and architecture of mixed reality systems	Remembering Understanding	&	1, 2, 3
2	Apply mixed reality development tools for implementing various techniques of mixed reality and analyze the vital techniques required to turn a vision into reality.	Applying Analyzing		2, 3, 4
3	Design MR interfaces and Develop mixed reality systems for real-world applications.	Applying Creating	&	2, 3, 5

SEMESTER IV

M. Sc (Artificial Intelligence)	Semester – IV			
Course Name: Robotic Process Automation	Course	Code: 22PM	A1403	
Lectures per week (1 Period is 60 minutes)		5		
Credits	4		0 2 -	
	West State of the	Hours	Marks	
Evaluation System		Office with expression and the	60	
	Theory Examination	2 Hrs.	00	
			40	
	Internal		100	
	Total Marks 100		100	

M. Sc (Artificia	al Intelligence)	Semes Course Code	ter-IV :: 22PMAI403 5
Lectures per week (1	Period is 60 minutes) dits	Hours	3 Marks
	5.comination	2 Hrs.	50
Evaluation System	Theory Examination Internal		

СО	Course Outcomes	Bloom's Taxonomy	ro
By th	e end of this course, learner will be able to: Understand basic programming concepts and its operation from RPA perspective and Robotic Process Automation	Remembering & Understanding	1, 2, 3
2	Develop familiarity and deep understanding of UiPath tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, tools and apply automation to image, text, data tables, data table	Applying	2, 3, 4
3	various functionalities of offensearch in Artificial	Analyzing	2, 3, 5
	Intelligence with respect to RPA.		0

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M. Sc (Artifi	cial Intelligence)	Semester – 4	
Course Name: PROJECT Lectures per week (1 Period is 50 minutes) Credits		Course Code: 22PMAI404	
Evaluation System	IMPLEMNTATION & VIVA VOCE	2 Hrs.	60
	PROJRCT REPORT		40

CO	Course Outcomes	Bloom's Taxonomy	PO
D ₁ , th	ne end of this course, learner will be able to:		
1	Students will be able to communicate with Clients and define the requirements based on problems in the existing system.	Remembering, Understanding, Analysing & Evaluating	1, 2, 4, 5, 6, 7, 10
2	Students will be able to design, develop and deploy solution to meet all the user and system requirements.	Understanding, Applying, Analysing & Creating	2, 4, 5, 6, 8, 9, 10, 11
3	Students will be able to design use cases and test cases to evaluate the performance of system & estimate the cost and efforts.	Applying, Analysing and Evaluating	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

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