FATIMA COLLEGE (AUTONOMOUS), MADURAI-18
DEPARTMENT OF COMPUTER SCIENCE

MAJOR CORE – 70 CREDITS

PROGRAMME CODE:PSCS

S.No	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	I	19PG1B1	Advanced Programming in Java	5	4	40	60	100
2.		19PG1B2	Distributed Operating Systems	4	4	40	60	100
3.		19PG1B3	Object Oriented Software Engineering	4	4	40	60	100
4.		19PG1B4	Theory of Computation	4	4	40	60	100
5.		19PG1B5	Lab I – Advanced Programming In Java	5	3	40	60	100
6.		19PG1B6	Lab II – Operating System	5	3	40	60	100
7.	II	19PG2B7	Extreme Programming – Asp.Net	4	4	40	60	100
8.		19PG2B8	Mobile Application Development Using Android Studio	4	4	40	60	100
9.		19PG2B9	Design and Analysis of Algorithms	4	4	40	60	100
10.		19PG2B10	Lab III – Extreme Programming – Asp.Net	5	3	40	60	100
11.		19PG2B11	Lab IV – Mobile Application Development using Android Studio	5	3	40	60	100
12.	III	19PG3B12	Digital Image Processing	5	5	50	50	100
13.		19PG3B13	Data Mining and Data Warehousing	5	5	40	60	100
14.		19PG3B14	Lab V – Digital Image Processing	5	3	40	60	100
15.		19PG3B15	Lab VI– Data Mining And Data Warehousing	5	3	40	60	100
16.	IV	19PG4B16	Principles Of Internet Of Things (Self Study)	-	4	40	60	100
			TOTAL	**69**	**60**			

MAJOR ELECTIVE / EXTRA DEPARTMENTAL COURSE / INTERNSHIP/ PROJECT

S.No	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. Mks
1.	I	19B1EDC	Web Development	3	3	40	60	100
2.	II	19B2EDC	Web Development	3	3	40	60	100
3.		19PG2BE1	Computational Intelligence	5	5	40	60	100
4.		19PG2BE2	Neural Networks	5	5	40	60	100
5.		19PG2BE3	Software Testing	5	5	40	60	100
6.		19PG2BE4	Embedded Systems	5	5	40	60	100
7.	III	19PG3BE5	Python Programming	5	5	40	60	100
8.		19PG3BE6	Cryptography And Network Security	5	5	40	60	100
9.		19PG3BE7	Distributed Database Management System	5	5	40	60	100
10.		19PG3BE8	Compiler Design	5	5	40	60	100
11.		19PG3BE9	Cloud Computing	5	5	40	60	100
12.		19PG3BE10	Advanced Computer Graphics & Animation	5	5	40	60	100
13.		19PG3BE11	Big Data Analytics	5	5	40	60	100
14.		19PG3BE12	Deep Learning	5	5	40	60	100
15.		19PG3BSI	Summer Internship/ Training/ Online Certification	-	3	40	60	100
16.	IV	19PG4BPR	Project	-	6	40	60	100
			TOTAL	**21**	**30**			

OFF-CLASS PROGRAMMES

ADD-ON COURSES

COURSES	HRS.	CREDITS	SEMESTER IN WHICH THE COURSE IS OFFERED	CIA MKS	ESE MKS	TOTAL MARKS
SOFT SKILLS	40	3	I	40	60	100
CONTENT MANAGEMENT SYSTEM (Offered by Dept. Of Computer Science)	40	4	II	40	60	100
COMPREHENSIVE VIVA (Question bank to be prepared for all the papers by the respective course teachers)	-	2	IV	-	-	100
READING CULTURE	15/ Semester	1	I-IV	-	-	-
TOTAL		10				

EXTRA CREDIT COURSE

Course Code	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
19PGSLB1	**SELF LEARNING COURSE for ADVANCED LEARNERS (Offered for II PG)** BIOINFORMATICS	-	5	III & IV	40	60	100

- ***Lab Courses :***
  - A range of 10-15 experiments per semester

- **Summer Internship:**
  - Duration-1 month (2nd Week of May to 2nd week of June-before college reopens)

- **Project:**
  - Off class
  - Evaluation components-Report writing + Viva Voce (Internal marks-50) + External marks 50

- **EDC:**

  Syllabus should be offered for two different batches of students from other than the parent department inSem-I &Sem-II

OLD

2019 - 2020

I M.Sc. Computer Science - I SEMESTER

MAJOR CORE

19PG1B1– ADVANCED PROGRAMMING IN JAVA

HRS/WEEK : 4 **CREDITS : 4**

COURSE OUTCOMES

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

CO1: Describe client/server applications, TCP/IP socket programming and distributed applications using RMI.

CO2: Analyze and design Window based applications using Swing Objects.

CO3: Develop and design Java programs using Swing components.

CO4: Discuss the various JDBC drivers and demonstrate J2EE application using JDBC connection and server side programs with Servlets.

CO5: Write component-based Java programs using JavaBeans.

SYLLABUS

UNIT I: **(12 Hrs)**

Networking: Networking Basics – The Networking Classes and Interfaces – Inet Address – Inet4Address and Inet6Address - TCP/IP Client Sockets – URL – URL Connection – HttpURLConnection – The URI Class – Cookies – TCP/IP Server Sockets – Datagrams. Regular Expressions and other Packages: The Core Java API Packages - Regular Expression Processing – Reflection – RMI.

UNIT II: **(12 Hrs)**

GUI Programming with Swing: Introducing Swing – Two key swing features – The MVG Connection – Components and Containers – Swing Packages – Event Handling – Swing Applet – Painting in Swing.

Exploring Swing: JLabel and ImageIcon – JTextField – The Swing Buttons – JTabbedPane – JScrollPane – JList – JComboBox – Trees – JTable.

UNIT III: **(12 Hrs)**

Swing Menus: Menu Basics – Overview of JMenuBar, JMenu, and JMenuItem – Create a Main Menu – Add Mnemonics and Accelerators to Menu Items – Add Images and Tooltips to Menu Items – Use JRadioButtonMenuItem and JCheckBoxMenuItem – Create a Popup Menu – Create a Toolbar – Use Actions – Entire MenuDemo Program Together.

UNIT IV: **(12 Hrs)**

JDBC- Java Database Connectivity: Introducing JDBC Driver Types - Creating Your First First JDBC Program – Performing Batch Updates – Using Save points - Configuring the JDBC-ODBC Bridge- Explaining Database Connection pools and data sources-Revisiting DBProcessor-Using the RowSet Interface. Servlets: The Life Cycle of a Servlet – Servlet Development Options – Using Tomcat – Simple Servlet – The Servlet API – The javax.servlet Package – Reading Servlet Parameters – The javax.servlet.http Package – Handling HTTP Requests and Responses – Using Cookies – Session Tracking.

UNIT V: **(12 Hrs)**

JSP: Introducing JSP – Examining MVC and JSP - JSP Scripting Elements and Directives –Working with Variable Scopes – Error pages – Using java Beans – Designing an online Store with JSP – Simple programs using JSP. Using JSP Tag Extensions– Use of Tag Extensions - Explaining custom tag concepts – Explaining taglib mapping – Understanding Tag Handlers – Exploring Dynamic Attributes.

