PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc COMPUTER SCIENCE

(Students admitted during 2021 – 2022 Onwards)

(Under CBCS with Outcome Based Education (OBE) Pattern)

SYLLABUS

H.H. THE RAJAH'S COLLEGE

PUDUKKOTTAI – 622 001

(Government Autonomous Institution, Affiliated to Bharathidasan University)

H.H THE RAJAH'S COLLEGE (AUTONOMOUS) - PUDUKKOTTAI
PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE
M.Sc COMPUTER SCIENCE (2021 – 2022)

S.NO	SEM	PAPER	SUB.CODE	SUBJECT	HOURS/ WEEK	CREDIT	EXAM HOURS	MARKS		
								INTERNAL	EXTERNAL	TOTAL
1	I	CC-I	21PCS1	Principles of Compiler Design	7	5	3	25	75	100
2	I	CC-II	21PCS2	Advanced Java Programming	7	5	3	25	75	100
3	I	CP-III	21PCS3P	Advanced Java Programming Lab	7	5	3	40	60	100
4	I	EC-I	21PCSE1A	Wireless Networks	7	5	3	25	75	100
			21PCSE1B	Embedded Systems						
			21PCSE1C	Mobile Computing						
5	I	EDC-I	21PCSED1	General Studies for Competitive Examinations	**2**	-	-	-	-	
					30	**20**	**-**	**-**	**-**	**400**
6	II	CC-IV	21PCS4	Distributed Operating Systems	6	5	3	25	75	100
7	II	CC-V	21PCS5	Data Mining and R Programming Language	5	5	3	25	75	100
8	II	CC-VI	21PCS6	Advanced Programming in Python	6	5	3	25	75	100
9	II	CP-VII	21PCS7P	Advanced Programming in Python Lab	5	5	3	40	60	100
10	II	EC-II	21PCSE2A	Microprocessors, Interfacing & Applications	5	5	3	25	75	100
			21PCSE2B	Artificial Intelligence						
			21PCSE2C	Soft Computing						
	II	EDC-I	21PCSED1	General Studies for Competitive Examinations	3	5	3	25	75	100
					30	**30**	**-**	**-**	**-**	**600**
11	III	CC-VIII	21PCS8	Cloud Computing	6	5	3	25	75	100
12	III	CC-IX	21PCS9	Advanced Network Security	6	5	3	25	75	100
13	III	CC-X	21PCS10	Programming in ASP .Net with C#	6	5	3	25	75	100
14	III	CP-XI	21PCS11P	Programming in ASP .Net with C# Lab	6	5	3	40	60	100
15	III	EC-III	21PCSE3A	Object Oriented Systems Development	6	5	3	25	75	100
			21PCSE3B	Computer Simulation and Modeling						
			21PCSE3C	WAP and XML						
					30	**25**	**-**	**-**	**-**	**500**
16	IV	CC-XII	21PCS12	Web Services	6	5	3	25	75	100
17	IV	CC-XIII	21PCS13	Advanced Software Engineering	6	5	3	25	75	100
18	IV	PW-I	21PCS14	Project Work	12	5	-	25	75	100
					24	**15**	**-**	**-**	**-**	**300**
Grand Total					**114**	**90**	-	-	-	**1800**

H.H THE RAJAH'S COLLEGE (AUTONOMOUS) - PUDUKKOTTAI
PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE
M.Sc. (Computer Science) - Course Structure under CBCS
(For the Candidates Admitted from the academic year 2021 - 2022 onwards)

Core Courses (14)				
Sl. No.	**Sub. Code**	**Code**	**Title of the Paper**	**Credits**
1	21PCS1	CC-I	Principles of Compiler Design	5
2	21PCS2	CC-II	Advanced Java Programming	5
3	21PCS3P	CP-III	Advanced Java Programming Lab.	5
4	21PCS4	CC-IV	Distributed Operating Systems	5
5	21PCS5	CC-V	Data Mining and R Programming Language	5
6	21PCS6	CC-VI	Advance Python Programming	5
7	21PCS7P	CP-VII	Advance Python Programming Lab.	5
8	21PCS8	CC-VIII	Cloud Computing	5
9	21PCS9	CC-IX	Advanced Network Security	5
10	21PCS10	CC-X	Programming in ASP .Net with C#	5
11	21PCS11P	CP-XI	Programming in ASP.Net with C# Lab	5
12	21PCS12	CC-XII	Web Services	5
13	21PCS13	CC-XIII	Advanced Software Engineering	5
14	21PCS14	PW-I	Project Work	5
				70
Elective Courses (3)				
1	21PCSE1A	EC-I	Wireless Networks	5
	21PCSE1B		Embedded Systems	
	21PCSE1C		Mobile Computing	
2	21PCSE2A	EC-II	Microprocessors, Interfacing and Applications	5
	21PCSE2B		Artificial Intelligence	
	21PCSE2C		Soft Computing	
3	21PCSE3A	EC-III	Object Oriented Systems Development	5
	21PCSE3B		Computer Simulation and Modeling	
	21PCSE3C		WAP and XML	
				15
Extra Disciplinary Courses (1)				
1	21PCSED1 OBJECTIVE TYPE	EDC-I	General Studies for Competitive Examinations	**5**
OVERALL TOTAL BASED ON PG COURSE				
1	Core Courses		13 (12 X 5 + 1 X 10)	70
2	Elective Courses		3 X 5	15
3	Extra Disciplinary Course		1 X 5	5
Total Credits				**90**

H.H THE RAJAH'S COLLEGE (AUTONOMOUS) - PUDUKKOTTAI
PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.SC. COMPUTER SCIENCE [2021 2022 ONWARDS]

SL. NO.	COURSE CODE	BOS for the year 2021-2022	Unit - I	Unit - II	Unit - III	Unit - IV	Unit - V	Total in % [Unit - I+ II+III+IV+V]	Cumulative Updating in %	STATUS
1	21PCS1	INCLUSION	20%	20%	20%	20%	20%	100%	100%	
		DELETION	20%	20%	20%	20%	20%	100%		
2	21PCS2	INCLUSION	NO CHANGE						_	
		DELETION								
3	21PCS3P	INCLUSION	NO CHANGE						_	LAB
		DELETION								
4	21PCS4	INCLUSION	20%	20%	20%	20%	20%	100%	100%	
		DELETION	20%	20%	20%	20%	20%	100%		
5	21PCS5	INCLUSION	0	0	0	0	20%	20%	20%	
		DELETION	0	0	0	0	20%	20%		
6	21PCS6	INCLUSION	20%	20%	20%	20%	20%	100%	100%	
		DELETION	20%	20%	20%	20%	20%	100%		
7	21PCS7P	INCLUSION	20%	20%	20%	20%	20%	100%	100%	LAB
		DELETION	20%	20%	20%	20%	20%	100%		
8	21PCS8	INCLUSION	NO CHANGE						_	
		DELETION								
9	21PCS9	INCLUSION	5%	8%	0	10%	0	23%	15%	
		DELETION	2%	5%	0	0	0	7%		
10	21PCS10	INCLUSION	0	0	0	0	20%	20%	20%	
		DELETION	0	0	0	0	20%	20%		
11	21PCS11P	INCLUSION	NEW						100%	LAB
		DELETION								
12	21PCS12	INCLUSION	0	0	10%	0	20%	30%	30%	
		DELETION	0	10%	0	0	20%	30%		
13	21PCS13	INCLUSION	20%	20%	20%	20%	20%	100%	100%	
		DELETION	20%	20%	20%	20%	20%	100%		
14	21PCSE1	INCLUSION	20%	20%	20%	20%	20%	100%	100%	
		DELETION	20%	20%	20%	20%	20%	100%		
15	21PCSE2	INCLUSION	20%	20%	20%	20%	20%	100%	100%	
		DELETION	20%	20%	20%	20%	20%	100%		
16	21PCSE3	INCLUSION	20%	20%	20%	20%	20%	100%	100%	
		DELETION	20%	20%	20%	20%	20%	100%		

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Remember; K2- Understanding; K3- Apply; K4-Analyze; K5- Evaluate

1. Theory: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1	A (Answer All)	10 x 2 = 20	Very Short Answers	75
K2	B (Either Or)	5 x 5 = 25	Short Answers	
K3 & K4	C (3 out of 5)	3 x 10 = 30	Descriptive / Detailed	

2. Practical Examinations: 60 Marks

Knowledge Level	Section		Total
	Practical	Record Work	
K3	50	10	60
K4			
K5			

PROGRAM OBJECTIVES:include:

1. To prepare and motivate graduates with recent technological developments related to core subjects like programming, databases, open source technologies, design of compilers, mobile computing and network security aspects and future technologies.
2. To encourage students for higher studies, research activities and technically competent to excel in IT industry by imparting interactive quality teaching and organizing various activities.
3. To inculcate the ability for designing, developing, analyzing, testing and implementing various software applications.
4. To train the graduates to have basic interpersonal skills and sense of social responsibility that paves them a way to become good team members and leaders.
5. To be able to adapt to change career opportunities and learn to effectively communicate ideas in oral and written form to cope up with evolving technical challenges.

PROGRAM OUTCOMES (POs)

PO1: Acquire sound knowledge in computer science including theory, programming, algorithms, databases and web development.

PO2: Ability to adopt knowledge to develop solutions using Information technology.

PO3: Design and develop computer based applications related to current emerging technologies.

PO4: Apply professional skills in software design process and practical competence in broad range of open source programming languages to withstand technological change and provide solutions to new ideas and innovations.

PO5: Create socially acceptable technical solutions to complex computer science problems with the application of emerging techniques for sustainable development relevant to professional computer based practice.

Course Code	21PCS1	PRINCIPLES OF COMPILER DESIGN	TOTAL HOURS	CREDITS
			7	5
Core/~~Elective~~/~~Supportive~~		Core Course - I	Syllabus Version	2021-2022

Course Objectives:

- To Learn the Concept of Compiling
- To Understand the Basics of Compilers
- To Learn the various Parts and Working of Compilers.

