

POOMPUHAR COLLEGE (AUTONOMOUS)

OF THE TAMIL NADU HR & CE DEPARTMENT

MELAIYUR - 609 107

DEPARTMENT OF COMPUTER SCIENCE

M. Sc. COMPUTER SCIENCE

Programme Structure and Scheme of Examination (under CBCS) (Applicable to the candidates admitted from the academic year 2023 -2024 onwards)

Part	Course Code	Study Components & Course Title	Credit	Hours/ Week	Maximum Marks		
					CIA	ESE	Total
		SEMESTER – I					
	23PCSCC11	Core – I: Analysis & Design of Algorithms	5	7	25	75	100
Part A Part A Part A	23PCSCC12	Core – II: Python Programming	5	7	25	75	100
	23PCSCP13	Core – III: Algorithm and Python Lab	4	6	25	75	100
	23PCSCE14-1/ 23PCSCE14-2/ 23PCSCE14-3	Elective – I: (Generic / Discipline Specific) (One from Group A) Advance Software Engineering/ Multimedia and its Applications/ Object Oriented Analysis and Design	3	5	25	75	100
	23PCSCE15-1/ 23PCSCE15-2	Elective – II: (Generic / Discipline Specific) (One from Group B) Embedded Systems/ Internet of Things	3	5	25	75	100
		Total	20	30			500
		SEMESTER – II					
	23PCSCC21	Core – IV: Data Mining and Warehousing	5	6	25	75	100
Part A	23PCSCC22	Core – V: Data Mining and Advance Java Programming Lab	5	6	25	75	100
	23PCSCP23	Core – VI: Advanced Java Programming	4	6	25	75	100
	23PCSCE24-1/ 23PCSCE24-2/ 23PCSCE24-3	Elective – III: (Generic / Discipline Specific)(One from Group C) Artificial Intelligence & Machine Learning/ Critical Thinking, Design Thinking and Problem Solving Advanced Operating System	3	4	25	75	100
	23PCSCE25-1/ 23PCSCE25-2	Elective – IV: (Computer / IT related) (One from Group D) Mobile Computing / Blockchain Technology	3	4	25	75	100
	23PCSCS26	Skill Enhancement Course [SEC] – I Object Oriented Programming through Java, HTML Basics	2	4	25	75	100
			22	30			700

List of Discipline Centric Electives / Generic Electives

Electives	Group	Course Code	Course Title
Discipline		23PCSCE14-1	Advance Software Engineering
	А	23PCSCE14-2	Multimedia and its Applications
		23PCSCE14-3	Object Oriented Analysis and Design
Generic	В	23PCSCE15-1	Embedded Systems
		23PCSCE15-2	Internet of Things
Discipline Centric		23PCSCE24-1	Artificial Intelligence & Machine Learning
	С	23PCSCE24-2	Critical Thinking, Design Thinking and Problem Solving
		23PCSCE24-3	Advanced Operating System
Generic	D	23PCSCE25-1	Mobile Computing
	~	23PCSCE25-2	Blockchain Technology

(Choose 1 out of 2 in each Group)

SEMESTER: I
PART: A
CORE COURSE - I

The 1	main obje	ctives of this course are to:							
1.	Enable the	e students to learn the Elementary Data Structures and algorithms.							
2.	Presents a	n introduction to the algorithms, their analysis and design							
3.	Discuss v	arious methods like Basic Traversal And Search Techniques, divid	e and co	onquer					
1	method, L	Dynamic programming, backtracking							
4. Evne	ected Cou	rse Outcomes:							
Or	the succe	essful completion of the course, student will be able to:							
	Get knowledge about algorithms and determines their time complexity								
1	Demons	strate specific search and sort algorithms using divide and con	nauer	K1.K2					
	technique.								
2	Gain go	od understanding of Greedy method and its algorithm.		K2,K3					
3	Able to	describe about graphs using dynamic programming technique.		K3,K4					
4	Demons	Demonstrate the concept of backtracking & branch and bound technique.							
5	Explore	the traversal and searching technique and apply it for trees and gra	phs.	K6					
K 1	I-Rememb	per;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Creat	te						
Ur	nit:1	INTRODUCTION	1	5hours					
Intro	duction: -	Algorithm Definition and Specification – Space complexity-Tim	e Comr	levity_					
Asvn	nptotic No	otations - Elementary Data Structure: Stacks and Oueues – Binary	Tree -	Binary					
Searc	ch Tree - H	Heap – Heapsort- Graph.		5					
Ur	nit:2	TRAVERSAL AND SEARCH TECHNIOUES	1	5hours					
Deal	- T	1 And Second Techniques Techniques for Direct Trees Technique							
Divid	te and Co	1 And Search Techniques: Techniques for Binary Trees-Technique nouer: - General Method – Binary Search – Merge Sort – Ouick So	's for Gi ort	rapns -					
U	nit.3	CREEDV METHOD	1	5hours					
	111.5	GREEDT WETHOD		Silvurs					
The	Greedy M	ethod:- General Method–Knapsack Problem–Minimum Cost Span	ning Tre	ee-					
Sing	le Source	Shortest Path.							
Ur	nit:4	DYNAMIC PROGRAMMING	1	5hours					
Dyna	amic Prog	ramming-General Method–Multistage Graphs–All Pair Shortest	Path-C	Optimal					
Bina	ry Search	Trees – Traveling Salesman Problem.		1					
Ur	nit:5	BACK TRACKING	1.	3hours					
D 1	·····	Constant Mathe							
Ham	tracking:-	General Method–8-Queens Problem–Sum Of Subsets–Graph Colo voles – Branch And Bound: - The Method – Traveling Salesperson	ring–						
Tiani									
	111:6	Contemporary Issues	2	hours					
		Total Lecture hours	74	Shours					
	(Total Eccure nours	/.	Shouls					
Те	ext Books								
1	Ellis Hor	owitz, "Computer Algorithms", Galgotia Publications.							
1 2	Ellis Hor Alfred V	owitz, "Computer Algorithms", Galgotia Publications. Aho ,John E.Hopcroft,Jeffrey D.Ullman, "Data Structures and Alg	;orithms	5"					
1 2 Re	Ellis Hor Alfred V.	owitz, "Computer Algorithms", Galgotia Publications. Aho ,John E.Hopcroft,Jeffrey D.Ullman, "Data Structures and Alg Books	orithms	5".					