TEXT BOOKS

1. ***Java The Complete Reference,*** Herbert Schildt 9th Edition, Mc Graw Hill Education, 2016. Chapters: 22, 30, 31, 32, 33,38
2. ***James McGovern***, Rahim Adatia and others, ***J2EE 1.4 Bible,*** 1st Edition, Wiley India (P) Ltd, (2008). Chapters: 6,7,18

REFERENCE BOOKS

1. ***Java How to program,*** Paul Deitel & Harvey Deitel, 10th Edition, Pearson Publications, 2014.
2. ***Java in a Nutshell,*** David Flnagan, 5th Edition, O'Reilly Media Inc., 2014.
3. ***J2EE : The Complete Reference,*** Jim Keogh, Tata McGraw-Hill Publishing Company Limited , New Delhi, 1st Edition, 18th Reprint 2008.
4. ***Thinking in Java,*** Harry H.Chaudhary, Bruce Eckel, 4th Edition, Prentice Hall Publications, 2006.
5. ***Java2 (JDK 5 edition) Programming Black Book,*** Steven Holzner et al., Dreamtech Press, New Delhi 2006.

NEW

5%

I M.Sc. Computer Science

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSCS	19PG1B1	Advanced Programming in Java	Lecture	5	4

COURSE DESCRIPTION

Advanced Programming in Java consists of Networking concepts, GUI Programming with Swing and Swing Menus, JDBC and JSP.

COURSE OBJECTIVES

- To understand the Networking concept using TCP/IP and RMI.
- To design and develop java program using Swings Components.
- To implement Server Side Program with Servlets.
- To understand and develop java program using JSP.

UNIT I: NETWORKING **(12 Hrs)**

Networking: Networking Basics – The Networking Classes and Interfaces – Inet Address – Inet4Address and Inet6Address - TCP/IP Client Sockets – URL – URL Connection – HttpURLConnection – The URI Class – Cookies – TCP/IP Server Sockets – Datagrams. Regular Expressions and other Packages: The Core Java API Packages - Regular Expression Processing – Reflection – RMI.

UNIT II: SWINGS **(12 Hrs)**

GUI Programming with Swing: Introducing Swing – Two key swing features – The MVG Connection – Components and Containers – Swing Packages – Event Handling – Swing Applet – Painting in Swing.

Exploring Swing: JLabel and ImageIcon – JTextField – The Swing Buttons – JTabbedPane – JScrollPane – JList – JComboBox – Trees – JTable.

UNIT III: SWING MENUS **(12 Hrs)**

Swing Menus: Menu Basics – Overview of JMenuBar, JMenu, and JMenuItem – Create a Main Menu – Add Mnemonics and Accelerators to Menu Items – Add Images and Tooltips to Menu Items – Use JRadioButtonMenuItem and JCheckBoxMenuItem – Create a Popup Menu – Create a Toolbar – Use Actions – Entire MenuDemo Program Together.

UNIT IV: JDBC **(12 Hrs)**

JDBC- Java Database Connectivity: Introducing JDBC Driver Types - Creating Your First First JDBC Program – Performing Batch Updates – Using Save points - Configuring the JDBC-ODBC Bridge- Explaining Database Connection pools and data sources-Revisiting DBProcessor-Using the RowSet Interface. Servlets: The Life Cycle of a Servlet – Servlet Development Options – Using Tomcat – Simple Servlet – The Servlet API – The javax.servlet Package – Reading Servlet Parameters – The javax.servlet.http Package – Handling HTTP Requests and Responses – Using Cookies – Session Tracking.

UNIT V: JSP **(12 Hrs)**

JSP: Introducing JSP – Examining MVC and JSP - JSP Scripting Elements and Directives –Working with Variable Scopes – Error pages – Using java Beans – Designing an online Store with JSP – Simple programs using JSP. Using JSP Tag Extensions– Use of Tag Extensions - Explaining custom tag concepts – Explaining taglib mapping – Understanding Tag Handlers – Exploring Dynamic Attributes.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT II: The MVG Connection – Components and Containers

UNIT III: Create a Popup Menu – Create a Toolbar

UNIT IV: Servlet Development Options – Using Tomcat – Simple Servlet

UNIT V: Using JSP Tag Extensions– Use of Tag Extensions - Explaining custom tag concepts

TEXT BOOKS

1. ***Java The Complete Reference,*** Herbert Schildt 9th Edition, Mc Graw Hill Education, 2016.
   Chapters: 22, 30, 31, 32, 33,38
2. ***James McGovern***, Rahim Adatia and others, ***J2EE 1.4 Bible,*** 1st Edition, Wiley India (P) Ltd, (2008). Chapters: 6,7,18

REFERENCES:

1. ***Java How to program,*** Paul Deitel& Harvey Deitel, 10th Edition, Pearson Publications, 2014.
2. ***Java in a Nutshell,*** David Flnagan, 5th Edition, O'Reilly Media Inc., 2014.
3. ***J2EE : The Complete Reference,*** Jim Keogh, Tata McGraw-Hill Publishing Company Limited , New Delhi, 1st Edition, 18th Reprint 2008.
4. ***Thinking in Java,*** Harry H.Chaudhary, Bruce Eckel, 4th Edition, Prentice Hall Publications, 2006.
5. ***Java2 (JDK 5 edition) Programming Black Book,*** Steven Holzner et al., Dreamtech Press, New Delhi 2006.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Describe client/server applications, TCP/IP socket programming and distributed applications using RMI.
CO 2	Analyze and design Window based applications using Swing Objects.
CO 3	Develop and design Java programs using Swing components
CO 4	Discuss the various JDBC drivers and demonstrate J2EE application using JDBC connection and server side programs with Servlets.
CO 5	Write component-based Java programs using. JavaBeans.

OLD

2019 - 2020
I M.Sc. Computer Science -I SEMESTER
MAJOR CORE
19PG1B2 – DISTRIBUTED OPERATING SYSTEMS

HRS/WEEK : 4 **CREDITS : 4**

COURSE OUTCOMES

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

CO1: Discuss the core concepts of distributed systems and the way in which several machines orchestrate to correctly solve problems in an efficient, reliable and scalable way.
CO2: Analyze various message passing mechanisms with its model.
CO3: Identify the inherent difficulties that arise due to distribution of computing resources.
CO4: Explain migration with the process management policies.
CO5: Explain the basic concepts, design and structure of the LINUX operating system.

SYLLABUS

UNIT I : **(12 Hrs)**

Fundamentals – Distributed computing systems – Evolution of distributed computing systems – Distributed computing system models – Popularity of distributed computing systems – Distributed operating system – issues in designing a distributed operating system – Introduction to distributed computing environment(DCE).

UNIT II : **(12 Hrs)**

Message Passing – Introduction – Desirable features of a good message-passing system – Issues in IPC by message passing – Synchronization – Buffering – Multidatagram messages – Remote Procedure Calls – Introduction – The RPC model – Transparency of RPC – Implementing RPC mechanism.