Unit:1

Introduction to Compilers: Word, Sentences, Languages – Compiler, Translator and interpreter –Phases of a compiler – Phases and Passes –**Lexical Analyser:** Tokens – Languages and Strings – Input Buffers – Transition Diagrams – Regular Expressions – finite Automata – NFA and DFA.

Unit:2

Context Free Grammar – Derivations and Reductions – Parse Trees – Ambiguous Grammar –**Parsers:** Top down parsing – Predictive parsers, Operator Precedence parsing – Bottom Up Parsing- Shift Reduce parser – LR parser – SLR.

Unit:3

Syntax Directed Translations: Attributes – Syntax Directed Translation – Synthesized Translation – Inherited Translation – Translation of Assignment statements – Translation of Boolean Functions – Syntax Directed Translation for postfix.

Unit:4

Symbol Table and Errors – Symbol Tables – Hash Table – Errors – Intermediate Code Generation – Postfix – Syntax Trees – Three address codes – Types: Quadruples, Triples and indirect Triples.

Unit:5

Code Optimization - Code improving Transformation – Basic Blocks – Flow Graphs – Loops – Loops in Flow Graphs –. Code generation – DAG – Peephole optimization.

Course Outcomes:

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

CO1: Understand and learn the various phases of compiler and role, design of lexical analyzer.

CO2: Perceive context-free grammars and parsers.

CO3: Know and implement LR parsers.

CO4: Develop code using syntax-directed translation schemes.

CO5: Optimize and design code generator.

Text Book

1	M.Joseph, "**Elementsof Compiler Design**" Dhanam Publications House, First Edition – June 2001. UNIT I: Chapter 1, 2; UNIT II: Chapter 3,4,5.1; UNIT III: Chapter 6; UNIT IV: Chapter 8, 9;UNIT V: Chapter 10, 11;

Reference Book	
1	Aho and J .D Ullman, "**The Principles of Compiler Design**" Narosa Publishing House,1987.
Online Web Reference	
1	https://www.tutorialspoint.com/compiler_design/index.htm

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	9	3	3	1
CO2	9	3	3	9	3
CO3	9	9	1	3	3
CO4	9	9	3	3	3
CO5	3	9	3	3	1
Weightage	39	39	13	21	11
Weightage % of Course Contribution of PO's	6.32	9.35	4.08	5.92	3.19

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS2	ADVANCED JAVA PROGRAMMING	TOTAL HOURS	CREDITS
			7	5
Core/~~Elective~~/~~Supportive~~		Core Course - II	Syllabus Version	2021-2022

Course Objectives:

- To Understand the OOPs Concept
- To Visualize the OOPs Concepts
- To Program Advanced OPPs Concepts using Java.

Unit:1

Fundamentals of Object Oriented Programming - Overview of Java Language – Introduction to classes – Class Fundamentals – declaring objects – Constructors – Methods – Overloading Methods – Inner classes – Inheritance – Method Overriding – Packages – Interfaces.

Unit:2

Exception Handling – Types of Exception – Try and Catch – Nested Try – Throw and Throws – Multithreading – Thread Priorities – Main Thread – Synchronization.

Unit:3

AWT classes – Window fundamentals –AWT Controls – Labels – Buttons – Menus – Handling Events by Extending AWT Components – Applet class – Applet Architecture – The HTML applet tag- Passing Parameters in Applets.

Unit:4

Networking – Networking basics- Java and the Net – Inet Address – TCP/IP Client sockets – URL – URL Connection – TCP/IP Server Sockets – A catching proxy HTTP Server – Datagrams.

Unit:5

Java database Connectivity – JDBC /ODBC bridge – Java SQL package – JDBC exception Class – Connection to remote database – Data manipulation – Data navigation – Introduction to Java Remote Method Invocation (RMI) – Java servlets – Introduction to Java Beans.

Expected Course Outcomes:

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

CO1: Able to Define OOPs concepts & basics of java programming.

CO2: Able to Identify the use of classes, interface, packages in solving specific problems.

CO3: Able to Analyze the use of Single threading and multithreading programs using synchronization and handle the exceptions to increase the performance of program.

CO4: Able to know the importance of collection framework in developing effective programs.

CO5: Analyse and Design GUI based applications using swings and applets.

Text Book

1	Herbert Schildt, "Java2 complete Reference", Tata McGraw Hill, Fourth Edition, 2001.
2	Ivan Bayross, "Java2.0 (Web enabled commercial application development)" – BPB publications Indian Edition 2000 (Chapters 11,13,14 and 16 only).

Reference Book	
1	Java 2, Swing, Servlets, JDBC & JAVA Beans Programs - Black Book, Steven Holzner.
Online Web Reference	
1	• http://www.learnjavaonline.org/

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	3	3	1	1
CO2	9	3	1	1	9
CO3	9	3	9	3	1
CO4	3	3	9	9	3
CO5	3	9	9	3	1
Weightage	33	21	31	17	15
Weightage % of Course Contribution of PO's	5.35	5.04	9.72	4.79	4.35

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS3P	ADVANCED JAVA PROGRAMMING LAB	TOTAL HOURS	CREDITS
			7	5
Core/~~Elective~~/~~Supportive~~		Core Course Practical - III	Syllabus Version	2021-2022

Course Objectives:

- To Impart Practical Knowledge in Advanced Java Programming Language

LIST OF PROGRAMS

1. Simple Programs
2. Constructors and Destructors
3. Inheritance
4. Method Overloading
5. Packages and Interface
6. Exception Handling
7. Multi-Threading
8. AWT Class and Applet
9. Network Socket Programs
10. Database Connectivity
11. RMI Concepts
12. Servlet Concept
13. Java Beans.

Expected Course Outcomes:

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

CO1: Able to Define OOPs concepts & basics of java programming.

CO2: Able to Identify the use of classes, interface, packages in solving specific problems.

CO3: Able to Analyze the use of Single threading and multithreading programs using synchronization and handle the exceptions to increase the performance of program.

CO4: Able to know the importance of collection framework in developing effective programs.

CO5: Analyse and Design GUI based applications using swings and applets.

Course Code	21PCSE1A	WIRELESS NETWORKS	TOTAL HOURS	CREDITS
			7	5
~~Core~~/Elective/~~Supportive~~		Elective Course - I	Syllabus Version	2021-2022

Course Objectives:

- To Study about Wireless Networks, Protocol Stack and Standards.
- To Study about Fundamentals of 3G Services, Its Protocols and Applications.
- To Study about Evolution of 4G Networks, its Architecture and Applications.

Unit:1

WIRELESS LAN - Introduction-WLAN Technologies: Infrared, UHF Narrowband, Spread Spectrum - IEEE802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security – IEEE802.16-WIMAX: Physical Layer, MAC, Spectrum Allocation For WIMAX.

Unit:2

MOBILE NETWORK LAYER - Introduction – Mobile IP: IP Packet Delivery, Agent Discovery, Tunneling And Encapsulation, IPV6-Network Layer In The Internet- Mobile IP Session Initiation Protocol – Mobile Ad-Hoc Network: Routing, Destination Sequence Distance Vector, Dynamic Source Routing.

Unit:3

MOBILE TRANSPORT LAYER - TCP Enhancements For Wireless Protocols – Traditional TCP: Congestion Control, Fast Retransmit/Fast Recovery, Implications Of Mobility – Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time Out Freezing, Selective Retransmission, Transaction Oriented TCP – TCP Over 3G Wireless Networks.

Unit:4

WIRELESS WIDE AREA NETWORK - Overview Of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High Speed Downlink Packet Access (HSDPA)- LTE Network Architecture And Protocol.

Unit:5

4G NETWORKS - Introduction – 4G Vision – 4G Features And Challenges – Applications Of 4G – 4G Technologies: Multicarrier Modulation, Smart Antenna Techniques, OFDM-MIMO Systems, Adaptive Modulation And Coding With Time Slot Scheduler, Cognitive Radio.

Expected Course Outcomes:

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

CO1: Understanding of the principles of mobile ad hoc networks and what distinguishes them from infrastructure-based networks.

CO2: Design and Implement Wireless Network Environment for Any Application Using Latest Wireless Protocols and Standards.

CO3: Conversant With the Latest 3G/4G and WiMAX Networks And Its Architecture.

CO4: Be familiar with the mechanisms for implementing security, transport layer and energy efficiency in MANETs.

CO5: Implement Different Type Of Applications For Smart Phones And Mobile Devices With Latest Network Strategies.

Text Books

1	Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012. UNIT - I: Chapter 7; UNIT - II: Chapter 8; UNIT - III: Chapter 9;

2	Vijay Garg , “Wireless Communications And Networking”, First Edition, Elsevier 2014. UNIT - IV: Chapter 15; UNIT - V: Chapter 23;
Reference Books	
1	Erik Dahlman, Stefan Parkvall, Johan Skold And Per Beming, “3G Evolution HSPA And LTE For Mobile Broadband”, Second Edition, Academic Press, 2008.
2	Anurag Kumar, D.Manjunath, Joy Kuri, “Wireless Networking”, First Edition, Elsevier 2011.
3	Simon Haykin , Michael Moher, David Koilpillai, “Modern Wireless Communications”, First Edition, Pearson Education 2013.
4	David G. Messerschmitt, “Understanding Networked Applications”, Elsevier, 2010.
Online Web Reference	
1	https://www.tutorialspoint.com/Wireless-Networks

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	1	3	3	1
CO2	9	9	3	1	9
CO3	9	3	3	9	1
CO4	9	9	9	9	3
CO5	3	9	9	1	1
Weightage	39	31	27	23	15
Weightage % of Course Contribution of PO’s	6.32	7.43	8.46	6.48	4.35

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCSE1B	EMBEDDED SYSTEMS	TOTAL HOURS	CREDITS
			7	5
~~Core~~/Elective/~~Supportive~~		Elective Course - I	Syllabus Version	2021-2022

Course Objectives:

- To provide fundamental concept of Embedded systems and real time operating systems.