2	Skiena,"TheAlgorithmDesignManual",SecondEdition,Springer,2008
3	Anany Levith,"Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
4	Robert Sedgewick, Phillipe Flajolet, "An Introduction to the Analysis of Algorithms", Addison-Wesley Publishing Company,1996.
F	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://nptel.ac.in/courses/106/106/106106131/
2	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3	https://www.javatpoint.com/daa-tutorial

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	S	М	S	L	М	L	S	М
CO2	S	S	S	S	S	М	S	М	S	М
CO3	S	S	S	S	S	М	S	М	S	М
CO4	S	S	S	S	S	М	S	М	S	М
CO5	S	S	S	S	S	М	S	М	S	М

Course Objectives: The main objectives of this course are to: 1. Presents an introduction to Python, creation of web applications, network applications and working in the clouds 2. Use functions for structuring Python programs 3. Understand different Data Structures of Python 4. Represent compound data using Python lists, tuples and dictionaries **Expected Course Outcomes:** On the successful completion of the course ,student will be able to: 1 Understand the basic concepts of Python Programming K1.K2 2 Understand File operations, Classes and Objects K2,K3 3 Acquire Object Oriented Skills in Python K3.K4 4 Develop web applications using Python K5 5 Develop Client Server Networking applications K5.K6 K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create Unit:1 **INTRODUCTION** 15hours Python: Introduction-Numbers-Strings-Variables-Lists-Tuples-Dictionaries-Sets-Comparison. Unit:2 **CODE STRUCTURES** 15hours **Code Structures:** if, elseif, and else – Repeat with while – Iterate with for – Comprehensions - Functions - Handle Errors with try and except - User Exceptions. Unit:3 **MODULES, PACKAGES AND CLASSES** 15hours Modules, Packages, and Programs: Standalone Programs - Command-Line Arguments -Modules and the import Statement – The Python Standard Library. Objects and Classes: Define a Class with class - Inheritance - Override a Method - Add a Method - In self Defense –Get and Set Attribute Values with Properties – Method Types – Duck Typing – Special Methods - Composition. **DATA TYPES AND WEB** Unit:4 13hours Data Types: Text Strings-Binary Data. Storing and Retrieving Data: File Input/Output-Structured Text Files - Structured Binary Files - Relational Databases - No SQL Data Stores. Web: Web Clients – Web Servers. Unit:5 SYSTEMS AND NETWORKS 15hours Systems: Files–Directories–Programs and Processes. Concurrency: Queues- Processes-Threads-Green Threads and gevent. Networks: Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – ZeroMQ –Internet Services – Web Services and APIs. Unit:6 **Contemporary Issues** 2 hours Expert lectures, online seminars -webinars **Total Lecture hours** 75hours

Г	ext Books						
1	Bill Lubanovic, "Introducing Python", O'Reilly, First Edition-Second Release, 2014.						
2	Mark Lutz, "Learning Python", O' Reilly, Fifth Edition, 2013.						
R	Reference Books						
1	David M. Beazley, "Python Essential Edition, 2009. Reference", Developer's Library Fourth						
2	Sheetal Taneja, Naveen Kumar, Approach", Pearson Publications. "Python Programming-A Modular.						
F	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]						
1	https://www.programiz.com/python-programming/						
2	https://www.tutorialspoint.com/python/index.htm						
3	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview						

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	М	S	S	S	М	М	S	М
CO2	S	S	S	S	S	S	S	М	S	М
CO3	S	S	S	S	S	S	S	М	S	М
CO4	S	S	S	S	S	S	S	М	S	М
CO5	S	S	S	S	S	S	S	М	S	М

23PCSCP13: ALGORITHM AND PYTHON LAB

Course Objectives:

The main objectives of this course are to:

- 1. This course covers the basic data structures like Stack, Queue, Tree, List and Elementary data items, lists, dictionaries, sets and tuples in Python.
- 2. This course enables the students to learn the applications of the data structures using various techniques
- 3. It also enable the students to understand C++language with respect to OOAD concepts
- 4. Application of OOPS concepts in Python.
- 5. To develop web applications using Python

Expe	ected Course Outcomes:						
Or	the successful completion of the course, student will be able to:						
1	Understand the concepts of object oriented with respect to C++ and able to write programs in Python using OOPS concepts.	K1,K2					
2	Able to understand and implement OOPS concepts and to understand the concepts of File operations and Modules in Python.	K3,K4					
3	Implementation of data structures like Stack, Queue, Tree, List using C++ and Implementation of lists, dictionaries, sets and tuples as programs.	K4,K5					
4	4 Application of the data structures for Sorting, Searching using different K5,K6 K5,K6						
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create							
K 1	I-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Cre	ate					
K	I-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Cre LIST OF PROGRAMS	ate 75 hours					
K 1	I-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Cre LIST OF PROGRAMS Algorithm Lab:) Write a program to solve the tower of Hanoi using recursion.	ate 75 hours					
K 1 <i>A</i> 1 2	I-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Cre LIST OF PROGRAMS Algorithm Lab:) Write a program to solve the tower of Hanoi using recursion.) Write a program to traverse through binary search tree using traversals.	ate 75 hours					
K1 A 1 2 3	I-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Cre LIST OF PROGRAMS Algorithm Lab:) Write a program to solve the tower of Hanoi using recursion.) Write a program to traverse through binary search tree using traversals.) Write a program to perform various operations on stack using linked list.	ate 75 hours					
K1 A 1 2 3 4	I-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Cre LIST OF PROGRAMS Mgorithm Lab:) Write a program to solve the tower of Hanoi using recursion.) Write a program to traverse through binary search tree using traversals.) Write a program to perform various operations on stack using linked list.) Write a program to perform various operation in circular queue.	ate 75 hours					
K1 A 1 2 3 4 5	I-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Cre LIST OF PROGRAMS Algorithm Lab:) Write a program to solve the tower of Hanoi using recursion.) Write a program to traverse through binary search tree using traversals.) Write a program to perform various operations on stack using linked list.) Write a program to perform various operation in circular queue.) Write a program to sort an array of an elements using quick sort.	ate 75 hours					

- 1) Programs using elementary data items, lists, dictionaries and tuples
- 2) Programs using conditional branches,
- 3) Programs using loops.
- 4) Programs using functions
- 5) Programs using exception handling

Expert lectures, online seminars –webinars		
	Total Lecture hours	75hours

Τ	ext Books						
1	Goodrich, "Data Structures & Algorithms in Java", Wiley 3 rd edition.						
2	Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.						
3	Bill Lubanovic, "Introducing Python", O'Reilly, First Edition-Second Release, 2014.						
4	Mark Lutz," Learning Python", O'Reilly, Fifth Edition, 2013.						
R	teference Books						
1	Anany Levith,"Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.						
2	Robert Sedge wick, Phillipe Flajolet, "An Introduction to the Analysis of Algorithms", Addison-Wesley Publishing Company, 1996.						
3	David M. Beazley, "Python Essential Reference", Developer's Library, Fourth Edition, 2009.						
4	Sheetal Taneja, Naveen Kumar, "Python Programming-A Modular Approach", Pearson Publications.						
R	elated Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]						
1	https://onlinecourses.nptel.ac.in/noc19_cs48/preview_						
2	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/						
3	https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis_ .htm						
4	https://www.programiz.com/python-programming/						
5	https://www.tutorialspoint.com/python/index.htm						
6	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview						
Ma	nning with Programming Outcomes						

Mapping with Programming Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	М	S	S	S	М	М	S	S
CO2	S	S	S	S	S	S	S	М	S	S
CO3	S	S	S	S	S	S	S	М	S	S
CO4	S	S	S	S	S	S	S	М	S	S

Cou	rse Objec	tives:							
The main objectives of this course are to:									
1. 2. 3.	 Introduce Software Engineering, Design, Testing and Maintenance. Enable the students to learn the concepts of Software Engineering. Learn about Software Project Management, Software Design & Testing. 								
Exp	ected Cou	rse Outcomes:							
0	n the succe	essful completion of the course, student will be able to:							
1	Unders	tand about Software Engineering process		K1,K2					
2	Unders manage	tand about Software project management skills, design and quality ement		K2,K3					
3	Analyz	e on Software Requirements and Specification		K3,K4					
4	Analyz	e on Software Testing, Maintenance and Software Re-Engineering		K4,K5					
5	Design project	and conduct various types and levels of software quality for a software	vare	K5,K6					
K	1-Rememb	per;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Creat	e						
U	nit:1	INTRODUCTION		15hours					
App Soft Soft Requ Form Oua	Approach – Software Processes: Software Process – Characteristics of a Software Process – Software Development Process Models. Unit:2 SOFTWARE REQUIREMENTS 15hours Software Requirements Analysis and Specification : Requirement engineering – Type of Requirements – Feasibility Studies – Requirements Elicitation – Requirement Analysis – Requirement Documentation – Requirement Validation – Requirement Management – SRS - Formal System Specification. Software Quality Management –Software Quality, Software								
Quu	inty ivianag	ement system, iso you.							
U	nit:3	PROJECT MANAGEMENT		15hours					
Soft plan – Sta man	Software Project Management: Responsibilities of a software project manager – Project planning – Metrics for Project size estimation – Project Estimation Techniques – COCOMO e – Staffing level estimation – Scheduling– Organization and Team Structures – Staffing – Risk management – Software Configuration Management .								
U	Unit:4 SOFTWARE DESIGN 15hours								
Soft Strat	ware Desi tegy of De	gn: Characteristics of a good software design – Cohesion ar sign – Function Oriented Design – Object Oriented Design - Detail	nd co ed Do	oupling - esign.					