UNIT III : **(12 Hrs)**

Distributed Shared Memory – Introduction – General architecture of DSM systems – Design and implementation issues of DSM – Synchronization – Introduction – Clock synchronization – Election Algorithms. Resource Management – Introduction – Desirable features of a good global scheduling algorithm – load sharing approach.

UNIT IV : **(12 Hrs)**

Process Management – Introduction – Process migration - Distributed File Systems – Introduction – Desirable features of a good distributed file system – File models– File-Accessing models – File-Sharing semantics – File-Caching schemes – File replication – Fault tolerance.

UNIT V : LINUX **(12 Hrs)**

The Linux Shell and File Structure: The Shell – The Command Line – History – Filename Expansion – Standard Input/Output and Redirection – Pipes – Ending Processes – The shell scripts and Programming –Shell Variables – Shell Scripts – Environment Variables and Subshells – Control Structures – TCSH/C Shell Control structures.

TEXT BOOKS

1. ***Distributed Operating Systems Concepts and Design,*** Pradeep K. Sinha, Prentice Hall of India Private Limited, 2012.
   Chapters: 1, 3.1 – 3.6, 4.1 – 4.4, 5.1 – 5.3, 6.1, 6.2, 6.6, 7.1, 7.2, 7.5, 8.1 – 8.2, 9.1 – 9.8
2. ***Linux: The Complete Reference,*** Richard Petersen, McGraw Hill Education (India) Private Limited, 6th Edition, 2011.
   Chapters: 3 (pg.35 – 55), 4

REFERENCE BOOKS

1. ***Operating Systems,*** Stuart Madnick, John Donovan, McGraw Hill Education, 2012.
2. ***Distributed Operating Systems***, Andrew S. Tanenbaum, Pearson Education, New Delhi, 2013.
3. ***Beginning Linux Programming,*** Neil Matthew, Richard Stones, Wiley India Pvt. Ltd, 2014

5%

I M.Sc. Computer Science

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG1B2	Distributed Operating Systems	Lecture	4	4

COURSE DESCRIPTION

To understand the concept of design and implementation in the context of distributed operating systems.

COURSE OBJECTIVES

- To apply the concepts of distributed systems in designing large systems, and will additionally apply these concepts to develop sample systems.
- To recognize the inherent difficulties that arise due to distribution of computing resources.

UNIT I : INTRODUCTION (12 Hrs)

Fundamentals – Distributed computing systems – Evolution of distributed computing systems – Distributed computing system models – Popularity of distributed computing systems – Distributed operating system – issues in designing a distributed operating system – Introduction to distributed computing environment(DCE).

UNIT II : MESSAGE PASSING (12 Hrs)

Message Passing – Introduction – Desirable features of a good message-passing system – Issues in IPC by message passing – Synchronization – Buffering – Multidatagram messages – Remote Procedure Calls – Introduction – The RPC model – Transparency of RPC – Implementing RPC mechanism.

UNIT III : DISTRIBUTED SHARED MEMORY (12 Hrs)

Distributed Shared Memory – Introduction – General architecture of DSM systems – Design and implementation issues of DSM – Synchronization – Introduction – Clock synchronization – Election Algorithms. Resource Management – Introduction – Desirable features of a good global scheduling algorithm – load sharing approach.

UNIT IV : PROCESS MANAGEMENT (12 Hrs)

Process Management – Introduction – Process migration - Distributed File Systems – Introduction – Desirable features of a good distributed file system – File models– File-Accessing models – File-Sharing semantics – File-Caching schemes – File replication – Fault tolerance.

UNIT V :LINUX (12 Hrs)

The Linux Shell and File Structure: The Shell – The Command Line – History – Filename Expansion – Standard Input/Output and Redirection – Pipes – Ending Processes – The shell scripts and Programming –Shell Variables – Shell Scripts – Environment Variables and Subshells – Control Structures – TCSH/C Shell Control structures.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT 1: Fundamentals – Distributed computing systems – Evolution of distributed computing systems – Distributed computing system models.

UNIT 5: The Linux Shell and File Structure: The Shell – The Command Line – History – Filename Expansion – Standard Input/Output and Redirection – Pipes – Ending Processes.

TEXT BOOKS

1. Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, Prentice Hall of India Private Limited, 2012.

Chapters: 1, 3.1 – 3.6, 4.1 – 4.4, 5.1 – 5.3, 6.1, 6.2, 6.6, 7.1, 7.2, 7.5, 8.1 – 8.2, 9.1 – 9.8

2. Linux: The Complete Reference, Richard Petersen, McGraw Hill Education (India) Private Limited, 6th Edition, 2011.

Chapters: 3 (pg.35 – 55), 4

REFERENCES:

1. ***Operating Systems,*** Stuart Madnick, John Donovan, McGraw Hill Education, 2012.
2. ***Distributed Operating Systems***, Andrew S. Tanenbaum, Pearson Education, New Delhi, 2013.
3. ***Beginning Linux Programming,*** Neil Matthew, Richard Stones, Wiley India Pvt. Ltd, 2014

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Discuss the core concepts of distributed systems.
CO 2	Analyze various message passing mechanisms with its model.
CO 3	Identify the inherent difficulties that arise due to distribution of computing resources.
CO 4	Explain migration with the process management policies.
CO 5	Explain the basic concepts, design and structure of the LINUX operating system.

OLD

2019 – 2020
I M.Sc. Computer Science - I SEMESTER
MAJOR CORE
19PG1B3 – OBJECT ORIENTED SOFTWARE ENGINEERING

HRS/WEEK: 4 **CREDITS: 4**

COURSE OUTCOMES

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

CO1: Differentiate traditional and object oriented software engineering
CO2: Explain various SDLC methods of OOSE
CO3: Describe techniques used in OOSE
CO4: Explain OOSE testing methods
CO5: Analyze and choose necessary method for a particular project

SYLLABUS

UNIT I : **(12 Hrs)**

Generic view of Process – Software Engineering – A layered technology – A process framework – The capability Maturity Model Integration (CMMI) – Process patterns – Process Assessment – Personal and Team Process Models – Process Technology – Product and Process – Specialized Process Models – The Unified Process –Agility –Agile Process – Agile Process Models.