Unit:1

Introduction to Embedded systems – processor in the system – software embedded into a system – structural units in a processor – processor, memory selection, Memory devices - Allocation of memory to program segments and blocks and memory map of a system.

Unit:2

Device drivers – Interrupt servicing mechanisms – context and periods for context switching - Programming concepts and Embedded programming in C and C++: Software programming in ALP and in high level language 'C' – 'C' program elements: Header source files and preprocessor directives – Macros and functions: Data types – data structures – modifiers – statements – loops and pointers – Embedded programming in C++ and Java.

Unit:3

Program modeling concepts in single and multiprocessor systems – software – development process: modeling process for software analysis – programming model for event controlled or response time constrained real time program- modeling of multiprocessor systems. Multiple processes – sharing data by multiple tasks and routines – inter process communications.

Unit:4

Real time operating systems: OS services – IO sub systems – Real time and embedded operating systems – Interrupt routines in RTOS environment – RTOS task scheduling models, Interrupt latency and response times of the task as performance metrics – performance metrics in scheduling models.

Unit:5

Hardware Software code design: Embedded system project management – Embedded system design and Co-design Issues – Design Cycle – uses of target system – use of software tools for development – use of scopes and logic analysers for system hardware tests – issues in embedded system design.

Expected Course Outcomes:

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

CO1: Understood microcomputer, core of theembedded system.

CO2: Understood general purpose and domain specific processors.

CO3: Understood typicalembedded system and itscomponents.

CO4: Would have learnt about device driver programming.

CO5: Would have learnt the concepts of RTOS (Real Time Operating Systems).

Text Book

1	Raj Kamal, "Embedded systems – Architecture, Programming and Design" – TMH, 2007.

Reference Book

1	Mohamed Ali Maszidi & Janice Gillispie Maszidi, "The 8051 Microcontroller and Embedded System", Pearson Publishers.

Online Web Reference	
1	• https://www.tutorialspoint.com/embedded_systems/index.htm

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	1	1	3	3
CO2	1	1	1	9	9
CO3	1	1	9	3	3
CO4	1	1	3	9	9
CO5	3	9	9	1	1
Weightage	15	13	23	25	25
Weightage % of Course Contribution of PO's	2.43	3.12	7.21	7.04	7.25

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCSE1C	MOBILE COMPUTING	TOTAL HOURS	CREDITS
			7	5
~~Core~~/Elective/~~Supportive~~		Elective Course - I	Syllabus Version	2021-2022

Course Objectives:

- Understand the basic concepts of mobile
- Be familiar with GPRS Technology Systems
- Be exposed to Ad-Hoc networks
- Gain knowledge about different mobile platforms

Unit:1

Introduction: Applications - History of Wireless Communication - Market for Mobile Communications - Simplified Reference Model - Wireless Transmission: Frequencies for Radio Transmission - Signals - Antennas - Signal Propagation.

Unit:2

Medium Access Control: Motivation for a Specialized MAC - SDMA - FDMA - TDMA - CDMA - Comparison of S / T / F / CDMA.

Unit:3

Telecommunication Systems: GSM - Mobile Services - System Architecture - Radio Interface - Protocols - Localization and Calling - Handover - Security - New Data Services - DECT System Architecture - DECT Protocol Architecture - TETRA - UMTS and IMT-2000.

Unit:4

Wireless LAN: Infra Red Vs Radion Transmission - Infrastructure and Ad-hoc network - IEEE 802.11 System Architecture - Protocol Architecture - Physical Layer - Medium Access Control Layer - MAC Management - 802.11b 231 - 802.11a 234 - HIPERLAN - Bluetooth.

Unit:5

Support for Mobility: File Systems - World Wide Web - Hypertext Transfer Protocol - Hypertext Markup Language - Approaches that Help Wireless Access - System Architecture - Wireless Application Protocol (Version 1.x) - i-Mode - SyncML - WAP 2.0.

Expected Course Outcomes:

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

CO1: Able to explain the basics of mobile system.
CO2: Able to develop mobile application.
CO3: Understand the Mobile Ad hoc networks and its routing.
CO4: Understand the different types of security features.
CO5: Understand the access control and energy models.

Text Books

1	Jochen Schiller, Mobile Communications, Second Edition,2012. Unit I: Chapter **1**,**2**; Unit II: Chapter **3**; Unit III: Chapter **4**; Unit IV: Chapter **7**; Unit V: Chapter **10**
2	William Stallings, "Wireless Communications & Networks", Pearson Education, 2009.

Reference Books

1	C. Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", 2nd Edition, Pearson Education. 2004.

2	Ashok K Talukder, Roopa R Yavagal, “Mobile Computing”, Tata McGraw Hill, 2005.
3	Jochen Burkhardt Dr.Horst Henn, Klaus Rintdoff, Thomas Schack, “Pervasive Computing”, Pearson, 2009.
4	FeiHu, Xiaojun Cao, “Wireless Sensor Networks Principles and Practice”, CRC Press, 2010.
Online Web Reference	
1	https://www.tutorialspoint.com/mobile-computing

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	3	3	3	1
CO2	9	3	3	1	9
CO3	9	1	1	9	1
CO4	3	3	3	1	3
CO5	3	3	9	1	1
Weightage	33	13	19	15	15
Weightage % of Course Contribution of PO’s	5.35	3.12	5.96	4.23	4.35

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS4	DISTRIBUTED OPERATING SYSTEMS	TOTAL HOURS	CREDITS
			6	5
Core/~~Elective~~/~~Supportive~~		Core Course - IV	Syllabus Version	2021-2022

Course Objectives:

- To study Distributed Operating System concepts
- To understand hardware, software and communication in Distributed OS
- To learn the Distributed Resource Management Components.

Unit:1

What Is A Distributed System? - Goals - Hardware Concepts - Bus-Based Multiprocessors - Switched Multiprocessors - Bus-Based Multicomputer - Switched Multicomputer - Software Concepts - Network Operating Systems - True Distributed Systems - Multiprocessor Timesharing Systems - Design Issues – Transparency - Flexibility - Reliability – Performance - Scalability.

Unit:2

Communication In Distributed Systems: Layered Protocols - The Physical Layer - The Data Link Layer - The Network Layer - The Transport Layer - The Session Layer - The Presentation Layer - The Application Layer - Asynchronous Transfer Mode Networks - The Client-Server Model - Remote Procedure Call - Group Communication - Introduction to Group Communication - Design Issues - Group Communication in ISIS

Unit:3

Synchronization In Distributed Systems: Clock Synchronization - Logical Clocks - Physical Clocks - Clock Synchronization Algorithms - Mutual Exclusion - A Centralized Algorithm - A Distributed Algorithm - A Token Ring Algorithm - A Comparison of the Three Algorithms - Election Algorithms - Atomic Transactions - Deadlocks In Distributed Systems.

Unit:4

THREADS: Introduction to Threads - Thread Usage - Design Issues for Threads Packages - Implementing a Threads Package - Threads and RPC - System Models - The Workstation Model - Using Idle Workstations - The Processor Pool Model - A Hybrid Model - Processor Allocation - Allocation Models - Design Issues for Processor Allocation Algorithms - Implementation Issues for Processor Allocation Algorithms - Fault Tolerance.

Unit:5

Distributed File Systems: Distributed File System Design - The File Service Interface - The Directory Server Interface - Semantics of File Sharing - Distributed File System Implementation: File Usage – System Structure - Caching – Replication.

Expected Course Outcomes:

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

CO1: Clear understanding on several resource management techniques like distributed shared memory and other resources.

CO2: Apply Knowledge on mutual exclusion and Deadlock detection of Distributed operating system.

CO3: Able to design and implement algorithms of distributed shared memory and commit protocols.

CO4: Evaluate and understand threads in DOS.

CO5: Create and ascertain distributed file system.

Text Book	
1	Andrew S. Tanenbaum, "**Distributed Operating Systems**", Pearson Education, Delhi, 2002. UNIT I: Chapter 1; UNIT II: Chapter 2; UNIT III: Chapter 3; UNIT IV: Chapter 4; UNIT V: Chapter 5.
Reference Book	
1	Pradeep K. Sinha, "**Distributed Operating Systems, Concepts and Design**", Prentice Hall of India, New Delhi, 2001.
Online Web Reference	
1	http://ecomputernotes.com/fundamental/disk-operating-system/distributed-operating-system

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	1	1	3	3
CO2	9	3	3	3	1
CO3	3	1	3	9	9
CO4	9	3	1	3	1
CO5	9	3	1	3	1
Weightage	39	11	9	21	15
Weightage % of Course Contribution of PO's	6.32	2.64	2.82	5.92	4.35

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS5	DATA MINING AND R PROGRAMMING LANGUAGE	TOTAL HOURS	CREDITS
			5	5
Core/~~Elective~~/~~Supportive~~		Core Course - V	Syllabus Version	2021-2022

Course Objectives:

- To Learn the Techniques of Data Mining
- To Learn the Basics of Web Mining
- To Learn the Basics of R Programming.

Unit:1

Introduction: Basic data mining tasks – Data mining versus knowledge discovery in databases – Data mining issues –Related concepts-Data mining techniques: Introduction – A statistical perspective on data mining – similarly measures – Decision trees - Neural networks – Genetic algorithms.

Unit:2

Classification: Introduction – Statistical-based algorithms – Distance based algorithms-Decision Tree based algorithm – Neural network based algorithm – Rule based algorithms – Combing techniques. Clustering: Introduction – Similarity and Distance measures – Outliers – Hierarchical algorithm – Partitional Algorithm – Clustering large databases- Clustering with categorical attributes.

Unit:3

Association Rules: Introduction – Large item sets – Basic algorithms – Parallel and distributed algorithm – Comparing approaches – Incremental rules – Advanced Association Rule techniques – Measuring the quality of rules.