U	nit:5		SOFTWARE TESTING 13hours								
Soft testi Deb Con	Software Testing: A Strategic approach to software testing – Terminologies – Functional testing– Structural testing – Levels of testing – Validation testing - Regression testing – Art of Debugging-ReliabilityEstimation.SoftwareMaintenance - Software Re-engineering - Configuration Management Activities.										
U	nit:6			Conte	mporary	Issues				2 hours	
E	xpert lectur	es, online	seminars	-webina	ırs				-		
						Tot	tal Lectu	ire hours		75hours	
Т	ext Books										
1	An Integr Delhi, 3rd	ated Appro l Edition.	oach to S	oftware	Engineeri	ng–Pank	aj Jalote	, Narosa P	ublishir	ig House,	
2	Fundame	ntals of So	ftware E	ngineerir	ıg –Rajib	Mall, PH	II Public	ation,3 rd H	dition.		
Re	eference B	ooks									
1	Software Publisher	Engineerir s, 3rd editi	ng–K.K.A on.	Aggarwal	and Yog	esh Sing	h, New A	Age Intern	ational		
2	A Practiti	oners App	roach-So	ftware E	ngineerin	ig,-R.S.P	ressman,	McGraw	Hill.		
3	Fundame	ntals of D.	Softwa Manodrio	re Eng oli, PHI F	gineering Publicatio	- Ca n.	urlo Gl	hezzi, N	I. Jara	ayeri,	
R	elated Onl	ine Conte	nts[MO0	DC, SWA	AYAM, I	NPTEL,	Website	es etc.]			
1	https://www.javatpoint.com/software-engineering-tutorial										
2	2 <u>https://onlinecourses.swayam2.ac.in/cec20_cs07/preview</u>										
3	https://on	linecourses	.nptel.ac	in/noc19	_cs69/pre	eview					
Ма	nning:4L	Duogua	ming O-	tao 100 000							
	pping with	Program	ming Uu	ICOMES	PO5	DO 6	DO7	DOS	PO0	DO10	

··· I· I·	8		8							
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	Μ	S	S	S	М	М	М	М
CO2	S	S	S	S	S	S	S	М	S	S
CO3	S	S	S	S	S	S	S	М	S	S
CO4	S	S	S	S	S	S	S	М	S	S
CO5	S	S	S	S	S	S	S	M	S	S

The main objectives of this course are to:

- 1. To introduce the students about the concepts of Multimedia, Images & Animation.
- 2. To introduce Multimedia authoring tools
- 3. To understand the role of Multimedia in Internet
- 4. To know about High Definition Television and Desktop Computing– Knowledge based Multimedia systems

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic concepts of Multimedia	K1,K2						
2	Demonstrate Multimedia authoring tools	K2,K3						
3	Analyze the concepts of Sound, Images, Video & Animation	K4						
4	Apply and Analyze the role of Multimedia in Internet and realtime applications	K4,K5						
5	Analyze multimedia applications using HDTV	K5,K6						
K	K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create							

Unit:1INTRODUCTION12hoursWhat is Multimedia?-Introduction to making Multimedia-Macintosh and Windows Production

platforms – Basic Software tools.

Unit:2

MULTIMEDIA TOOLS

12hours

10hours

Making Instant Multimedia–Multimedia authoring tools–Multimedia building blocks–Text– Sound.

Unit:3

Images-Animation-Video.

Unit:4

INTERNET

ANIMATION

12hours

Multimedia and the Internet–The Internet and how it works–Tools for World Wide Web– Designing for the World Wide Web.

Unit:5 MULTIMEDIA SYSTEMS 12hours

High Definition Television and Desktop Computing -Knowledge based Multimedia systems.

U	nit:6	2 hours							
E	xpert lectur	res, online seminars - webinars							
		Total Lecture hours	60hours						
Т	Text Books								
1	Tay Vaug	ghan, "Multimedia making it work", Fifth Edition, Tata McGraw H	ill.						
2	John F.K	oegel Bufford, "Multimedia Systems", Pearson Education.							
Re	Reference Books								
1	Judith Jef	floate, "Multimedia in Practice (Technology and Applications)", P	HI,2003.						

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

- 1 <u>https://www.tutorialspoint.com/multimedia/index.htm</u>
- 2 <u>https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_mult_imedia.htm</u>
- 3 <u>https://nptel.ac.in/courses/117/105/117105083/</u>

Mapping with Programming Outcomes

	8	8								
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	М	S	М	М	М	S
CO2	S	S	S	S	М	S	М	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Cou	rse Object	tives:							
The	main objec	ctives of this course are to:							
1. 2.	 Present the object model, classes and objects, object orientation, machine view and model management view. Enables the students to learn the basic functions, principles and concepts of object 								
	oriented a	nalysis and design.	jeet						
3.	Enable the	e students to understand C++ language with respect to OOAD							
Exp	ected Cou	rse Outcomes:							
O	n the succe	essful completion of the course, student will be able to:							
1	Understand the concept of Object-Oriented development and modeling techniques K1,K2								
2	Gain kn	owledge about the various steps performed during object design	K2,K3						
3	Abstract	t object-based views for generic software systems	K3						
4	Link OC	DAD with C++ language	K4,K5						
5	Apply th	ne basic concept of OOPs and familiarize to write C++ program	K5,K6						
K	1-Rememb	er;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create							
U	nit:1	OBJECT MODEL 15	Shours						
Applamor	lying the (ng Objects	Object Model. Classes and Objects: The Nature of an Object – R	elationship						
U	nit:2	CLASSES AND OBJECTS 15	Shours						
Clas and obje	ses and Ot Objects. C cts.	oject: Nature of Class – Relationship Among classes – The Interplay lassification: The importance of Proper Classification –identifying of	of classes of classes of classes and						
U	nit:3	C++ INTRODUCTION 15	Shours						
Intro Func	duction to ctions in C-	C++-Input and output statements in C++-Declarations-control struct	tures–						
U	nit:4	INHERITANCE AND OVERLOADING 13	Bhours						
Clas Poin	ses and Ob ters and A	ojects–Constructors and Destructors–operators overloading - Inherita rrays.	nce –						
U	Unit:5 POLYMORPHISM AND FILES 15hours								
Men Strir	Memory Management Operators-Polymorphism–Virtual functions–Files–Exception Handling – String Handling.								
U	nit:6	Contemporary Issues 2	hours						
Ex	xpert lectur	res, online seminars –webinars							
		Total Lecture hours 75	Shours						