UNIT II : **(12 Hrs)**

System Engineering - Computer Based Systems - System Modeling Requirements Engineering – A bridge to design and construction – Requirements engineering tasks, developing Use-Cases Building the analysis model – Requirement Analysis – Analysis modeling approaches – Data modeling concepts – Object- Oriented Analysis – Class based modeling

UNIT III : **(12 Hrs)**

Design Engineering – Design within the context of Software Engineering – Design Process and Design Quality Creating an Architectural Design – Software Architecture – Data design Modeling Component level design –Component-Designing Class-Based Components

UNIT IV : **(12 Hrs)**

Performing User Interface Design – The Golden Rules – User Interface analysis and Design Testing Strategies – A strategic approach to software testing – test strategies for Object-Oriented Software Testing Tactics – Object Oriented Testing Methods

UNIT V : **(12 Hrs)**

Introducing the UML- Classes – Class Diagrams- Use cases- Use case diagrams- Case Study

TEXT BOOKS

1. ***Software Engineering - A Practitioner's Approach***, Roger S. Pressman, 6th Edition, McGraw Hill Higher Education, 2014.
   Chapters: 2, 3.5, 3.6, 4.1 – 4.3, 6.1, 6.5, 7.1, 7.2, 7.5, 8.1 – 8.4, 8.7, 9.1, 9.2, 10.1, 10.2, 11.1, 11.2, 12.1, 12.2, 13.1, 13.4, 14.7
2. ***The Unified Modeling Language User Guide***, Grady Booch, James Rumbaugh and Ivar Jacobson, Pearson Education, 2007. Chapters: 2, 4, 8, 16, 17

REFERENCE BOOKS

1. ***Object Oriented Software Engineering***, Ivar Jacobson, Magnus Christerson, Patrik Jonsson, Gunnar Overgaard, Pearson Education, Seventh Reprint, 2009.
2. ***Object Oriented Software Engineering***, Yogesh Singh and Ruchika Malhotra, PHI Learning Pvt Ltd, 2012.
3. ***Applying UML and Patterns***, Craig Larman, Third Edition, Pearson publication, 2012.
4. ***Object-Oriented Software Engineering***, Stephen R Schach, First Edition, CTI Reviews, 2014.

5%

I M.Sc. Computer Science

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG1B3	Object Oriented Software Engineering	Lecture	4	4

COURSE DESCRIPTION

Object Oriented software Engineering provides object oriented programming techniques. And explains various object oriented development cycles with appropriate testing methods. And gives how to design and construct modular, reusable, extensible and portable object-oriented software.

COURSE OBJECTIVES

- To understand a systematic discipline, quantifiable approach to the design development operation and maintenance of software using object oriented concept.
- To understand and apply different Object Oriented development models

UNIT I : INTRODUCTION (12 Hrs)

Generic view of Process – Software Engineering – A layered technology – A process framework – The capability Maturity Model Integration (CMMI) – Process patterns – Process Assessment – Personal and Team Process Models – Process Technology – Product and Process – Specialized Process Models – The Unified Process –Agility –Agile Process – Agile Process Models.

UNIT II : SYSTEM MODELING REQUIREMENTS (12 Hrs)

System Engineering - Computer Based Systems - SystemModelling Requirements Engineering – A bridge to design and construction – Requirements engineering tasks, developing Use-Cases Building the analysis model – Requirement Analysis – Analysis modelling approaches – Data modelling concepts – Object- Oriented Analysis – Class based modelling

UNIT III : DESIGN ENGINEERING (12 Hrs)

Design Engineering – Design within the context of Software Engineering – Design Process and Design Quality Creating an Architectural Design – Software

Architecture – Data design Modeling Component level design –Component-Designing Class-Based Components

UNIT IV : USER INTERFACE DESIGN (12 Hrs)

Performing User Interface Design – The Golden Rules – User Interface analysis and Design Testing Strategies – A strategic approach to software testing – test strategies for Object-Oriented Software Testing Tactics – Object Oriented Testing Methods

UNIT V : (12 Hrs)

Introducing the UML- Classes – Class Diagrams- Use cases- Use case diagrams-Case Study

SELF STUDY: DYNAMISM: (For CIA Only)
UNIT V

TEXT BOOKS

1. ***Software Engineering - A Practitioner's Approach***, Roger S. Pressman, 6th Edition, McGraw Hill HigherEducation, 2014.
Chapters: 2, 3.5, 3.6, 4.1 – 4.3, 6.1, 6.5, 7.1, 7.2, 7.5, 8.1 – 8.4, 8.7, 9.1, 9.2, 10.1, 10.2, 11.1, 11.2, 12.1, 12.2, 13.1, 13.4, 14.7
2. ***The Unified Modeling Language User Guide***, Grady Booch, James Rumbaugh and Ivar Jacobson, Pearson Education, 2007.
Chapters: 2, 4, 8, 16, 17

REFERENCES:

1. ***Object Oriented Software Engineering***, Ivar Jacobson, Magnus Christerson, Patrik Jonsson, Gunnar Overgaard, Pearson Education, Seventh Reprint, 2009.
2. ***Object Oriented Software Engineering***, Yogesh Singh and Ruchika Malhotra, PHI Learning Pvt Ltd, 2012.
3. ***Applying UML and Patterns***, Craig Larman, Third Edition, Pearson publication, 2012.
4. ***Object-Oriented Software Engineering***, Stephen R Schach, First Edition, CTI Reviews, 2014.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Differentiate traditional and object oriented software engineering
CO 2	Explain various SDLC methods of OOSE
CO 3	Describe techniques used in OOSE
CO 4	Explain OOSE testing methods
CO 5	Analyze and choose necessary method for a particular project

OLD

2019 - 2020
I M.Sc. Computer Science - I SEMESTER
MAJOR CORE
19PG1B4 – THEORY OF COMPUTATION

HRS/WEEK : 4 **CREDITS : 4**

COURSE OUTCOMES

On the successful completion of the course, students will be able to
CO1: Demonstrate an in-depth understanding of theories, concepts and techniques in automata and their link to computation.
CO2: Develop abstract machines that demonstrate the properties of physical machines and be able to specify the possible inputs, processes and outputs of these machines.
CO3: Analyze the computational strengths and weaknesses of these machines.
CO4: Explain Context-Free Grammar.
CO5: Apply automata concepts and techniques in designing systems that address real world problems.

SYLLABUS

UNIT I: Set Theory **(12 Hrs)**
Introduction – Sets and Elements - - Universal Set and Empty Set – Subsets – Venn Diagrams –Set Operations – Algebra of sets and duality – Finite, Infinite Sets and Counting Principle-The Inclusion – Exclusion Principle – Classes of Sets, Power Sets, Partitions, Mathematical Induction – Multisets.

UNIT II : Relations **(12 Hrs)**
Introduction – Product Sets – Relations – Pictorial Representations of Relations – Composition of Relations - Types of Relations – Closure Properties – Equivalence Relations – Partial Ordering Relations – n-Ary Relations – Relational Model for Databases.

UNIT III : Finite Automata & Regular Expressions **(12 Hrs)**
Finite state systems-Basic definitions-Non-deterministic Finite Automata (NFA) –Finite Automata with output-The pumping lemma for regular set-Closure properties of regular set.

UNIT IV : Context-Free Grammars & Pushdown Automata **(12 Hrs)**
Context-Free Grammars**:** Motivation and introduction- Context-Free grammars-Derivation trees - Chomsky Normal Form – Greibach Normal Form. Pushdown Automata **:** Informal description – Definitions .

UNIT V : Turing Machines **(12 Hrs)**
Introduction-The Turing Machine Model-Computable Languages and functions-Techniques for Turing machines Constructions.