Unit:4

Web mining: Introduction – Web content mining – Web structure mining – Web usage mining. Temporal mining: Introduction – Time series – Pattern detection – Sequence – Temporal association rules.

Unit:5

BASICS OF R: The R User Interface - Objects - Functions - Sample with Replacement - Writing Your Own Functions - The Function Constructor - Arguments - Scripts - Extract function.

Expected Course Outcomes:

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

CO1: Apply the concepts of database technology evolutionary path which has led to the need for data mining and its applications.

CO2: Ability to assess the association rules pertaining to data mining.

CO1: Would have learnt about Mining Data for meaningful knowledge

CO2: Able to analyse the techniques of web mining & text mining

CO3: Apply the basics of R Programming in certain data mining techniques.

Text Books

1	Margaret H .Dunham "**DATA MINING Introductory and Advanced topics**" UNIT I: Chapters 1-3; UNIT II: Chapters 4, 5; UNIT III:Chapter 6; UNIT IV:Chapters 7 and 9
2	Garrett Grolemund, "**Hands on Programming with R**", O'ReillyUnit V: Chapter 1.

Reference Book	
1	G.K. Gupta , "**Introduction to Data Mining with Case Studies**" – PHI Pvt Ltd.
Online Web Reference	
1	https://www.tutorialspoint.com/data_mining/index.htm

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	1	1	3	9	9
CO2	9	1	1	3	1
CO3	1	3	3	9	9
CO4	1	9	9	3	3
CO5	9	1	3	1	3
Weightage	21	15	19	25	25
Weightage % of Course Contribution of PO's	3.4	3.6	5.96	7.04	7.25

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS6	ADVANCED PYTHON PROGRAMMING	TOTAL HOURS	CREDITS
			6	5
Core/~~Elective~~/~~Supportive~~		Core Course - VI	Syllabus Version	2021-2022

Course Objectives:

- To introduce Python programming language.
- To acquire programming skills in core Python.
- To acquire Object Oriented and File Handlings kills in Python.
- To develop the skill of designing Graphical user Interfaces in Python.

Unit:1

Basics of Python Programming: Introduction – Python Character Set – Token – Python Core Data Type – The print() Function – Assigning Value to a Variable – Multiple Assignments – Writing Simple Programs in Python – The input() Function – The eval() Function- Formatting Number and Strings- Python Inbuilt Functions. Decision Statements: Decision Making Statements - Loop Control Statements – The While Loop – The for Loop – The break statement – The Continue Statement.

Unit:2

Functions: Introduction – Syntax and Basics of a Function – Use of a Function – Parameters and Arguments in a Function – The Local and Global Scope of a Variable – The return Statement – Recursive Functions – The Lambda Function. Strings – Introduction – The str Class – Basic Inbuilt Python Functions for String – The index [ ] Operator –Traversing String with FOR and WHILE Loop – Immutable Strings – The String Operators – String Operations.

Unit:3

Lists: Introduction – Creating Lists – Accessing the Elements of a List – Negative List Indices – List Slicing List Slicing with Step Size – Python Inbuilt Functions for Lists – The List Operator – List Comprehensions – List Methods. Object – Oriented Programming : Class, objects and Inheritance : Defining Classes – The Self – Parameter and Adding Methods to a Class – Display Class Attributes and Methods- Special Class Attributes – Accessibility – The_init_Method(Constructor) – Passing An Object as Parameter to a Method - _del_() (Destructor Method) – Inheritance – Types of Inheritance- Method Overriding.

Unit:4

Tuples, Sets and Dictionaries: Introduction to Tuples: Creating Tuples – The tuple() Function – Inbuilt Functions for Tuples – Indexing and Slicing – Operations on Tuples – Passing Variables Length Arguments to Tuples – List and Tuples – Sort Tuples – Traverse Tuples from a List – The zip() Functions – The Inverse zip(*) Functions. Sets: Creating Sets – The Set in and Not in Operator – The Python Set Class – Set Operations. Dictionaries.

Unit:5

Graphics Programming: Drawing with Turtle Graphics: Introduction – Getting Started with the turtle Module – Moving the Turtle in any Direction – Moving Turtle to Any Location – The Color, bgcolor, circle and Speed Method of Turtle – Drawing with Colors – Drawing Basic Shapes using Iterations – Changing Color Dynamically Using List – Turtles to Create Bar Charts. File Handling: Introduction – Need of File Handling - Text Input and Output – The Seek () Function – Binary Files.

Expected Course Outcomes:

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

CO1: Understand the programming techniques.

CO2: Acquire the basics of the Python Programming.

CO3: Discover how to work with lists and sequence data. **CO4:** Write Python functions to facilitate code reuse. **CO5:** Use Python to read and write files.	
Text Book	
1	Ashok NamdevKamthane Amit Ashok Kamthane "**Programming and Problem Solving With PYTHON**", McGraw Hill Education. Unit I: Chapter 2.1 – 2.12, 4.7, 5.2, 5.4, 5.6, 5.7; Unit II: Chapter 6.1 – 6.8, 7.1 – 7.8 Unit III: Chapter 8.1 – 8.10, 10.2 – 10.11, 10.13, 10.14, 10.21 Unit IV: Chapter 11.1.1 – 11.1.11, 11.2.1 – 11.2.4, 11.3.1 – 11.3.10 Unit V: Chapter 12.1 – 12.9, 13.1 – 13.5
Reference Books	
1	Gowrishankar S., Veena. A, "**Introduction to Python Programming**", CRC Press, 2019.
2	Mark Summerfield, "**Programming in Python 3 - A Complete Introduction to the Python Language"**, Developer's Library.
Online Web Reference	
1	https://www.w3schools.com/python/python_intro.asp

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	9	3	1	9
CO2	3	3	3	9	1
CO3	9	9	3	3	9
CO4	3	3	1	1	9
CO5	9	9	3	3	9
Weightage	33	33	13	17	37
Weightage % of Course Contribution of PO's	5.35	7.91	4.08	4.79	10.72

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS7P	ADVANCED PYTHON PROGRAMMING LAB	TOTAL HOURS	CREDITS
			5	5
Core/~~Elective~~/~~Supportive~~		Core Course Practical - VII	Syllabus Version	2021-2022

Course Objectives:

To Impart Practical Knowledge in Python Programming Language

LIST OF PROGRAMS

1. Write a Recursive Function which Computes N^{th} Fibonacci Numbers and to generate Prime numbers for the same N Value.
2. Write a Program to find the Maximum of a List of Numbers.
3. Write a Program for String Operations.
4. Write a Python program to Create a Tuple, Add an item in a Tuple, Remove an item from a Tuple, Convert a Tuple to a String and Get an item in the Tuple
5. Write a Program to Multiply Matrices.
6. Write a Program to Search an Element from a List.
7. Write a Program for Linear Search.
8. Write a Program for Binary Search.
9. Write a Program to implement Merge Sort.
10. Write a Program to implement Insertion Sort.
11. Write a Program to implement Selection Sort.
12. Write a Python Program to Copy the Content of a File to another File
13. Write a Program to Simulate Bouncing Ball using Pygame.
14. Write a Program to Override Display ( ) method in Multiple Inheritance.
15. Write a Python program to Create a Shallow Copy of Set.

Expected Course Outcomes:

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

CO1: Write, Test and Debug Python Programs

CO2: Implement Conditionals and Loops for Python Programs

CO3: Use functions and represent Compound data using Lists, Tuples and Dictionaries

CO4: Read and write data from & to files in Python and develop Application using Pygame

CO5: Create and execute a shallow copy of set.

Course Code	21PCSE2A	MICROPROCESSORS, INTERFACING AND APPLICATIONS	TOTAL HOURS	CREDITS
~~Core~~/Elective/~~Supportive~~		Elective Course - II	Syllabus Version	2021-2022

Course Objectives:

- Understand the architecture and functionality of a microprocessor
- Classify the instruction set of a microprocessor and distinguish the functions of different instructions
- Demonstrate programming proficiency by developing simple assembly language programs
- Identify the different ways of interfacing memory and I/O with microprocessors
- Design microprocessor-based systems for real time applications.

Unit:1

Overview of Microcomputer Systems – Hardware - Addresses – General Operation of a Computer - Intel 8086 CPU Architecture – Internal Operation –Machine Language Instructions – Addressing Modes – Instruction Formats – Instruction Execution Timing – Pin Configuration of 8086: Minimum Mode, Maximum Mode.

Unit:2

Assembler Language Programming – Assembler Instruction Format – Data Transfer Instructions – Arithmetic Instructions – Branch Instructions – Loop Instructions – Flag Manipulation Instructions – Logical Instructions – Shift and Rotate Instructions – Stack Instructions – Call and Return Instructions – Macros – String Instructions – REP Prefix – IN and OUT Instructions.

Unit:3

Assembly Language Programs – Addition, Subtraction, Multiplication and Division – Multibyte Addition and Subtraction – Complements – Assembly and Disassembly of a Word – Sum of a Series – Block Data Transfer – Finding the Smallest and the Biggest Number in an Array – Arranging a Series of Numbers in Descending and Ascending Order – Length of a String – Number of Occurrences of a Character in a String.

Unit:4

I/O Interfaces – Functions – Address Space Partitioning: Memory Mapped I/O Scheme, I/O Mapped I/O Scheme – Memory and I/O Interfacing – Data Transfer Schemes – I/O Ports – Programmable Peripheral Interface – Programmable DMA Controller.

Unit:5

Microprocessor Applications – Delay Subroutines – Seven Segment Displays – Frequency Measurement – Temperature Measurement – Water Level Indicator and Controller – Traffic Lights Control.

Expected Course Outcomes:

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

CO1: Understand the architecture, memory organization of microprocessor 8086.

CO2: Apply the programming using assembly level language in microprocessors and microcontroller for simple arithmetic, logical, string and real time applications.