Г	ext Books
1	"Object Oriented Analysis and Design with Applications", Grady Booch, Second Edition, Pearson Education.
2	"Object- Oriented Programming with ANSI& Turbo C++", Ashok N.Kamthane, First Indian Print -2003, Pearson Education.
R	eference Books
1	Balagurusamy "Object Oriented Programming with C++", TMH, Second Edition, 2003.
F	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/
3	https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_an_alysis.htm

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	М	S	М	S	М	S	S
CO2	S	S	S	М	S	М	S	М	S	S
CO3	S	S	S	М	S	М	S	М	S	S
CO4	S	S	S	М	S	М	S	М	S	S
CO5	S	S	S	М	S	M	S	М	S	S

SEMESTER: I PART: A ELECTIVE : II

23PCSCE15-1: EMBEDDED SYSTEMS

CREDIT: 3 HOURS: 5

Course	Objectives:							
The main objectives of this course are to:								
1. Pres	1. Present the introduction to 8051 Microcontroller Instruction Set, concepts on RTOS &							
Soft	tware tools.							
2. Gan	n the knowledge about the embedded software development.							
5. Lea	d Course Outcomes:							
On the	e successful completion of the course student will be able to:							
	Understand the concept of 8051 microcontroller	K1 K2						
$\frac{1}{2}$	Understand the Instruction Set and Programming	K1,K2						
2 0	Analyze the concents of RTOS	K2,K3						
	Analyze and design various real time embedded systems using RTOS	K5						
1 5 I	Debug them all functioning system using various debugging techniques	K5 K6						
	emember: K2-Understand: K3-Apply: K4-Applyze: K5-Evaluate: K6_ Cre	eate						
Unit·1	8051 MICRO CONTROLLER	12Hours						
8051Mic	crocontroller:Introduction-8051Architecture-Input/OutputPins.PortsandC	ircuits- External						
Memory	y - Counters / Timers - Serial Data Input / Output –Interrupts							
Unit:2	2 PROGRAMMING BASICS	12Hours						
Arithmet	tic Operation-Jump and Call Instructions-Simple Program. Applicate-Display Interface.	ions: Keyboard						
Unit:3	3 CONCEPTS ON RTOS	12Hours						
CONCE and data commun Manager	PTS ON RTOS: Introduction to RTOS-Selecting an RTOS-Task and Ta a- Semaphores and shared data. MORE operating systems services: In hication - Message Queues, Mailboxes and pipes- Timer Functions-Evenent.	sk states - Tasks nterrupt Process vents - Memory						
Unit:4	4 DESIGN USING RTOS	10Hours						
Basic De schedulii	esign using a RTOS: Principles - Encapsulating semaphores and Queues- ng considerations-Saving memory space and power- introductions to RTI	Hard real time L &QNX.						
Unit:5	5 SOFTWARE TOOLS	12Hours						
SOFTW	ARETOOLS:EmbeddedsoftwareDevelopmentTools:HostsandTargetMac	hines-						
Linker/L Debuggi	Linker/Locators for Embedded software-getting Embedded software into the Target systems. Debugging Techniques: Testing on your Host machine -Instruction set simulators.							
Unit:6	6 Contemporary Issues	2 hours						
Expert	t lectures, online seminars –webinars							
	Total Lecture hours	60Hours						

Т	ext Books
1	David E.Simon, "An Embedded Software primer" Pearson Education Asia, 2003.
2	Kenneth J Ayala, "The 8051Microcontroller and Architecture programming and application", Second Edition, Penram International.
R	eference Books
1	Raj Kamal, "Embedded Systems – Architecture, programming and design", Tata McGraw– Hill, 2003.
R	elated Online Contents [MOOC, SWAYAM, NPTEL, Website setc.]
1	https://onlinecourses.nptel.ac.in/noc20_cs14/preview_
2	https://www.javatpoint.com/embedded-system-tutorial
3	https://www.tutorialspoint.com/embedded_systems/index.htm

Mapping with Programming Outcomes

mappin	15 WILLI I	1051 ann	mig Out	comes						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	S	М	S	S	М	М	S
CO2	М	М	S	S	М	S	М	S	S	S
CO3	М	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

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The main objectives of this course are to:

- 1. About Internet of Things where various communicating entities are controlled and managed for decision making in the application domain.
- 2. Enable students to learn the Architecture of IoT and IoT Technologies
- 3. Developing IoT applications and Security in IoT, Basic Electronics for IoT, ArduinoIDE, Sensors and Actuators Programming NODEMCU using Arduino IDE.

Exp	Expected Course Outcomes:							
Oı	n the succe	ssful completion of the course, student will be able to:						
1	1 Understand about IoT, its Architecture and its Applications K							
2	2 Understand basic electronics used in IoT & its role K							
3	3 Develop applications with C using Arduino IDE							
4Analyze about sensors and actuatorsK								
5 Design IoT in rea ltime applications using today's internet &wireless technologies								
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create								
Unit:1 INTRODUCTION		1	2hours					

Introduction to IoT: Evolution of IoT – Definition & Characteristics of IoT - Architecture of IoT– Technologies for IoT – Developing IoT Applications – Applications of IoT.

Unit:2	

BASIC ELECTRONICS FOR IoT

12hours

Basic Electronics for IoT: Electric Charge, Resistance, Current and Voltage - Binary Calculations - Logic Chips - Microcontrollers - Multipurpose Computers - Electronic Signals -Pulse Width Modulation.

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Unit:3
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PROGRAMMING USING ARDUINO

12hours

Programming Fundamentals with C using Arduino IDE: Installing and Setting up the Arduino IDE - Basic Syntax - Data Types/ Variables/ Constant - Operators - Conditional Statements and Loops - Using Arduino C Library Functions for Serial, delay and other invoking Functions -Strings and Mathematics Library Functions.

Unit:4	SENSORS AND ACTUATORS	10hours
C 1.4		1/ 1

Sensors and Actuators: Analog and Digital Sensors-Interfacing temperature sensor, ultrasound Sensor and infrared(IR) sensor with Arduino. 12hours Unit:5

SENSOR DATA IN INTERNET

Sending Sensor Data Over Internet: Introduction to ESP8266 NODEMCU WiFi Module -Programming NODEMCU using Arduino IDE.

Unit:6	Contemporary Issues	2 hours
Expert lectur	res, online seminars –webinars	
	Total Lecture hours	hours

Τ	ext Books
1	Arshdeep Bahga, Vijay Madisetti, "InternetofThings:AHands-OnApproach", 2014. ISBN: 978-0996025515
2	Boris Adryan, Dominik Obermaier, Paul Fremantle, "The Technical Foundations of IoT", Artech Houser Publishers, 2017.
R	eference Books
1	Michael Margolis, "Arduino Cookbook", O"Reilly,2011
2	Marco Schwartz, "Internet of Things with ESP8266", Packt Publishing, 2016.
3	DhivyaBala, "ESP8266: Step by Step Tutorial for ESP8266 IoT, Arduino NODEMCU Dev. Kit", 2018.
R	Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://onlinecourses.nptel.ac.in/noc20_cs66/preview
2	https://www.javatpoint.com/iot-internet-of-things
3	https://www.tutorialspoint.com/internet_of_things/index.htm

Mappir	Mapping with Programming Outcomes									
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	М	М	М	S	М	S	Μ	М	S	М
CO2	М	S	М	S	М	S	М	S	S	S
CO3	S	S	S	S	М	S	М	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Expected Course Outcomes:

The main objectives of this course are to:

- 1. Enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing.
- 2. Develop skills of using recent data mining software for solving practical problems.
- 3. Develop and apply critical thinking, problem-solving, and decision-making skills.