TEXT BOOKS

1. ***Discrete Mathematics,*** Seymour Lipschuts, Marc Lars Lipson, Varsha H. Patil, Tata McGraw – Hill Publishing Company Limited, 2nd edition, 2008. Chapters: 1, 2
2. ***Introduction to Automata Theory, Languages and Computations ,*** J.E. Hopcroft, R. Motwani and J.D. Ullman, Narosa Publishin House, Reprint 2002.
   Chapters: 2.1 -2.3, 2.7, 3.1, 3.2 , 4.1 – 4.3, 4.5, 4.6, 5.1, 5.2, 7.1, 7.2, 7.4

REFERENCE BOOKS

1. ***Theory of Computation****,George Tourlakis,A John Wiley &Sons,Inc,Publication 2009*
2. ***Concise Guide Of Computation Theory,*** *Akira Maruola ,Springer Publication 2011*
3. ***An Introduction to the Theory of Computer Science,****Michael sipser 3rd Edition,2012.*
4. ***Mathematical Theory Of Computation ,****Zohar Manna ,2012*

5%

I. M.Sc. Computer Science

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSCS	19PG1B4	Theory Of Computation	**Lecture**	4	4

COURSE DESCRIPTION

To introduce the concept of automata theory, the theory of formal languages and grammars to understand the properties of physical machines

COURSE OBJECTIVES

- To introduce the mathematical foundation of computation including automata theory, the theory of formal languages and grammars.
- To develop ability to understand and conduct mathematical proofs for computation and algorithms.

SYLLABUS

UNIT I: SET THEORY (12 Hrs)

Introduction – Sets and Elements - Universal Set and Empty Set – Subsets – Venn Diagrams –Set Operations – Algebra of sets and duality – Finite, Infinite Sets and Counting Principle-The Inclusion – Exclusion Principle – Classes of Sets, Power Sets, Partitions, Mathematical Induction – Multisets.

UNIT II : RELATIONS (12 Hrs)

Introduction – Product Sets – Relations – Pictorial Representations of Relations – Composition of Relations - Types of Relations – Closure Properties – Equivalence Relations – Partial Ordering Relations – n-Ary Relations – Relational Model for Databases.

UNIT III : FINITE AUTOMATA & REGULAR EXPRESSIONS (12 Hrs)

Finite state systems-Basic definitions-Non-deterministic Finite Automata (NFA) – Finite Automata with output-The pumping lemma for regular set-Closure properties of regular set.

UNIT IV :CONTEXT-FREE GRAMMARS & PUSHDOWN AUTOMATA (12 Hrs)

Context-Free Grammars**:** Motivation and introduction- Context-Free grammars-Derivation trees - Chomsky Normal Form – Greibach Normal Form. Pushdown Automata **:**Informal description – Definitions .

UNIT V : TURING MACHINES (12 Hrs)

Introduction-The Turing Machine Model-Computable Languages and functions-Techniques for Turing machines Constructions.

SELF STUDY : **DYNAMISM: (For CIA Only)**

UNIT -1 : Universal Set and Empty Set – Subsets – Venn Diagrams –Set Operations
UNIT II : Pictorial Representations of Relations, n-Ary Relations – Relational Model for Databases
UNIT III :Closure properties of regular set
UNIT IV : Pushdown Automata **:** Informal description – Definitions
UNIT V: Computable Languages and functions

TEXT BOOKS

1. ***Discrete Mathematics,*** Seymour Lipschuts, Marc Lars Lipson, Varsha H. Patil, Tata McGraw – Hill Publishing Company Limited, 2nd edition, 2008. Chapters: 1, 2
2. ***Introduction to Automata Theory, Languages and Computations ,***J.E. Hopcroft, R. Motwani and J.D. Ullman, NarosaPublishin House, Reprint 2002. Chapters: 2.1 -2.3, 2.7, 3.1, 3.2 , 4.1 – 4.3, 4.5, 4.6, 5.1, 5.2, 7.1, 7.2, 7.4

REFERENCES:

1. ***Theory of Computation****,GeorgeTourlakis,A John Wiley &Sons,Inc,Publication 2009*
2. ***Concise Guide Of Computation Theory,*** *Akira Maruola ,Springer Publication 2011*
3. ***An Introduction to the Theory of Computer Science,****Michaelsipser 3rd Edition,2012.*
4. ***Mathematical Theory Of Computation ,****Zohar Manna ,2012*

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Demonstrate an in-depth understanding of theories, concept and techniques in automata and their link to computation.
CO 2	Develop abstract machines that demonstrate the properties of physical machines and be able to specify the possible inputs, processes and outputs of these machines.
CO 3	Analyze the computational strengths and weaknesses of these machines
CO 4	Explain Context-Free Grammar.
CO 5	Apply automata concepts and techniques in designing systems that address real world problems.

OLD

2019 - 2020

I M.Sc. Computer Science - I & II SEMESTER

EXTRA DEPARTMENTAL COURSE

19PGBEDC - WEB DEVELOPMENT

HRS/WEEK: 3+3 (per Sem) **CREDITS: 3+3**

(will be conducted for 2 semesters)

COURSE OUTCOMES

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

CO1: Define various tags of HTML

CO2: Design a web page with attractive display

CO3: Create a Layout for a webpage using Block tags

CO4: Explain how and where to apply CSS

CO5: Design own website

SYLLABUS

UNIT I: Overview Of Html **(6 Hrs)**

Fundamentals of HTML - Root Elements-Metadata Elements- Section Elements-Heading Elements-Flow Elements-Phrasing Elements- Embedded Elements- Interactive Elements –Working with Headings-Character Entities – Horizontal Rules – Line Breaks – Paragraph – Citations – Quotations – Definitions - Comments.

UNIT II: Working With Text **(6 Hrs)**

Working with Text - Formatting Text with HTML Elements – Physical styles – Logical styles – Defining the MARK Element- Defining the STRONG Element- Defining the CODE Element- Defining the SMALL Element.

UNIT III: Organizing Text **(6 Hrs)**

Organizing Text in HTML - Arranging text – Allowing Word Breaks- Defining the preformatted Text - DIV Element and SPAN Element – Formatting Text in Tables - Creating Ruby (Captioned) Text – Displaying List- Immediate Solutions : Allowing Word Breaks Using the WBR Element – Displaying The Preformatted Text – Using the DIV Element - Positionaing Text Using the DIV Element – Using the SPAN Element – Formatting Text Using Tables – Creating the Ruby Text – Creating Lists.

UNIT IV: Creating Tables **(6 Hrs)**

Creating Tables - Understanding Tables – Describing the TABLE Elements – CAPTION –COLGROUP – COL – TBODY – THEAD – TFOOT – TR – TD and TH - Creating a Simple Table – Adding a Title to a Table – Caption to a Table – Specifying the Properties of the Columns – Spanning Rows and Columns – Using Images in a Table.

UNIT V: Understanding CSS **(6 Hrs)**

Overview of CSS – Discussing the Evolution of CSS – Understanding the Syntax of CSS – Exploring CSS Selectors – Inserting CSS in an HTML Document.

TEXT BOOK

HTML5 Black Book, Kogent Learning Solutions Inc., Dreamtech Press, 2012.

Chapters (Page Numbers) : 2(31-50 & 68-76) ; 3(77-94); 4(113-128) ; 6 (145-164) ; 18 (465-476)

REFERENCE BOOKS

1. ***Sergey's HTML5 & CSS3 Quick Reference: Color Edition,*** Sergey Mavrody, Published 16 Nov 2009.
2. ***HTML5: The Missing Manual,*** Matthew MacDonald, Published in 2011.
3. ***Head First HTML5 Programming: Building Web Apps with JavaScript,*** Elisabeth Freeman and Eric Freeman, Published in 2011.
4. ***Beginning HTML5 and CSS3 For Dummies,*** Chris Minnick and Ed Tittel, Published 2013.