CO3: Identify the different ways of interfacing memory and I/O with microprocessors.

CO4: Apply and analyse the interfacing concept of different programmable interfacing modules with microprocessors and controllers for real time applications.

CO5: Develop code for applications using microprocessors and microcontrollers to meet the societal requirements.

Text Books	
1	Yu-cheng Liu and Glenn A. Gibson, “Microcomputer Systems–The 8086/8088 Family – Architecture, Programming and Design”, Prentice Hall of India, Second Edition, 2011.
2	B. Ram, “Fundamentals of Microprocessors and Microcontrollers”, Dhanpat Rai Publications, Seventh Edition, 2011.
Reference Book	
1	Douglas V. Hall, “Microprocessors and Interfacing – Programming and Hardware”, Tata McGraw Hill, Revised Second Edition, 2006.
Online Web Reference	
1	https://www.tutorialspoint.com/microprocessor/microprocessor_io_interfacing_overview.htm

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	3	3	1	9
CO2	9	9	1	1	3
CO3	3	9	1	3	3
CO4	9	3	3	1	1
CO5	3	9	3	1	3
Weightage	33	33	11	7	19
Weightage % of Course Contribution of PO’s	5.35	7.91	3.45	1.97	5.51

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCSE2B	ARTIFICIAL INTELLIGENCE	TOTAL HOURS	CREDITS
			5	5
~~Core~~/Elective/~~Supportive~~		Elective Course - II	Syllabus Version	2021-2022

Course Objectives:

- The students will understand the AI & Expert Systems.
- Learn the Heuristic techniques and reasoning.

Unit:1	

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

Unit:2	

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First - Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.

Unit:3	

Using Predicate logic: Representing simple facts in logic - Representing Instance and Is a relationships - Computable functions and predicates - Resolution.

Unit:4	

Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge.

Unit:5	

Game playing – The minimax search procedure – Expert System - Perception and Action.

Expected Course Outcomes:

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

CO1: Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems.

CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

CO3: Demonstrate proficiency in applying scientific method to models of machine learning.

CO4: Discuss the basicsof different optimizations techniques.

CO5: Learn and apply Heuristic Search Techniques.

Text Book

1	Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991. Unit1: Chapter 1(1.1,1.3.1.5), Chapter 2(2.1,2.2); Unit2: Chapter 3(3.1,3.2,3.3,3.6), Chapter 4(4.1,4.2,4.3,4.4). ; Unit3: Chapter 5(5.1,5.2,5.3,5.4). Unit4: Chapter 6. Unit5: Chapter 12(12.1,12.2),Chapter 20 and Chapter 21

Reference Book

1	John Paul Mueller & Luca Massaron, "Artificial Intelligence for dummies", Wiley Pub.

Online Web Reference	
1	https://www.tutorialspoint.com/artificial_intelligence/index.htm

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	9	1	3	3
CO2	3	1	9	3	1
CO3	9	3	1	9	1
CO4	3	1	1	1	9
CO5	9	3	9	1	1
Weightage	33	17	21	17	15
Weightage % of Course Contribution of PO's	5.35	4.08	6.58	4.79	4.35

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCSE2C	SOFT COMPUTING	TOTAL HOURS	CREDITS
			5	5
~~Core~~/Elective/~~Supportive~~		Elective Course - II	Syllabus Version	2021-2022

Course Objectives:

- Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
- Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.

Unit:1

Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics - Applications - Artificial Neural Network (ANN): Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process – Basic Models of ANN: McCulloch-Pitts Model – Hebb Network – Linear Separability.

Unit:2

Supervised Learning Networks: Perceptron Networks – Adaline and Madaline Networks – Back Propagation Network – Radial Basis Function Network. Associative Memory Networks – BAM - Hopfield Network - Boltzmann Machine. Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.

Unit:3

Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation - Membership Functions: Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods.

Unit:4

Fuzzy Arithmetic – Extension Principle – Fuzzy Measures – Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning – Fuzzy Inference and Expert Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems.

Unit:5

Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function – Genetic Operators: Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA – The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming – Applications of GA.

Expected Course Outcomes:

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

CO1: Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.

CO2: Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic.

CO3: To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations.

CO4: Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.

CO5: Reveal different applications of these models to solve engineering and other problems.

Text Book	
1	S.N. Sivanandam, S.N. Deepa, “Principles of Soft Computing”, Wiley India, 2007.
Reference Book	
1	S. Rajasekaran, G.A.V. Pai, “Neural Networks, Fuzzy Logic, Genetic Algorithms”, Prentice Hall India, 2004.
Online Web Reference	
1	https://nptel.ac.in/courses/106/105/106105173/

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	3	9	1	3	3
CO2	3	3	9	3	1
CO3	9	3	1	9	1
CO4	3	9	1	1	9
CO5	9	3	3	1	1
Weightage	27	27	15	17	15
Weightage % of Course Contribution of PO’s	4.38	6.47	4.7	4.79	4.35

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCSED1	GENERAL STUDIES FOR COMPETITIVE EXAMINATIONS	TOTAL HOURS	CREDITS
			5	5
~~Core~~/~~Elective~~/Supportive		Extra Disciplinary Course - I	Syllabus Version	2021-2022

Course Objectives:

Unit:1	

Teaching Aptitude: Teaching : Nature, objectives, characteristics and basic requirements; Learner's characteristics; Factors affecting teaching; Methods of teaching; Teaching aids; Evaluation systems.
Research Aptitude: Research: Meaning, characteristics and types; Steps of research; Methods of research; Research Ethics; Paper, article, workshop, seminar, conference and symposium; Thesis writing: its characteristics and format.

Unit:2	

Reading Comprehension: A passage to be set with questions to be answered. Communication: Communication: Nature, characteristics, types, barriers and effective classroom communication.

Unit:3	

Reasoning (Including Mathematical) Number series; letter series; codes; Relationships; classification
Logical Reasoning: Understanding the structure of arguments; Evaluating and distinguishing deductive and inductive reasoning; Verbal analogies: Word analogy - Applied analogy; Verbal classification. Reasoning Logical Diagrams: Simple diagrammatic relationship, multi-diagrammatic relationship; Venn diagram; Analytical Reasoning.

Unit:4	

Data Interpretation: Sources, acquisition and interpretation of data - Quantitative and qualitative data; - Graphical representation and mapping of data. Information and Communicating Technology (ICT): ICT: meaning, advantages, disadvantages and uses; General abbreviations and terminology; Basics of internet and e-mailing.

Unit:5	

People and Environment: People and environment interaction; Sources of pollution; Pollutants and their impact on human life, exploitation of natural and energy resources; Natural hazards and mitigation Higher Education System : Governance Polity And Administration; Structure of the institutions for higher learning and research in India; formal and distance education; professional/technical and general education; value education: governance, polity and administration; concept, institutions and their interactions.

Online Web Reference

1	http://www.cbsenetonline.in/ https://ugcnetpaper1.com/ugc-net-study-materials/

Course Code	21PCS8	CLOUD COMPUTING	TOTAL HOURS	CREDITS
			6	5
Core/~~Elective~~/~~Supportive~~		Core Course - VIII	Syllabus Version	2021-2022

Course Objectives:

- To impart knowledge on Introduction to Cloud Computing,
- The Evolution of SaaS,
- The Anatomy of Cloud Infrastructure,
- Workflow Management Systems and Clouds

Unit:1

Introduction to Cloud Computing: Roots of Cloud Computing - Layers and Types of Cloud - Features of a cloud-Infrastructure Management-Infrastructure as a Service Providers-Platform as a Service Providers-Challenges and Risks. Broad Approaches to Migrating into the Cloud - Seven Step Model of Migration into a Cloud.

Unit:2

The Evolution of SaaS-The Challenges of SaaS Paradigm- Approaching the SaaS Integration Enigma-New Integration Scenarios- The Integration Methodologies- SaaS Integration Products, Platforms and Services-B2Bi Services -. Background of Enterprise cloud computing paradigm- Issues for Enterprise Applications on the Cloud- Transition Challenges.

Unit:3

The Anatomy of Cloud Infrastructure- Distributed Management of Virtual Infrastructures- Scheduling Techniques for Advance Reservation of Capacity- RVWS Design - Cluster as a Service: The Logical Design - Cloud Storage : from LANs TO WANs- Technologies for Data Security in Cloud Computing.

Unit:4

Workflow Management Systems and Clouds - Architecture of Workflow Management Systems - Utilizing Clouds for Workflow Execution- A Classification of Scientific Applications and Services in the Cloud-SAGA based Scientific Applications that Utilize Clouds. MapReduce Programming Model- Major MapReduce Implementations for the Cloud- MapReduce Impacts and Research Directions.

Unit:5

Grid and Cloud- HPC in the Cloud: Performance related Issues -Data Security in the Cloud- The Current State of Data Security in the Cloud- Homo Sapiens and Digital Information- Risk- Identity- The Cloud, Digital Identity and Data Security - Content Level Security:Pros and Cons- Legal Issues in Cloud Computing - Data Privacy and Security Issues.

Expected Course Outcomes:

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

CO1: Able to explain and examine various computing paradigms.

CO2: Able to define cloud computing and explain fundamental concepts of cloud.

CO3: Able to describe cloud architecture, deployment and management.

CO4: Able to explain the basics of cloud computing stack and cloud service models.

CO5: Able to Identify various cloud service providers, their services and tools.