O	n the succe	essful completion of the course, student will be able to:					
1	Understar	d the basic data mining techniques and algorithms	K1,K2				
2	Understand the Association rules, Clustering techniques and Data warehousing K2,K3 contents						
3	Compare prediction	and evaluate different data mining techniques like classification, , Clustering and association rule mining	K4,K5				
4	Design da	ta warehouse with dimensional modeling and apply OLAP operation	ns K5,K6				
5	Identify a	ppropriate data mining algorithms to solve real world problems	K6				
K	1-Rememb	per;K2-Understand;K3-Apply; K4-Analyze;K5-Evaluate; K6-Create	;				
U	nit:1	BASICS AND TECHNIQUES	12hours				
issues – data mining metrics – social implications of data. Data mining techniques: Introduction – a statistical perspective on data mining – decision trees. Unit:2 ALGORITHMS 12hours							
U	nit:2	ALGORITHMS	12hours				
U Clas tree-	nit:2 sification: based algo	ALGORITHMS Introduction –Statistical –based algorithms -distance–based algorithms-neural network–based algorithms–rule-based algorithms.	12hours orithms-decision				
Un Clas tree-	nit:2 sification: based algo nit:3	ALGORITHMS Introduction –Statistical –based algorithms -distance–based algorithms-neural network–based algorithms–rule-based algorithms. CLUSTERING AND ASSOCIATION	12hours prithms-decision 12hours				
Ui Clas tree- Ui Clus Asso algor	nit:2 sification: based algo nit:3 etering: Introciation ru ithms – co	ALGORITHMS Introduction –Statistical –based algorithms -distance–based algorithms-neural network–based algorithms–rule-based algorithms. CLUSTERING AND ASSOCIATION roduction–Outliers–Hierarchical Algorithms -Partitional Algorithms. les: Introduction - large item sets - basic algorithms – parallel mparing approaches- incremental rules – measuring the quality of rule	12hours orithms-decision 12hours 1 &distributed les.				
Un Clas tree- Un Clus Assoc algor	nit:2 sification: based algo nit:3 stering: Intro- ciation ru ithms – cos	ALGORITHMS Introduction –Statistical –based algorithms -distance–based algorithms-neural network–based algorithms–rule-based algorithms. CLUSTERING AND ASSOCIATION roduction–Outliers–Hierarchical Algorithms -Partitional Algorithms. les: Introduction - large item sets - basic algorithms – parallel mparing approaches- incremental rules – measuring the quality of rul DATA WAREHOUSING AND MODELING	12hours orithms-decision 12hours 1 & distributed les. 11hours				

U	J nit:5	APPLICATIONS OF DATA WAREHOUSE	11 hours				
Developing a data WAREHOUSE: why and how to build a data warehouse -data warehouse							
arch	architectural strategies and organization issues - design consideration - data content - metadata						
dist	ribution of	data – tools for data warehousing.					
App	olications o	f data warehousing and data mining in government: Introduction	n - national data				
war	ehouses.						
U	J nit:6	Contemporary Issues	2 hours				
E	xpert lectur	res, online seminars –webinars					
		Total Lecture hours	60hours				
Т	ext Books						
1	Margaret education	H. Dunham, "Data Mining: Introductory and Advanced Topics", P ,2003.	earson				
2	2 C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI, Second Edition.						
R	leference B	ooks					
1	ArunK.Pı	ajari,"Data Mining Techniques", Universities Press(India)Pvt. Ltd.	,2003.				
2	Alex Bers	son, Stephen J.Smith," Data Warehousing, Data Mining and OLAF	",TMCH, 2001.				
3	Jiawei Ha Academic	an& Micheline Kamber, "Data Mining Concepts & Techn e press.	iques", 2001,				
R	Related Onl	ine Contents [MOOC, SWAYAM, NPTEL, Websites etc.]					
1	https://wv	vw.javatpoint.com/data-warehouse					
2	https://np	tel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/					
3	https://wv introducti	vw.btechguru.com/trainingitdatabase-management-systemsfile- on-to-data-warehousing-and-olap-2-video-lecture1205426151.	<u>-structures</u> <u>html</u>				

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	S	S	S	S	М	М	М	М
CO2	S	S	S	S	S	S	S	М	S	S
CO3	S	S	S	S	S	S	S	М	S	S
CO4	S	S	S	S	S	S	S	М	S	S
CO5	S	S	S	S	S	S	S	М	S	S

23PCSCP22: DATA MINING AND ADVANCE JAVA PROGRAMMING LAB

Course Objectives:

The main objectives of this course are to:

- 1. To enable the students to learn the concepts of Data Mining algorithms namely classification, clustering, regression.
- 2. To apply statistical interpretations for the solutions and use visualizations techniques for interpretations.
- 3. To enable the students to implement the simple programs using JSP, JAR and provide knowledge on using Servlets, Applets.
- 4. To introduce JDBC and navigation of records and to understand RMI& its implementation.
- 5. To introduce Socket programming in Java.

Expected Course Outcomes:

0	On the successful completion of the course, student will be able to:					
1	Able to write programs using R for Association rules, Clustering techniques	K1,K2				
	and simple Java programmes.					
2	To implement data mining techniques like classification, prediction and must	K2,K3				
	be capable of implementing JDBC and RMI concepts.					
3	Able to use different visualizations techniques using R and able to write	K4,K5				
	Applets with Event handling mechanism.					
4	To apply different data mining algorithms to solve real world applications and	K5,K6				
	To create interactive web based applications using servlets and JSP.					
K	1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create					
2 3 4 K	 and simple Java programmes. To implement data mining techniques like classification, prediction and must be capable of implementing JDBC and RMI concepts. Able to use different visualizations techniques using R and able to write Applets with Event handling mechanism. To apply different data mining algorithms to solve real world applications and To create interactive web based applications using servlets and JSP. 1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create 	K2,K3 K4,K5 K5,K6				

LIST OF PROGRAMS IN DATA MINING

- 1. Implement Apriori algorithm to extract association rule of data mining.
- 2. Implement k-means clustering technique.
- 3. Implement any one Hierarchal Clustering.
- 4. Implement Classification algorithm.
- 5. Implement Decision Tree.

LIST OF PROGRAMS IN ADVANCE JAVA

75hours

75hours

- 1. Display a welcome message using Servlet.
- 2. Design a Purchase Order form using Html form and Servlet.
- 3. Develop a program for calculating the percentage of marks of a student using JSP.
- 4. Design a Purchase Order form using Html form and JSP.
- 5. Prepare a Employee payslip using JSP.