NEW

5%

I M.Sc. Computer Science

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19B1EDC/ 19B2EDC	WEB DEVELOPMENT	Lecture	3	3

COURSE DESCRIPTION

This Course introduces basic web design using Hypertext Markup Language (HTML) and Cascading Style Sheets (CSS). And this course provides knowledge to plan and design effective web pages with different text formatting and images to create website.

COURSE OBJECTIVES

- To enhance the knowledge of the students in effective webpage designing.
- To provide skills to sharply focus on needed information to be presented in a website.
- To improve the quality of the students by giving strong base in fundamental and advanced concepts.
- To give courage to face the real-world scenarios as it is practical oriented
- To inculcate the ability to explain, analyze, identify and define the technology required to build and implement a web site.

UNIT I: OVERVIEW OF HTML (9 Hrs)

Fundamentals of HTML - Root Elements-Metadata Elements- Section Elements-Heading Elements-Flow Elements- Phrasing Elements- Embedded Elements-Interactive Elements –Working with Headings-Character Entities – Horizontal Rules – Line Breaks – Paragraph – Citations – Quotations – Definitions - Comments.

UNIT II: WORKING WITH TEXT (9 Hrs)

Working with Text - Formatting Text with HTML Elements – Physical styles – Logical styles – Defining the MARK Element- Defining the STRONG Element-Defining the CODE Element- Defining the SMALL Element.

UNIT III: ORGANIZING TEXT (9 Hrs)

Organizing Text in HTML -Arranging text – Allowing Word Breaks- Defining the preformatted Text - DIV Element and SPAN Element – Formatting Text in Tables - Creating Ruby (Captioned) Text – Displaying List-Immediate Solutions : Allowing

Word Breaks Using the WBR Element – Displaying The Preformatted Text – Using the DIV Element - Positionaing Text Using the DIV Element – Using the SPAN Element – Formatting Text Using Tables – Creating the Ruby Text – Creating Lists.

UNIT IV: CREATING TABLES (**9 Hrs)**

Creating Tables - Understanding Tables – Describing the TABLE Elements – CAPTION –COLGROUP – COL – TBODY – THEAD – TFOOT – TR – TD and TH - Creating a Simple Table – Adding a Title to a Table – Caption to a Table – Specifying the Properties of the Columns – Spanning Rows and Columns – Using Images in a Table.

UNIT V: UNDERSTANDING CSS (**9 Hrs)**

Overview of CSS – Discussing the Evolution of CSS – Understanding the Syntax of CSS – Exploring CSS Selectors – Inserting CSS in an HTML Document.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT I: Working with Headings-Character Entities – Horizontal Rules – Line Breaks – Paragraph – Citations – Quotations – Definitions - Comments

UNIT III: Arranging text – Allowing Word Breaks- Defining the preformatted Text - DIV Element and SPAN Element – Formatting Text in Tables - Creating Ruby (Captioned) Text

UNIT IV: Adding a Title to a Table – Caption to a Table – Specifying the Properties of the Columns

TEXT BOOK

HTML5 Black Book, Kogent Learning Solutions Inc., Dreamtech Press, 2012.

Chapters (Page Numbers) : 2(31-50 & 68-76) ; 3(77-94); 4(113-128) ; 6 (145-164) ; 18 (465-476)

REFERENCES:

1. ***Sergey's HTML5 & CSS3 Quick Reference: Color Edition,*** Sergey Mavrody, Published 16 Nov 2009.
2. ***HTML5: The Missing Manual,*** Matthew MacDonald,Published in 2011.
3. ***Head First HTML5 Programming: Building Web Apps with JavaScript,*** Elisabeth Freeman and Eric Freeman, Published in 2011.
4. ***Beginning HTML5 and CSS3 For Dummies,*** Chris Minnick and Ed Tittel, Published 2013.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Define various tags of HTML
CO 2	Design a web page with attractive display
CO 3	Create a Layout for a webpage using Block tags
CO 4	Explain how and where to apply CSS
CO 5	Analyze content to design website

I M.Sc. Computer Science - II SEMESTER

OLD

MAJOR CORE

19PG2B7 - EXTREME PROGRAMMING – ASP.NET

HRS/WEEK: 4 **CREDITS: 4**

COURSE OUTCOMES

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

CO1: Explain the important facts of ASP.NET 3.5, analyze and evaluate Web Form processing stages.

CO2: Demonstrate web application using different types of Server Controls with input validation. Analysis and Identify state management techniques.

CO3: Discuss Data Access Technology using ADO.NET architecture.

CO4: Formulate Data Sources using SQL Data Source , Object Data Source and process data with rich data controls.

CO5: Discuss and demonstrate Themes and Master pages of Web site .

SYLLABUS

UNIT I: Introducing ASP .NET **(12Hrs)**

The Evolution of Web Development – Seven Important Facts about ASP .NET – ASP .NET 3.5.

Web Forms: Page Processing – Web Forms Processing Stages – The Page As a Control Container –The Page Class.

UNIT II: Server Contols **(12Hrs)**

Types of Server Controls – HTML Server Controls – Web Controls – The List Controls – Input Validation Controls – Rich Controls.

State Management: ASP .NET State Management – View State – Transferring Information Between Pages – Cookies – Session State – Application State.

UNIT III: ADO .NET Fundamentals **(12 Hrs)**

The ADO.NET Architecture – The Connection Class – The Command and Data Reader Classes – Transactions – Provider – Agnostic Code.

Data Components and the DataSet: Building a Data Access Component – Disconnected Data – The DataSet – The DataAdapter Class – The DataView Class – Typed DataSets.

UNIT IV: Data Binding **(12 Hrs)**

Basic Data Binding – Data Source Controls – The SQLDataSource - The ObjectDataSource – The Limits of the Data Source Controls.

Rich Data Controls: The GridView – Formatting the GridView – GridView Row Selection – Sorting the GridView – Paging the GridView – GridView Templates – The ListView – The DetailsView and FormView – Advanced Grids.

UNIT V: Themes And Master Pages **(12 Hrs)**

Cascading Style Sheets – Themes – Standardizing Website Layout – Master Page Basics – Advanced Master Pages.

Website Navigation: Pages with Multiple Views – Site Maps – The TreeView Control – The Menu Control.

TEXT BOOK

Pro ASP.NET 3.5 in C# 2008, Matthew MacDonald and Mario Szpuszta, 2nd Edition, 2008.

Chapters: 1, 3, 4, 6, 7, 8, 9, 10, 16, 17

REFERENCE BOOKS

5. ***Microsoft ASP.NET 3.5***, George Shepherd, PHI Pvt Ltd , 2008.
6. ***Professional ASP.NET 3.5 in C# & VB***, Bill Evjen, Scott Hanselman & Devin Rader, Wiley Publication, 2009.
7. ***Programming Microsoft ASP.NET4,*** Dino Esposito, Dream Tech press, 2011.
8. ***The Complete Reference ASP.NET***, Matthew MacDonald, Tata McGrow Hill Education Pvt Ltd, 2012.
9. ***Beginning ASP.NET 4.5 in C# and VB,*** Imar Spaanjaars, Wiley India Pvt Ltd, 2013.
10. ***ASP.NET developer's Guide***, Greg Buczek, McGrow Hill Education Pvt Ltd, 2014.