Text Book

1	Rajkumar Buyya, James Broberg, and Andrzej Goscinski, "Cloud Computing - Principles and Paradigms", 2011. UNIT I: Chapter 1, 2. UNIT II: Chapter 3,4. UNIT III: Chapter 5,6. UNIT IV: Chapter 12,13

	UNIT V: Chapter 17,23.
Reference Book	
1	George Reese, “Cloud Application Architectures”, ISBN: 84047142, Shroff / O'Reilly,2009.
Online Web Reference	
1	https://www.guru99.com/cloud-computing-for-beginners.html

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	9	9	3	1
CO2	9	9	9	9	1
CO3	9	3	3	9	1
CO4	9	1	3	3	3
CO5	9	3	1	3	3
Weightage	45	25	25	27	9
Weightage % of Course Contribution of PO’s	7.29	6	7.84	7.61	2.61

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS9	ADVANCED NETWORK SECURITY	TOTAL HOURS	CREDITS
			6	5
Core/~~Elective~~/~~Supportive~~		Core Course - IX	Syllabus Version	2021-2022

Course Objectives:

- To Recall the Understanding of ISO/OSI Model
- To Understand the need for Security
- To learn the techniques of Cryptography.

Unit:1

Overview: Computer Security Concepts - The OSI Security architecture – Security Attacks- Security Services – Security Mechanisms - A model for network security - **Classical Encryption Techniques**: Symmetric Cipher model - Substitution Techniques – Transposition Techniques **- Block Cipher and DES:** Traditional Block Cipher Structure - Principles - The Data Encryption Standard (DES) – The Strength of DES.

Unit:2

Advanced Encryption Standard: Finite Field Arithmetic - AES Structure **- Block Ciphers Operation**: Multiple Encryption and triple DES – Electronic Code Book – Ciphers Block Chaining Mode- Cipher Feedback Mode – Output Feedback Mode – Counter Mode. **Random Bit Generation and Stream Cipher :** Principles of Pseudo Random Number Generation using Block Cipher – Pseudo Random Number Generator using Stream Ciphers Principles of Pseudorandom number generation – Pseudorandom number generation – stream ciphers - RC4.

Unit:3

Public-Key Cryptography and RSA: Principles of Public- Key Cryptosystems – RSA algorithm**. OtherPublic - Key Cryptosystems**: Diffie - Hellman Key Exchange – Elliptic curve Arithmetic – Elliptic curve Cryptography. Message Authentication Code: Message Authentication Requirements – Message Authentication Functions- Requirements for Message Authentication codes- Security of MACs.

Unit:4

Electronic Mail Security: Internet mail architecture – Email Threats and comprehensive Email security - Pretty Good Privacy – S/MIME.**IP Security**: IP Security Overview – IP Security Policy – Encapsulating Security Payload – Combining Security Associations - Internet Key Exchange – Cryptographic Suites.

Unit:5

Intruders: Intruders – Intrusion detection – Password Management. Malicious Software: Viruses – Virus Counter Measures. Firewall: The need for Firewalls- Firewall Design Principles- Trusted Systems.

Expected Course Outcomes:

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

CO1: Understand and apply the cryptographic algorithms to safeguard from intruders

CO2: Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack

CO3: Implement the various key distribution,management and message authentication schemes to send the messages with security

CO4: Identify information system requirements for Transport level,wireless network, E-Mail and IP

CO5: Designa network security system by implementing all the concepts of encryption and decryption algorithms

Text Book	
1	William Stallings, "Cryptography and Network Security", Fifth Edition, Pearson Education, 2006. UNIT I:Chapter 1.2-1.6, 2.1-2.3, 3.1-3.4.;UNIT II: Chapter 5.1, 5.2, 6.1-6.6, 7.1, 7.2, 7.4, 7.5.; UNIT III: Chapter 9.1, 9.2, 10.1, 10.3, 10.4.; UNIT IV: Chapter 18.1, 18.2, 19.1, 19.2, 19.3, 19.4, 19.5, 19.6.; UNIT V: Chapter 20.1-20.3, 21.2, 21.3, 22.1-22.3.
Reference Book	
1	Johannes A. Buchaman, "Introduction to Cryptography", Springer – Verlag.
2	Atul Kahate, "Cryptography and Network Security", TMH.
Online Web Reference	
1	https://www.studytonight.com/computer-networks/

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	9	9	3	3
CO2	9	9	3	3	1
CO3	9	3	1	3	1
CO4	9	1	3	1	3
CO5	9	3	1	3	1
Weightage	45	25	17	13	9
Weightage % of Course Contribution of PO's	7.29	6	5.33	3.66	2.61

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS10	PROGRAMMING IN ASP.NET WITH C#	TOTAL HOURS	CREDITS
			6	5
Core/~~Elective~~/~~Supportive~~		Core Course - X	Syllabus Version	2021-2022

Course Objectives:

- To Learn the basics of DOTNET Framework
- To Learn to Program in Web Forms
- To Learn to Program in ASP.Net
- To Learn to Use ADO.Net
- To learn to use C# coding.

Unit:1

.Net Framework - Learning the Common Language Runtime - .Net Class Library - .net Languages- ASP.Net File Type – Data Types, Objects & Namespaces – Code Behind.

Unit:2

Web Form Fundamentals- Server Controls – HTML Control Classes - Web Controls – Web Control Classes – Auto Post Back and Web Control Events.

Unit:3

Validation and Rich Controls – The Calendar Control – Ad Rotator Validation Controls – Validated Customer Form.

Unit:4

Characteristics of ADO.Net – ADO.Net Data Objects Model – SQL Bases – Creating a Connection- Accessing Disconnected Data – Modifying Disconnected Data- Updating Disconnected Data - OLEDB Connectivity: Data Insertion – Data Deletion – Data Modification and Data Deletion.

Unit:5

Introduction to C# - C#, Understanding .NET, Overview of C#, Literals, Variables, Data types, Operators and Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations, Object oriented aspects of C# - Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

Expected Course Outcomes:

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

CO1: Apply knowledge learned in this course as well knowledge earned from previous courses.

CO2: To design an almost error-free database structure to reflect the automated system.

CO3: Use the development products of Microsoft Visual Studio.Net® products.

CO4: To implement and connect the automated system to a database stored on a web server.

CO5: Learn how to link and publish Visual Studio.Net® applications to reflect a web application.

Text Books

1	Steven Holzner, "The Complete Reference ASP.NET", McGraw Hill Education (India) Edition 2008. UNIT I: Chapter 1 – 3, 5; UNIT II: Chapter 6, 7; UNIT III: Chapter 9; UNIT IV: Chapter12, 13

2	E. Balagurusamy, “Programming in C#”. TMH, 2010. UNIT V: Chapter 1 – 4.
Reference Books	
1	Mathew Mac Donald, “ASP.NET Complete Reference”, TMH 2005.
2	J.Liberty, D.Hurwitz, “Programming ASP.NET”, Third Edition, O’REILLY, 2006.
Online Web Reference	
1	https://www.geeksforgeeks.org/introduction-to-asp-net/

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	3	3	1	1
CO2	9	3	1	1	1
CO3	3	3	1	3	1
CO4	9	3	3	9	1
CO5	3	1	1	3	1
Weightage	33	13	9	17	5
Weightage % of Course Contribution of PO’s	5.35	3.12	2.82	4.79	1.45

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS11P	PROGRAMMING IN ASP.NET WITH C# LAB	TOTAL HOURS	CREDITS
			6	5
Core/~~Elective~~/~~Supportive~~		Core Course Practical - XI	Syllabus Version	2021-2022

Course Objectives:

To Impart Practical Knowledge in Programming ASP.NET with C#

LIST OF PROGRAMS

1. HTML Control Classes
2. Web Controls
3. Validation Controls
4. Rich Controls
5. Database Handling using SQL Client
6. Database Handling using OLEDB Client
7. Data Binding with Databases
8. Data List

Expected Course Outcomes:

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

CO1: Apply knowledge learned in this course as well knowledge earned from previous courses.

CO2: To design an almost error-free database structure to reflect the automated system.

CO3: Use the development products of Microsoft Visual Studio.Net® products.

CO4: To implement and connect the automated system to a database stored on a web server.

CO5: Learn how to link and publish Visual Studio.Net® applications to reflect a web application.

Course Code	21PCSE3A	OBJECT ORIENTED SYSTEMS DEVELOPMENT	TOTAL HOURS	CREDITS
			6	5
~~Core~~/Elective/~~Supportive~~		Elective Course –III	Syllabus Version	2021-2022

Course Objectives:

- Introduce the concept of Object-oriented design and understand the fundamentals of OOSD life cycle.
- Familiar with evolution of object-oriented model, classes and it notations
- Practice UML in order to express the design of software projects.

Unit:1

Fundamentals of OOSD - Overview of Object Oriented Systems Development : Two orthogonal view of the software - OOSD methodology - Why an object orientation?. Object basics: Object Oriented Philosophy- Objects – Attributes – Object respond to messages – Encapsulation and information hiding – class hierarchy – Polymorphism – Object relationship and associations - Software development process – OOSD Use case Driven Approach – Reusability.

Unit:2

Methodology, Modeling and UML - Object Oriented Methodologies: Rumbaugh et al.'s object modeling technique – The Booch methodology – The Jacobson et al. methodology – Patterns – Frameworks - The Unified approach. Unified Modeling Language : Static and dynamic models – Why modeling - UML diagrams – UML class diagram – Use case diagram - UML dynamic modeling – packages and model organization.

Unit:3

Object Oriented Analysis - Object Oriented Analysis process: Business Object Analysis - Use case driven object oriented analysis – Business process modeling – Use-Case model – Developing effective documentation. Classification: Classifications theory – Approaches for identifying classes – Noun phrase approach – Common class patterns approach – Use-Case Driven approach – Classes, Responsibilities, and Collaborators - Naming classes. Identifying object relationships, attributes, and methods: Association – Super-Sub class relationship – Aggregation – Class responsibility – Object responsibility.

Unit:4

Object Oriented Design - Object Oriented Design Process and Design Axioms - OOD process- OOD axioms – Corollaries – Design patterns. Designing classes: Designing classes – Class visibility – Refining attributes – Designing methods and protocols – Packages and managing classes. Access layer: Object Store and persistence – DBMS – Logical and physical Database Organization and access control – Distributed Databases and Client Server Computing.