Total Lecture	hours
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Т	ext Books
1	Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson education, 2003.
2	C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI, Second Edition.
3	Jamie Jaworski, "Java Unleashed", SAMS Techmedia Publications, 1999.
4	Campione, Walrath and Huml, "The Java Tutorial", Addison Wesley, 1999.
R	eference Books
1	Arun K.Pujari," Data Mining Techniques", Universities Press(India)Pvt. Ltd.,2003.
2	Alex Berson, Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", TMCH, 2001.
3	Jim Keogh,"The Complete Reference J2EE",Tata McGraw Hill Publishing Company Ltd,2010.
4	David Sawyer McFarland, "Java Script And JQuery-The Missing Manual", Oreilly Publications, 3rd Edition, 2011.
R	elated Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.javatpoint.com/data-warehouse
2	https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/
3	https://www.btechguru.com/trainingitdatabase-management-systemsfile-structures
	introduction-to-data-warehousing-and-olap-2-video-lecture1205426151.html
4	https://www.javatpoint.com/servlet-tutorial
5	https://www.tutorialspoint.com/java/index.htm
6	https://onlinecourses.nptel.ac.in/noc19_cs84/preview

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	М	S	S	S	М	М	S	S
CO2	S	S	S	S	S	S	S	М	S	М
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	М	S	S

The main objectives of this course are to:

- 1. Enable the students to learn the basic functions, principles and concepts of advanced java programming.
- 2. Provide knowledge on concepts needed for distributed Application Architecture.
- 3. Learn JDBC, Servlet packages, JQuery, Java Server Pages and JAR file format

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

1 Understand the advanced concepts of Java Programming K1,K2 2 Understand JDBC and RMI concepts K2,K3 3 Apply and analyze Java in Database K3,K4 Handle different event in java using the delegation event model, event listener 4 K5 and class 5 Design interactive applications using Java Servlet, JSP and JDBC K5.K6 K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create **BASICS OF JAVA** Unit:1 12hours

Java Basics Review: Components and event handling-Threading concepts-Networking features .

Unit:2 REMOTE METHOD INVOCATION 12hours

Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons-Defining Remote objects- Remote Object Activation.

Unit:3DATABASE10hoursJavainDatabases-JDBCprinciples-databaseaccess-Interacting-databasesearch-Creating multimedia
databases - Database support in web applications10hours

Unit:4SERVLETS12hoursJava Servlets: Java Servlet and CGI programming- A simple java Servlet-Anatomy of a java
Servlet-Reading data from a client-sending data to a client and writing the http response header-
working with cookies Java Server Pages: JSP Overview-Installation-JSP tags-Components of a

JSP page.

Unit:	Jnit:5 ADVANCED TECHNIQUES							
JAR file format creation–Internationalization–Swing Programming–Advanced java techniques								
Unit:	Unit:6 Contemporary Issues							
Expert lectures, online seminars –webinars								
		Total Lecture hours	60hours					
Text	Books							
1 Ja	Jamie Jaworski, "Java Unleashed", SAMS Tech media Publications, 1999.							
2 Ca	Campione, Walrath and Huml, "The Java Tutorial", AddisonWesley, 1999.							

R	eference Books
1	JimKeogh,"The Complete Reference J2EE",Tata McGraw Hill Publishing Company Ltd, 2010.
2	David Sawyer McFarland, "Java Script And JQuery-The Missing Manual", Oreilly Publications, 3rd Edition, 2011.
3	Deitel and Deitel, "Java How to Program", Third Edition, PHI/Pearson Education Asia.
R	elated Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.javatpoint.com/servlet-tutorial
2	https://www.tutorialspoint.com/java/index.htm
3	https://onlinecourses.nptel.ac.in/noc19_cs84/preview

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	М	М	М	S
CO2	S	S	S	S	S	S	S	М	S	S
CO3	S	S	S	S	S	S	S	М	S	S
CO4	S	S	S	S	S	S	S	М	S	S
CO5	S	S	S	S	S	S	S	М	S	S

23PCSCE24-1: ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Course Objectives:

The main objectives of this course are to:

- 1. Enable the students to learn the basic functions of AI, Heuristic Search Techniques.
- 2. Provide knowledge on concepts of Representations and Mappings and Predicate Logic.
- 3. Introduce Machine Learning with respect Data Mining, Big Data and Cloud.
- 4. Study about Applications & Impact of ML.

Expected Course Outcomes:

Or	On the successful completion of the course, student will be able to:							
1	Demons	trate AI problems and techniques	K1,K2					
2	Underst	and machine learning concepts	K2,K3					
3	Apply b inferenc	asic principles of AI in solutions that require problem solving, e, perception, knowledge representation, and learning	K3,K4					
4	Analyze	the impact of machine learning on applications	K4,K5					
5	5Analyze and design a real world problem for implementation and understand the dynamic behavior of a systemK5,K6							
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create								
Ur	Unit:1 INTRODUCTION 12hours							

Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics.

Unit:2

SEARCH TECHNIQUES

12hours

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations.

Unit:3

PREDICATE LOGIC

12hours

Using Predicate logic: Representing simple facts in logic - Computable functions and predicates - Resolution - Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge- Logic programming-Forward Vs Backward reasoning.

Unit:4 MACHINE LEARNING 12hours

Understanding Machine Learning: What Is Machine Learning?-Defining Big Data-Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine Learning.

ľ	Init·	5	ΔP	PLICAT		F MACH	INF LF.	ARNING	1	1	Ohours
- U											
Looking Inside Machine Learning: The Impact of Machine Learning on Applications-Data											
Prej	parat	ion-The	Machine	Learning	Cycle.						
U	Unit:6Contemporary Issues2 hours									2 hours	
E	Expert lectures, online seminars –webinars										
							Tota	l Lecture	e hours	6	ohours
Т	Text Books										
1	Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.										
2	Ge	eorge F I	Luger," Aı	tificial In	telligenco	e",4 th Edi	tion, Pear	rson Educ	ation Pub	ol,2002.	
R	lefer	ence Bo	ooks								
1	Ma Ki	achine I rsch.	Learning F	or Dumm	ies ®,IBI	M Limite	d Edition	by	Judith Hu	ırwitz,	Daniel
R	Relat	ed Onli	ne Conter	ntsIMOO	C. SWA	YAM. N	PTEL. W	Vebsites e	etc.]		
1	htt	ns://ww	w.ibm.con	n/downloa	ads/cas/G	B8ZMO2	73				
2	<u>h++</u>				tificial in	talligana					
2	<u>nu</u>	<u>ps.//ww</u>	w.javatpoi			temgence					
3	htt	ps://npt	el.ac.in/cou	urses/106/	105/1061	05077/					
Ma	ppin	g with	Program	ning Out	comes						
C	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO	1	S	S	S	S	S	S	S	М	М	S
CO	2	S	S	S	S	S	S	S	М	S	S
CO3 S S S S S M S							S	S			

CO5 S S *S-Strong; M-Medium; L-Low

S

CO4

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23PCSCE24-2: CRITICAL THINKING, DESIGN THINKING AND PROBLEM SOLVING

Course Objectives:

The main objectives of this course are to:

- 1. Learn critical thinking and its related concepts
- 2. Learn design thinking and its related concepts
- 3. Develop Thinking patterns, Problem solving & Reasoning

Expected Course Outcomes:

On the successful completion of the course ,student will be able to:

Unit:1 CRITICAL THINKING							
K1-Remember;K2-Understand;K3-Apply; K4-Analyze;K5-Evaluate; K6-Create							
5 Analyze the concepts of Thinking patterns, Problem solving & Reasoning in real time applications							
alysis	K4,K5						
	K3,K4						
Focus on the explicit development of critical thinking and problem solving skills							
Understand the concepts of Critical thinking and its related technology							
nd its related tech	nology						

Critical Thinking: Definition, Conclusions and Decisions, Beliefs and Claims, Evidence –finding, evaluation, Inferences, Facts – opinion, probable truth, probably false, Venn diagram. Applied critical thinking: Inference, Explanation, Evidence, Credibility.