5%

I M.Sc. Computer Science

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG2B7	EXTREME PROGRAMMING – ASP.NET	Lecture	4	4

COURSE DESCRIPTION

Extreme Programming – ASP.NET contains Introduction about ASP.NET3.5 , Types of Server Control, State Management, Fundamentals of ADO.Net , SQL Data Source and Object Data Source, Data Binding concepts using Rich Data Controls and Web Navigation Controls.

COURSE OBJECTIVES

- To understand the Architecture of ASP.NET
- To acquire a working knowledge of the .NET programming model
- To implement database applications using SQL Data Source and Object Data Source
- To design and develop Master pages and navigation of web pages.

UNIT I: INTRODUCING ASP .NET (12Hrs)

The Evolution of Web Development – Seven Important Facts about ASP .NET – ASP .NET 3.5.

*WebForms:*Page Processing – Web Forms Processing Stages – The Page As a Control Container –The Page Class.

UNIT II: SERVER CONTROLS (12Hrs)

Types of Server Controls – HTML Server Controls – Web Controls – The List Controls – Input Validation Controls – Rich Controls.

*State Management:*ASP .NET State Management – View State – Transferring Information Between Pages – Cookies – Session State – Application State.

UNIT III:ADO .NET FUNDAMENTALS (12 Hrs)

The ADO.NET Architecture – The Connection Class – The Command and Data Reader Classes – Transactions – Provider – Agnostic Code.

Data Components and the DataSet: Building a Data Access Component – Disconnected Data – The DataSet – The DataAdapter Class – The DataView Class – Typed DataSets.

UNIT IV: DATA BINDING **(12 Hrs)**

Basic Data Binding – Data Source Controls – The SQLDataSource - The ObjectDataSource – The Limits of the Data Source Controls.

*Rich Data Controls:*TheGridView – Formatting the GridView – GridView Row Selection – Sorting the GridView – Paging the GridView – GridView Templates – The ListView – The DetailsView and FormView – Advanced Grids.

UNIT V:THEMES AND MASTER PAGES **(12 Hrs)**

Cascading Style Sheets – Themes – Standardizing Website Layout – Master Page Basics – Advanced Master Pages.

*Website Navigation:*Pages with Multiple Views – Site Maps – The TreeView Control – The Menu Control.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT I: ASP .NET 3.5– The Page Class.

UNIT II: HTML Server Controls – The List Controls

UNIT IV: The DetailsView and FormView – Advanced Grids.

UNIT V: Advanced Master Pages – The Menu Control.

TEXT BOOK

Pro ASP.NET 3.5 in C# 2008, Matthew MacDonald and Mario Szpuszta, 2nd Edition, 2008.
Chapters: 1, 3, 4, 6, 7, 8, 9, 10, 16, 17

REFERENCES:

1. ***Microsoft ASP.NET 3.5***, George Shepherd, PHI Pvt Ltd , 2008.
2. ***Professional ASP.NET 3.5 in C# & VB***, Bill Evjen, Scott Hanselman& Devin Rader, Wiley Publication, 2009.
3. ***Programming Microsoft ASP.NET4,*** Dino Esposito, Dream Tech press, 2011.
4. ***The Complete Reference ASP.NET***, Matthew MacDonald, Tata McGrow Hill Education Pvt Ltd, 2012.
5. ***Beginning ASP.NET 4.5 in C# and VB,***ImarSpaanjaars, Wiley India Pvt Ltd, 2013.
6. ***ASP.NET developer's Guide***, Greg Buczek, McGrow Hill Education Pvt Ltd, 2014.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Design and develop web applications using different Server Controls.
CO 2	Implement web applications with different state managements
CO 3	Create Data Access Technology using ADO.NET architecture.
CO 4	Design and utilize Data Sources using SQL Data Source , Object Data Source for data manipulation operation.
CO 5	Design and develop web sites.

I M.Sc. Computer Science - II SEMESTER OLD

MAJOR CORE

19PG2B8 – MOBILE APPLICATION DEVELOPMENT USING ANDROID STUDIO

HRS/WEEK : 4 **CREDITS : 4**

COURSE OUTCOMES

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

CO1: Design scripts to meet given interface and media control requirements

CO2: Utilize variables, properties and other code elements appropriately to implement the code design

CO3: Implement and evaluate techniques for the installation of mobile applications

CO4: Explain the principles of technologies which support media production and delivery on a variety of platforms

CO5: Evaluate alternative mobile frameworks, and contrast different programming platforms

SYLLBUS

UNIT I: **(12 Hrs)**

A Brief History of Mobile: -The Evolution of Devices. The Mobile Ecosystem**:** Operators -Networks -Devices - Platforms - Operating Systems -Application Frameworks - Size and Scope of the Mobile Market- The Addressable Mobile Market- Mobile As a Medium.

UNIT II: **(12 Hrs)**

Designing for Context: Thinking in Context -Taking the Next Steps . Developing a Mobile Strategy**:** New Rules. Types of Mobile Applications: Mobile Application Medium Types.

UNIT III: **(12 Hrs)**

Mobile Information Architecture **:** Mobile Information Architecture -The Design Myth. Mobile Design: Interpreting Design-The Mobile Design Tent-Pole-Designing for the Best Possible Experience-The Elements of Mobile Design - Mobile Design Tools -Designing for the Right Device -Designing for Different Screen Sizes. Mobile Web Apps Versus Native Applications: The Ubiquity Principle - When to Make a Native Application - When to Make a Mobile Web Application.

UNIT IV: **(12 Hrs)**

Mobile 2.0**:** Mobile 2.0. Mobile Web Development**:** Web Standards -Designing for Multiple Mobile Browsers –Device Plans -Markup - CSS: Cascading Style Sheets- JavaScript. iPhone Web Apps: Markup- CSS- JavaScript- Creating a Mobile Web App- Web Apps As Native Apps -PhoneGap -Tools and Libraries.

UNIT V: **(12 Hrs)**

Adapting to Devices**:** Strategy #1: Do Nothing- Strategy #2: Progressive Enhancement- Strategy #3: Device Targeting- Strategy #4: Full Adaptation- What Domain Do I Use. Making Money in Mobile: Working with Operators- Working with an App Store- Add Advertising- Invent a New Model. Supporting Devices: Having a Device Plan- Device Testing- Desktop Testing- Usability

TEXT BOOK

1. ***Mobile Design and Development: Practical concepts and techniques for creating mobile sites and web apps,*** Brian Fling, 1st Edition, O'Reilly Publications, 2018.
   Chapters: 1-15

REFERENCE BOOKS

1. *Designing Mobile Interfaces: Patterns for Interaction Design,* Steven Hoober, Eric Berkman, 1st Edition,O'Reilly Publications, 2012.
2. ***Mobile Design Pattern Gallery: UI Patterns for Smartphone Apps,*** Theresa Neil, 2nd Edition, O'Reilly Publications, 2014.
3. ***Android user interface design ,****Lan G.Clifton 2nd Edition,Pearson Publication 2016*
4. ***Beginning Android 4 Application Development***
   *Wei-Meng Lee Authorized reprint by wiley india pvt.*ltd, 2016
5. ***Android Application Development(With Kitkat Support) Black Book***
   DT Editiorial Services &Pradeep Kothari Published By Dreamtech Press 2017

I M.Sc. Computer Science

SEMESTER –II

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG2B8	Mobile Application Development Using Android Studio	Lecture	4	4

COURSE DESCRIPTION

The primary goals will be design the next generation of mobile website, apps and other mobile interfaces across multiple platform such as IOS, android, windows and mobile web.