Unit:5

Software Quality - Software Quality Assurance : Quality assurance tests – Testing strategies – Impact of Object Orientation on Testing - Test Cases- Test Plan – Continuous testing. System Usability and Measuring User satisfaction: Usability Testing – User satisfaction test – A tool for analyzing user satisfaction. System Usability and Measuring User satisfaction – Usability Testing.

Expected Course Outcomes:

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

CO1: Design an application using UML Static modeling as fundamental tool.

CO2: Design an application using UML Dynamic modeling as fundamental tool.

CO3: Evaluate appropriate modern tool for designing and modeling.

CO4: Analysis of Object oriented process, use case modeling, domain/class, Interaction and Behavior modeling.

CO5: Apply design patterns to understand reusability in OO design.	
Text Book	
1	Ali Bahrami, "Object Oriented Systems Development using UML", McGraw-Hill, 2008.
Reference Books	
1	Booch Grady, Rumbaugh James, Jacobson Ivar, "The Unified modeling Language – User Guide", Pearson Education, 2006
2	Brahma Dathan, Sarnath Ramnath, "Object Oriented Analysis, Design and Implementation", Universities Press, 2010.
Online Web Reference	
1	https://www.geeksforgeeks.org/unified-modeling-language-uml-introduction/
2	https://www.uml.org/

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	3	9	9	3
CO2	9	1	3	3	1
CO3	3	9	3	9	1
CO4	3	9	3	3	9
CO5	9	3	9	1	9
Weightage	33	25	27	25	23
Weightage % of Course Contribution of PO's	5.35	6	8.46	7.04	6.67

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCSE3B	COMPUTER SIMULATION AND MODELING	TOTAL HOURS	CREDITS
			6	5
~~Core~~/Elective/~~Supportive~~		ELECTIVE COURSE – III	Syllabus Version	2021-2022

Course Objectives:

- To impart knowledge in real time modeling process and the simulation of any system using the real time mode.

Unit:1

Introduction to Simulation: When Simulation is the Appropriate Tool- When Simulation is not Appropriate- Advantages and Disadvantages of Simulation- Areas of Application- Systems and System Environment- Components of a SystemDiscrete and Continuous Systems- Model of aSystem- Types of Models- DiscreteEvent System Simulation –Steps in a simulation study.Simulation Examples: Simulation of Queuing Systems, Simulation of Inventory Systems.

Unit:2

Simulation Software: History of Simulation Software- Selection of Simulation Software- Simulation in JAVA, Simulation in GPSS, Simulation in SSF- Simulation software – Experimentation and Statistical and analysis tools.

Unit:3

Statistical Models in Simulation: Review of Terminology and Concepts- Useful Statistical Models- Discrete Distributions- Continuous Distributions- Poisson process. Queuing models- Characteristics of queuing systems.

Unit:4

Random-Number Generation: Properties of Random Numbers-Generation of Pseudo- Random Numbers-Techniques for Generating Random Numbers-Linear congruential Method- Random number streams - Tests for random numbers Frequency tests - Test for Autocorrelation.Random-Variate Generation: Inverse Transform Technique-Exponential Distribution-Uniform Distribution- Weibull Distribution.

Unit:5

Input Modeling: Data Collection - Identifying the Distribution with Data- parameter estimation- goodness of fit tests. Verification and Validation of Simulation Models: Model Building, Verification, and Validation-Verification of Simulation Models Calibration and Validation of Models.

Expected Course Outcomes:

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

CO1: Ability to understand about simulation software.

CO2: Assess and learn about Random Number Generation.

CO3: Analyse the usage of statistical models in simulation.

CO4: Acquire knowledge about Input Modeling.

CO5: Evaluate the productivity of input modeling.

Text Book

1	Jerry Banks, John S. Carson, II Barry L. Nelson., "Discrete-Event System Simulation", 4TH Edition, PHI Edition, 2009. Unit:I :Chapter 1 Sections (1.1-1.11), Chapter 2 Sections (2.1, 2.2) ; Unit:II :Chapter 4 Sections (4.1, 4.2, 4.4-4.7) ; Unit:III :Chapter 5 Sections (5.1-5.5), Chapter 6 Sections (6.1) Unit:IV :Chapter 7 Sections (7.1, 7.2, 7.3.1, 7.3.3, 7.4), Chapter 8 Sections (8.1.1-8.1.3) Unit:V :Chapter 9 Sections (9.1-9.4), Chapter 10 Sections (10.1-10.3).

Reference Book	
1	E.Winsberg, “Science in the age of computer simulation”, Chicago: University Press, 2010.
Online Web Reference	
1	https://faculty.londondeanery.ac.uk/e-learning/using-simulation-in-clinical-education/simulation-and-learning

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	9	9	1	9	3
CO2	9	3	1	1	3
CO3	3	1	3	3	1
CO4	9	9	3	3	9
CO5	3	3	3	1	9
Weightage	33	25	11	17	25
Weightage % of Course Contribution of PO’s	5.35	6	3.45	4.79	7.25

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCSE3C	WAP AND XML	TOTAL HOURS	CREDITS
			6	5
~~Core~~/Elective/~~Supportive~~		ELECTIVE COURSE – III	Syllabus Version	2021-2022

Course Objectives:

- To impart knowledge on eXtensible Markup Language (XML)
- To achieve secured, messaging through web services.

Unit:1

Overview of WAP: WAP and the wireless world – WAP application architecture – WAP internal structure – WAP versus the Web – WAP 1.2 – WTA and push features. Setting up WAP: Available software products – WAP resources – The Development Toolkits.

Unit:2

WAP gateways: Definition – Functionality of a WAP gateway – The Web model versus the WAP model – Positioning of a WAP gateway in the network – Selecting a WAP gateway Basic WML: Extensible markup language – WML structure – A basic WML card – Text formatting – navigation – Advanced display features.

Unit:3

Interacting with the user: Making a selection – Events – Variables – Input and parameter passing. WML Script: Need for WML script – Lexical Structure – Variables and literals – Operators – Automatic data type conversion – Control Constructs Functions – Using the standard libraries – programs – Dealing with Errors.

Unit:4

XML: Introduction XML: An Eagle's Eye view of XML – XML Definition – List of an XML Document – Related Technologies – An introduction to XML Applications – XML Applications – XML for XML – First XML Documents Structuring Data: Examining the Data XMLizing the data – The advantages of the XML format – Preparing a style sheet for Document Display.

Unit:5

Attributes, Empty Tags and XSL: Attributes – Attributes Versus Elements – Empty Tags – XSL – Well formed XML documents – Foreign Languages and Non Roman Text – Non Roman Scripts on the Web Scripts, Character sets, Fonts and Glyphs – Legacy character sets– The Unicode Character set – Procedure to Write XML Unicode.

Expected Course Outcomes:

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

CO1: Apply XML concepts to develop Web application.

CO2: Develop SOA application using XML and Web Services.

CO3: Extract information from the web sites using XML programming.

CO4: Apply the understanding of XML in development of simple applications.

CO5: Evaluate XML Unicode.

Text Book

1	UNIT-I, II & III - Charles Arehart and Others. "Professional WAP with WML, WML script, ASP, JSP, XML, XSLT, WTA Push and Voice XML" Shroff Publishers and Distributers Pvt. Ltd 2000.
2	Unit IV & V - Eliotte Rusty Harlod "XML TM Bible", Books India (P) Ltd, 2000

Reference Book	
1	Heather Williamson, "XML: The Complete Reference ",Tata McGraw-Hill Education India.
Online Web Reference	
1	http://w3schools.sinsixx.com/wap/wap_intro.asp.htm

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	3	9	3	9	1
CO2	9	1	3	1	3
CO3	3	9	1	3	1
CO4	9	3	3	1	9
CO5	1	9	3	1	9
Weightage	25	31	13	15	23
Weightage % of Course Contribution of PO's	4.05	7.43	4.08	4.23	6.67

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS12	WEB SERVICES	TOTAL HOURS	CREDITS
			6	5
Core/~~Elective~~/~~Supportive~~		Core Course - XII	Syllabus Version	2021-2022

Course Objectives:

- To understand the Basics of Web Services
- To Learn SOAP with XML
- To Learn the usage of WSDL and UDDI
- To apply security measures in Web Services.

Unit:1

Introduction: What are Web Services? SOAP WSDL UDDI – Why was a service are important? – The evolution of web applications Not Just another distributed Computing platform – Web Services and enterprises.

Unit:2

XML Fundamentals: The Lingua Franca of Web Services – XML Documents – XML namespaces Explicit and Default namespaces, inheriting namespaces, and not inheriting namespaces, Attributes and namespaces - XML Schema XML Schema and namespaces, A First Schema, Implementing XML Schema types, The any Element, Inheritance, Substitution groups, Global and local type declarations, Managing Schemas, Schemas and instance documents- XML Schema best practices.

Unit:3

SOAP: SOAP Messages – SOAP Encoding – SOAP RPC - Using Alternative SOAP Encodings - SOAP, Web Services and REST Architecture - WSDL: Using SOAP and WSDL

Unit:4

UDDT at glance – The UDDI Business registry – UDDI under the covers – Accessing UDDI – How UDDI is playing out - Conversations: Overview – Web Services Conversation Language – WSCL Interface components – The Bar Scenario Conversations – Relationship between WSCL and WSDL.

Unit:5

Workflow – Business Process Management – Workflows and Workflow Management Systems-Business Process Execution Language for Web Services - Security - Everyday Security Basics - Security Is An End-to-End Process - Web Services Security Issues - Types of Security Attacks and Threats - Web Services Security Roadmap - WS-Security.

Expected Course Outcomes:

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

CO1: Asses about the basic building blocks of web services.

CO2: Understanding the concepts of SOAP, WSDL AND WSCL.

CO3: Evaluating the importance of UDDI.

CO4: Ability to understand about Business Process Management.

CO5: Learn the importance of Web Services Security.