Unit:2	DESIGN THINKING	12hours

Design Thinking: Introduction, Need of Design Thinking, problem to question - design thinking process, Traditional Problem Solving versus Design Thinking, phases of Design Thinking, problem exploration, Stake holder assessment.

Unit:3	CASE STUDY	12hours								
Thinking to confidence, fear management, duty Vs passion, Team management, Tools for Thinking, prototype design, Relevance of Design and Design Thinking in engineering, human centered design.										
Unit:4	10hours									
Problem solving: problem definition, problem solving methods, selecting and using information,										
data processing, solution methods, spatial reasoning.										

U	J <mark>nit:5</mark>	5	REASONING								2hours
Re im sol	asoni plem lving:	ing: Ded enting, : Combin	luctive an and evalution ning skills	nd hypoth uating sc s – using	netical rea plutions, imaginati	asoning, interperse on, devel	computat onal prol oping mo	ional pro olem solv odels.	blem solv ving. Ad	ving; gen vanced p	erating, problem
Unit:6 Contemporary Issues 2 hours											
E	Expert lectures, online seminars –webinars										
	-						Tota	l Lecture	hours	6	Ohours
T	ext I	Books									
1	Joh Sol	nn Butter lving, Ca	worth and mbridge	d Geoff Universit	Thwaites, ty Press, 2	Thinking 2013.	g skills: C	Critical Th	ninking ar	nd Proble	m
2	H.S.Fogler and S.E.Le Blanc, Strategies for Creative Problem Solving, 2 nd edition, Pearson, Upper Saddle River, NJ, 2008.										
R	lefere	ence Boo	oks								
1	A. Whimbey and J. Lochhead, Problem Solving & Comprehension, 6th edition, Lawrence Erlbaum, Mahwah, NJ, 1999.										
2	М. 199	Levine, 94.	Effective	Problem	Solving,	2nd editi	ion, Prent	ice Hall,	Upper Sa	ddle Riv	er, NJ,
3	Mi	chael Ba	ker, The	Basic of	Critical T	hinking,	The Criti	cal Think	ing Copre	ess, 2015	
4	Da	vid Kelle	ey and To	m Kelley	, Creativ	e Confide	ence,2013	i.			
R	Relate	ed Onlin	e Conter	ts[MOO	C, SWA	YAM, N	PTEL, W	Vebsites e	etc.]		
1	http	os://www	v.tutorials	point.con	n/critical	thinking/	index.htn	<u>1</u>			
2	http	ps://www	v.tutorials	point.con	n/design	thinking/	design th	inking qu	uick guid	e.htm	
3	http	ps://nptel	l.ac.in/cou	- 1109/	/104/1091	.04109/					
Mapping with Programming Outcomes											
C	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO	1	S	S	М	S	S	S	М	S	S	S
CO2 S		S	S	M	S	S	S	M	S	S	S
CO	3	S	S	M	S	S	S	S	S	S	S
<u>CO</u>	94	S	S	S	S S	S	S	S	S	S	S
		S	S M. 1		S	S	8	S	8	S	5

The main objectives of this course are to:

- 1. Enable the students to learn the different types of operating systems and their functioning.
- 2. Gain knowledge on Distributed Operating Systems
- 3. Gain insight into the components and management aspects of real time and mobile operating systems.
- 4. Learn case studies in Linux Operating Systems

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the design issues associated with operating systems	K1,K2
2	Master various process management concepts including scheduling, deadlocks and distributed file systems	K3,K4
3	Prepare Real Time Task Scheduling	K4,K5
4	Analyze Operating Systems for Handheld Systems	K5
5	Analyze Operating Systems like LINUX and iOS	K5.K6

K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create

Unit:1BASICS OF OPERATING SYSTEMS12hours

Basics of Operating Systems: What is an Operating System? – Main frame Systems –Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems -Process Scheduling – Cooperating Processes – Inter Process Communication-Deadlocks –Prevention – Avoidance – Detection – Recovery.

DISTRIBUTED OPERATING SYSTEMS

12hours

Distributed Operating Systems: Issues – Communication Primitives – Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems –design issues – Case studies .

Unit:3	10hours								
Realtime Operating Systems : Introduction – Applications of Real Time Systems – Basic									
Model of Rea	Model of Real Time System – Characteristics – Safety and Reliability.								
Unit:4	HANDHELD SYSTEM	12hours							
Operating Sys	tems for Handheld Systems: Requirements-Technology Over	view- Handheld							
Operating Sys	Operating Systems-Palm OS-Symbian Operating System-Android-Architecture of android-								
Securing handh	neld systems								
Unit:5 CASE STUDIES									

Case Studies : Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy - Managing I/O devices – Accessing Files- iOS : Architecture and SDK.

U	J nit:6	Contemporary Issues	2 hours				
E	xpert lectur	res, online seminars-webinars					
		Total Lecture hours	60hours				
Т	ext Books						
1	1Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, "Operating System Concepts", Seventh Edition, John Wiley & Sons, 2004.						
2	2 Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2001.						
R	eference Bo	ooks					
1	Rajib Ma	ll,"Real-Time Systems:TheoryandPractice",PearsonEducationIndia	,2006.				
2	Pramod C Third edi	Chandra P.Bhatt, An introduction to operating systems, concept and tion, 2010.	practice, PHI,				
3	Daniel.P.	Bovet&MarcoCesati,"UnderstandingtheLinuxkernel",3 rd edition,O"	Reilly,2005				
4	NeilSmyt	h,"iPhoneiOS4DevelopmentEssentials-Xcode",FourthEdition,Payl	oad media, 2011.				
R	Related Onl	ine Contents[MOOC, SWAYAM, NPTEL, Websites etc.]					
1	https://on	linecourses.nptel.ac.in/noc20_cs04/preview					
2	https://wv	vw.udacity.com/course/advanced-operating-systemsud189					
3	https://mi	nnie.tuhs.org/CompArch/Resources/os-notes.pdf					

Mapping with Programming Outcomes

11	0	0	0							
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	S	S	S	S	М	М	М	М
CO2	S	М	S	S	S	S	S	М	S	М
CO3	S	М	S	S	S	S	S	М	S	М
CO4	S	М	S	S	S	S	S	М	S	М
CO5	S	М	S	S	S	S	S	М	S	М

SEMESTER: II
PART: A
ELECTIVE : IV

23PCSCE25-1: MOBILE COMPUTING

Course Objectives:

The main objectives of this course are to:

- 1. Present the overview of Mobile computing, Applications and Architectures.
- 2. Describe the futuristic computing challenges.
- 3. Enable the students to learn the concept of mobile computing.

Expo	Expected Course Outcomes:								
Or	On the successful completion of the course, students will be able to:								
1	1 Understand the need and requirements of mobile communication								
2	2 Focus on mobile computing applications and techniques								
3 Demonstrate satellite communication in mobile computing									
4	4 Analyze about wireless local loop architecture K5,K6								
5	5 Analyze various mobile communication technologies K6								
K1-Remember;K2-Understand;K3-Apply; K4-Analyze;K5-Evaluate; K6-Create									
U	nit:1	INTRODUCTION	12hours						

Introduction: Advantages of Digital Information - Introduction to Telephone Systems –Mobile communication: Need for Mobile Communication – Requirements of Mobile Communication.

Unit:2

MOBILE COMMUNICATION

12hours

Introduction to Cellular Mobile Communication – Mobile Communication Standards – Mobility Management – Frequency Management.

Unit:3

MOBILE COMPUTING

12hours

Mobile Computing: History of data networks – Classification of Mobile data networks - CDPD System – Satellites in Mobile Communication: Satellite classification – Global Satellite Communication – Changeover from one satellite to other – Global Mobile Communication.

Unit:4

MOBILE COMMUNICATION SYSTEM

11hours

Important Parameters of Mobile Communication System – Mobile Internet: Working of Mobile IP – Wireless Network Security – Wireless Local Loop Architecture: Components in WLL – Problems in WLL – Modern Wireless Local Loop – Wireless Application Protocol.

COMMUNICATION TECHNOLOGY

11hours

WCDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad hoc Network and Bluetooth technology – Fourth Generation Mobile Communication systems.

Unit:6	Contemporary Issues	2 hours				
Expert lectures, online seminars-webinars						
	Total Lecture hours	60hours				

Τ	Text Books
1	T.G.Palanivelu, R.Nakkeeran, "Wireless and Mobile Communication", PHI Limited, 2009.
2	Jochen S chiller," Mobile Communications", Second Edition, Pearson Education, 2007.
R	eference Books
1	Asoke K Talukder, Hasan Ahmed, Roopa Yavagal, "Mobile Computing", TMH, 2010.
R	Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.tutorialspoint.com/mobile_computing/index.htm
2	https://www.javatpoint.com/mobile-computing
3	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	М	L	L	М	S	М	М	М	М
CO2	S	S	S	М	М	S	М	S	S	S
CO3	S	S	S	S	М	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

2 hours

Cou	rse Object	lives:						
The	main objeo	ctives of this course are to:						
1. 2. 3.	 Understand the fundamentals of block chain and cryptocurrency. Understand the influence and role of block chain in various other fields. Learn security features and its significance. 							
4.	 Identify problems & challenges posed by BlockChain. 							
Exp	Expected Course Outcomes:							
Oı	On the successful completion of the course, student will be able to:							
1	1Demonstrate blockchain technology and crypto currencyK1,K2							
2	Understand the mining mechanism in blockchain K2							
3	Apply and identify security measures, and various types of services that allow K3,K4 people to trade and transact with bitcoins							
4	Apply a	nd analyze Block chain in health care industry	K4,K5					
5	Analyze	security, privacy, and efficiency of a given Block chain system	K5,K6					
K	I-Rememb	er;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Creat	e					
Uı	nit:1	INTRODUCTION	12hours					
Bitco Strat	Introduction to Blockchain - The big picture of the industry – size, growth, structure, players.Bitcoin versus Cryptocurrencies versus Blockchain - Distributed Ledger Technology (DLT).Strategic analysis of the space – Blockchain platforms, regulators, application providers.Unit:2NETWORKAND SECURITYAdvantage over conventional distributed database. Blockchain Network, Mining Mechanism.							
Dist	ributed Co	nsensus, Blockchain 1.0, 2.0 and 3.0 – transition, advancements an	d features.					
Uı	nit:3	CRYPTOCURRENCY	12hours					
Cryp Publ mod	Cryptocurrency - History, Distributed Ledger, Bitcoin protocols -Symmetric-key cryptography - Public-key cryptography - Digital Signatures -High and Low trust societies - Types of Trust model: Peer-to-Peer, Leviathan, and Intermediary.							
Uı	nit:4	CRYPTOCURRENCY REGULATION	11hours					
Cryp cryp	otocurrency tocurrency	y Regulation-Stakeholders, Roots of Bitcoin, Legal vie - Black Market-Global Economy.	ews-exchange of					
U	nit:5	CHALLENGES IN BLOCKCHAIN	11hours					
Oppo macl chain Valu	ortunities nine to ma n in Health le.	and challenges in Block Chain – Application of block chain: chine communication –Data management in industry 4.0–future p a 4.0 - Blockchain properties - Healthcare Costs - Healthcare Qua	Industry 4.0 – prospects. Block lity - Healthcare					

Contemporary Issues

U	J nit : 6		
E	xpert lectur	es, online seminars –webinars	
		Total Lecture hours	60hours
Т	ext Books		
1	Arvind N "Bitcoin Universit	arayanan, Joseph Bonneau, Edward Felten, Andrew Miller and St and Cryptocurrency Technologies: A Comprehensive Introduc y Press (July 19, 2016).	teven Goldfeder, tion", Princeton
2	Antonopo	oulos, "Mastering Bit coin: Unlocking Digital Cryptocurrencies"	
R	leference B	ooks	
1	Satoshi N	akamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System"	
2	Rodrigod for Indus	a Rosa Righi, Antonio Marcos Alberti, Madhusudan Singh, "Bloch try 4.0" Springer 2020.	chain Technology
R	Related On	ine Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://ww	vw.javatpoint.com/blockchain-tutorial	
2	https://ww	vw.tutorialspoint.com/blockchain/index.htm	
3	https://np	tel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/	

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	Μ	S	М
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

The main objectives of this course are to:

- 1. To implement the static web pages using HTML and do client side validation using JavaScript.
- 2. To introduce Node JS implementation for server side programming.
- 3. To experiment with single page application development using React.

Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Develop a proper understanding of Web Development Architecture.					
2	Create application using React components.					
3	Perform Navigation using Routes.					
4	Build Web Applications using React with Redux.					
5	Perform ReactJS animations					
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create						
Unit:1			15hours			
ReactJS introduction, why to learn ReactJS, React Environment Setup- pre-requisite for ReactJS						
ways	ways to install ReactJS, ReactJS - Architecture, ReactJS - creating a React Application, Reac					

create-react-app, Features of ReactJS.

Unit:2

15hours

ReactJS - JSX, ReactJS - components: creating a React component, creating a class component, creating a function component, ReactJS - styling, ReactJs - properties (props), React Props Validation.

Unit:3 15hours ReactJS state management, ReactJS event Management, React Constructor, React component API, React component Life-cycle, React Forms and user input, controlled Component, Un-Controlled Component. Unit:4

15hours

13hours

ReactJS - Http client Programming, React Lists, The map() function, React Keys, React Refs, React Fragments, React Router, React CSS, React Animation, React Date picker, DoM in React.

Unit:5

React AJAX call - HTTP GET request, HTTP GET Request and Looping through data, React Bootstrap, React Table, React Hooks, React building and deployment.

Unit:6	Contemporary Issues	2 hours				
Expert lectures, online seminars- webinars						
	Total Lecture hours	75hours				

Text Books					
1	Learning React: Functional web Development with React and Redux 1 st Edition by Alex				
]	Banks.				
2	The Road to React: your journey to master plain yet pragmatic React.js by Robin Wieruch				
Reference Books					
1	React.js Essentials: A fast-paced guide to designing and building scalable and maintainable				
	web apps with React.js Artemij Fedosejev.				
2	Full-Stack React projects: Learn MERN stack development by building modem web apps				
	using MongoDB, Express, React, and Node.js, 2nd Edition paperback by shama Hoque				
3	React.js Book: Learning React Javascript Library From Scratch by Greg Sidelnikov				
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]					
1	https://www.mygreatlearning.com/academy/learn-for-free/courses/react-js-tutorial				
2	https://www.classcentral.com/course/edx-introduction-to-reactjs-8770				

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	S	М	S	L	М	L	S	М
CO2	S	S	S	S	S	М	S	М	S	М
CO3	S	S	S	S	S	М	S	М	S	М
CO4	S	S	S	S	S	М	S	М	S	М
CO5	S	S	S	S	S	М	S	М	S	М