Text Book

1	Sandeep Chatterjee, James Webber, "Developing Enterprise web services". Pearson Education, 2004 UNIT I: Chapter 1; UNIT II: Chapter 2; UNIT III: Chapter 3; UNIT IV: Chapter 4,5; UNIT V: Chapter 8.

Reference Book	
1	Frank, P.Coyle, XML, “Web Services and the Data Revolution”, Pearson Education, 2002.
Online Web Reference	
1	• https://www.tutorialspoint.com/webservices/index.htm

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	3	1	1	9	9
CO2	9	3	3	1	1
CO3	3	1	1	3	1
CO4	3	1	3	1	9
CO5	9	3	1	3	1
Weightage	27	9	9	17	21
Weightage % of Course Contribution of PO’s	4.38	2.16	2.82	4.79	6.09

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS13	ADVANCED SOFTWARE ENGINEERING	TOTAL HOURS	CREDITS
			6	5
Core/~~Elective~~/~~Supportive~~		Core Course - XIII	Syllabus Version	2021-2022

Course Objectives:

- To study advance software engineering concepts
- To understand Quality Management of Software Development
- To learn Software Quality Assurance models.

Unit:1

Quality Concepts: Software Quality - The Quality Dilemma - Achieving Software Quality - Review Techniques: Cost Impact of Software Defects - Defect Amplification and Removal - Informal Reviews.

Unit:2

Software Quality Assurance: Issues - Elements of Software Quality Assurance - Tasks, Goals and Metrics - Formal Approaches of SQA - Software Reliability - The ISO 9000 Quality Standards - The SQA Plan.

Unit:3

Software Testing Strategies: A Strategic Approach to Software Testing - Strategic Issues - Test Strategies for Conventional Software - Test Strategies for Webapps - Validation Testing - System Testing - The Art of Debugging.

Unit:4

Testing Conventional Applications: Software Testing Fundamentals - Internal and External Views of Testing - White Box Testing - Basis Path Testing - Black-Box Testing - Patterns for Software Testing.

Unit:5

Testing Web Applications: Testing Concepts for WebApps - The Testing Process - Content Testing - User Interface Testing - Component-Level Testing - Navigation Testing - Configuration Testing - Security Testing - Performance Testing.

Expected Course Outcomes:

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

CO1: Understanding of advance software concepts based on quality management.

CO2: Knowledge on Quality concepts, review techniques and software quality assurance.

CO3: Able to design and implement software testing strategies on software.

CO4: Analyze the importance of testing a software before implementing.

CO5: Applying the testing strategies to a web based application.

Text Book

1	Roger S. Pressman, "Software Engineering - A Practitioner's Approach" - 7Ed. Unit - I: Chapters 14, 15; Unit - II: Chapters 16; Unit - III: Chapters 17; Unit - Iv: Chapter 18; Unit - V: Chapter 20;

Reference Books

1	Ian Sommerville, "Software Engineering", 9Ed, Pearson
2	Ronald J. Leach, "Introduction to Software Engineering", 2Ed, CRC.

Online Web Reference	
1	https://www.javatpoint.com/software-engineering-tutorial

Mapping Course Outcomes with Programme Outcomes:

POs / COs	PO1	PO2	PO3	PO4	PO5
CO1	3	1	1	9	9
CO2	9	1	1	3	3
CO3	9	3	1	3	1
CO4	9	3	3	1	9
CO5	1	3	1	3	1
Weightage	31	11	7	19	23
Weightage % of Course Contribution of PO's	5.02	2.64	2.19	5.35	6.67

STRONG: 9; **MEDIUM: 3**; **LOW: 1**;

Course Code	21PCS14	PROJECT WORK	TOTAL HOURS	CREDITS
			12	5
Core / ~~Elective~~ / ~~Supportive~~		Core Course - XIV	Syllabus Version	2021-2022

Course Objectives:

1. To Conduct an engineering project.

2. To Communicate with engineers and the community at large in written an oral forms.

3. Effectively organise time to deliver on the dissertation's aims within the limited time available.

4. Effectively manage tasks and solve problems.

Expected Course Outcomes:

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

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Undertake problem identification, formulation and solution.

CO3: Design engineering solutions to complex problems utilising a systems approach.

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Able to build a small application from the above study.

Online Web Reference

1	https://sourceforge.net

Max Marks : 100

IE : 25

EX : 75

Credit : 5

H.H. THE RAJAH'S COLLEGE(AUTONOMOUS),PUDUKKOTTAI
PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE
M.Sc. COMPUTER SCIENCE

PROGRAMME ARTICULATION MATRIX

Sl. No.	Sub. Code	Course Code	PO1	PO2	PO3	PO4	PO5	TOTAL
1	21PCS1	CC-I	39	39	13	21	11	**123**
2	21PCS2	CC-II	33	21	31	17	15	**117**
3	21PCS4	CC-IV	39	11	9	21	15	**95**
4	21PCS5	CC-V	21	15	19	25	25	**105**
5	21PCS6	CC-VI	33	33	13	17	37	**133**
6	21PCS8	CC-VIII	45	25	25	27	9	**131**
7	21PCS9	CC-IX	45	25	17	13	9	**109**
8	21PCS10	CC-X	33	13	9	17	5	**77**
9	21PCS12	CC-XII	27	9	9	17	21	**83**
10	21PCS13	CC-XIII	31	11	7	19	23	**91**
11	21PCSE1A	EC-I	39	31	27	23	15	**135**
12	21PCSE1B		15	13	23	25	25	**101**
13	21PCSE1C		33	13	19	15	15	**95**
14	21PCSE2A	EC-II	33	33	11	7	19	**103**
15	21PCSE2B		33	17	21	17	15	**103**
16	21PCSE2C		27	27	15	17	15	**101**
17	21PCSE3A	EC-III	33	25	27	25	23	**133**
18	21PCSE3B		33	25	11	17	25	**111**
19	21PCSE3C		25	31	13	15	23	**107**
TOTAL			**617**	**417**	**319**	**355**	**345**	**2053**

H.H THE RAJAH'S COLLEGE (AUTONOMOUS) - PUDUKKOTTAI
PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc. COMPUTER SCIENCE

CO-PO Weightage Matrix

Sl. No.	Sub. Code	Course Code	PO1	PO2	PO3	PO4	PO5	AVERAGE
1	21PCS1	CC-I	6.32	9.35	4.08	5.92	3.19	**5.99**
2	21PCS2	CC-II	5.35	5.04	9.72	4.79	4.35	**5.7**
3	21PCS4	CC-IV	6.32	2.64	2.82	5.92	4.35	**4.63**
4	21PCS5	CC-V	3.4	3.6	5.96	7.04	7.25	**5.11**
5	21PCS6	CC-VI	5.35	7.91	4.08	4.79	10.72	**6.48**
6	21PCS8	CC-VIII	7.29	6	7.84	7.61	2.61	**6.38**
7	21PCS9	CC-IX	7.29	6	5.33	3.66	2.61	**5.31**
8	21PCS10	CC-X	5.35	3.12	2.82	4.79	1.45	**3.75**
9	21PCS12	CC-XII	4.38	2.16	2.82	4.79	6.09	**4.04**
10	21PCS13	CC-XIII	5.02	2.64	2.19	5.35	6.67	**4.43**
11	21PCSE1A	EC-I	6.32	7.43	8.46	6.48	4.35	**6.58**
12	21PCSE1B		2.43	3.12	7.21	7.04	7.25	**4.92**
13	21PCSE1C		5.35	3.12	5.96	4.23	4.35	**4.63**
14	21PCSE2A	EC-II	5.35	7.91	3.45	1.97	5.51	**5.02**
15	21PCSE2B		5.35	4.08	6.58	4.79	4.35	**5.02**
16	21PCSE2C		4.38	6.47	4.7	4.79	4.35	**4.92**
17	21PCSE3A	EC-III	5.35	6	8.46	7.04	6.67	**6.48**
18	21PCSE3B		5.35	6	3.45	4.79	7.25	**5.41**
19	21PCSE3C		4.05	7.43	4.08	4.23	6.67	**5.21**
TOTAL			**100**	**100**	**100**	**100**	**100**	**100**

H.H THE RAJAH'S COLLEGE (AUTONOMOUS) - PUDUKKOTTAI
PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc. Computer Science

Courses Focus on Employability / Entrepreneurship / Skill Development

Paper	Name of the Course	Course Code	Activities with direct bearing on Employability / Entrepreneurship / Skill development
CC-1	Compiler Design	21PCS1	Skill Development
CC-II	Advanced Java Programming	21PCS2	Entrepreneurship
CP-III	Advanced Java Programming Lab.	21PCS3P	Entrepreneurship
CC-IV	Distributed Operating Systems	21PCS4	Skill Development
CC-V	Data Mining And R	21PCS5	Skill Development
CC-VI	Advance Python Programming	21PCS6	Entrepreneurship
CP-VII	Advance Python Programming Lab.	21PCS7P	Entrepreneurship
CC-VIII	Cloud Computing	21PCS8	Skill Development
CC-IX	Advanced Network Security	21PCS9	Employability
CC-X	Programming With Asp .Net With C#	21PCS10	Entrepreneurship
CP-XI	Programming With Asp.Net With C# Lab	21PCS11P	Entrepreneurship
CC-XII	Web Services	21PCS12	Skill Development
CC-XIII	Advance Software Engineering	21PCS13	Skill Development
PW-1	Project Work	21PCS14	Employability
EC-1	Wireless Networks	21PCSE1A	Skill Development
	Embedded Systems	21PCSE1B	Entrepreneurship
	Mobile Computing	21PCSE1C	Skill Development
EC-II	Microprocessors, Interfacing And Applications	21PCSE2A	Skill Development
	Artificial Intelligence	21PCSE2B	Skill Development
	Soft Computing	21PCSE2C	Skill Development
EC-III	Object Oriented Systems Development	21PCSE3A	Employability
	Computer Simulation and Modeling	21PCSE3B	Skill Development
	WAP and XML	21PCSE3C	Skill Development