COURSE OBJECTIVES

- Develop a grasp of the android OS architecture.
- Understand the application development lifecycle.
- Identify ,analyze and choose tools for android development including device emulator, profiling tools and IDE

UNIT I - WIRELESS COMMUNICATION FUNDAMENTALS (12 Hrs)

Introduction – Wireless transmission – Signal Propagation – Multiplexing

UNIT II - TELECOMMUNICATION NETWORKS&SATELLITE SYSTEMS (12 Hrs)

Telecommunications Systems: GSM: Mobile Services, System Architecture.
Satellite Systems: Basics (GEO,LEO,MEO) – Routing – Localization – Handover

UNIT III - MOBILE NETWORK & TRANSPORT LAYERS (12 Hrs)

Mobile IP : Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse Tunneling.
Mobile Transport Layer : Traditional TCP – Classical TCP improvements

UNIT IV : MOBILE APPLICATION DEVELOPMENT (12 Hrs)

Application Design : The Screen Layout and the main.xml File - Component IDs - A Few Simple Controls - Creating and Configuring an Android Emulator - Communicating with the Emulator

Controls and User Interface : Check Boxes - Radio Buttons - The Spinner DatePicker - Follow-Up - Key Classes Used in the controls

UNIT V : MULTISCREEEN APPLICATIONS & WORKING WITH IMAGES (12 Hrs)

Multiscreen Applications : Stretching the Screen - Pop-Up Dialog Boxes and Toasts - Menus on the Android Device - Follow-Up. - Key Classes Used in Multiscreen Applications

Working with Images : Displaying Images, Using Images Stored on the Android Device, Follow-Up, Key Classes Used in working with images

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT I : Signal Propagation

UNIT II : Basics (GEO,LEO,MEO)

UNIT III : Key Classes Used in the controls

UNIT IV : Key Classes Used in working with images

TEXT BOOK:

1. Mobile Communications, Jochen Schiller, 2nd Edition, PHI/Pearson Education, 2003.

Unit I: Chapters :1.1, 2.1 – 2.5 (Page No. : 1 -9, 25-46)

Unit II : Chapters: 4.1.1 4.1.2 , 5.3, 5.4, 5.5, 5.6 (Page No. : 96 -105)

Unit III: Chapters: 8.1.1 – 8.1.8 , 9.1,9.2 (Page No. : 303 – 323, 351 - 366)

2. Android Application Development for Java Programmers, JamesC.Sheusi, CourseTechnology PTR

UNIT IV: Chapter 3, 4

UNIT V : Chapter : 7, 8

REFERENCES:

1. Wireless Networks, Client Smith & Daniel Collins, 3rd Edition, McGraw Hill Publication, 2014.
2. Wireless Communications and Networks, William Stallings, PHI/Pearson Education, 2002.
3. Principles of Wireless Networks, Kaveh Pahlavan, Prasanth Krishnamoorthy, PHI/Pearson Education, 2003.
4. Mobile Design and Development: Practical concepts and techniques for creating mobile sites and web apps, Brian Fling, 1st Edition, O'Reilly Publications, 2018.
5. Beginning Android 4 Application Development, Wei-Meng Lee Authorized reprint by wileyindiapvt.ltd, 2016 .
6. Android Application Development(With Kitkat Support) Black Book , DT Editiorial Services &Pradeep Kothari Published By Dreamtech Press 2017

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Design scripts to meet given interface and media control requirements
CO 2	Utilize variables, properties and other code elements appropriately to implement the code design
CO 3	Implement and evaluate techniques for the installation of mobile applications
CO 4	Explain the principles of technologies which support media production and delivery on a variety of platforms
CO 5	Evaluate alternative mobile frameworks, and contrast different programming platforms

2019 – 2020

OLD

I M.Sc. Computer Science - II SEMESTER

MAJOR CORE

19PG2B9 – DESIGN AND ANALYSIS OF ALGORITHMS

HRS/WEEK: 4 **CREDITS: 4**

COURSE OUTCOMES

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

CO1: Analyze the time and space complexity of given Algorithms.
CO2: Demonstrate operations like searching, insertion, and deletion on various data structures.
CO3: Identify appropriate sorting/searching technique for given problem.
CO4: Apply the dynamic programming technique to solve the problems.
CO5: Discuss advanced tree and graph applications.

SYLLABUS

UNIT I : **(12 hrs)**

Introduction: Definition – Algorithm Specification – Performance Analysis – Space Complexity – Time Complexity – Amortized Complexity – Asymptotic Notation - Randomized Algorithms – Basics of Probability Theory – Randomized Algorithms: An Informal Description

UNIT II : **(12 hrs)**

Elementary Data Structures: Stacks And Queues – Trees - Binary Trees– Dictionaries - Binary Search Trees– Priority Queues – Heaps – Heapsort – Sets and Disjoint Set Union - Graphs – Introduction – Definitions – Graph Representations

UNIT III : **(12 hrs)**

Divide And Conquer: General Method – Binary Search – Finding the Maximum and Minimum – Merge Sort. Greedy Method: The General Method – Container Loading – Knapsack Problem – Minimum Cost Spanning Trees.

UNIT IV : **(12 hrs)**

Dynamic Programming: The General Method – Multistage Graphs – All Pairs Shortest Paths – Single-Source Shortest Paths: General Weights – Optimal Binary Search Trees – 0/1-Knapsack – The Traveling Salesperson Problem.

UNIT V : **(12 hrs)**

Backtracking: The General Method – The 8 Queens Problem – Graph Coloring. NP-Hard and NP-Complete Problems: Basic Concepts – NP-Hard Graph Problems – Clique Decision Problem – Node Cover Decision Problem, Chromatic Number Decision Problem, Directed Hamiltonian Cycle - Travelling Salesperson Decision Problem – AND/OR Graph Decision Problem.

TEXT BOOK

Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran, 2nd Edition, University Press, 2017.

Chapters: 1.1,1.2,1.3.1 – 1.3.4, 1.4.1, 1.4.2, 2, 3.1,3.3 – 3.5, 4.1 – 4.3, 4.6, 5.1 – 5.5, 5.7, 5.9, 7.1, 7.2, 7.4, 11.1, 11.3

REFERENCE BOOKS

1. ***Design and Analysis of Algorithms***, Prabhakar Gupta, Vineet Agarwal, Manish Varshney, Phi learning Pvt.Ltd, New Delhi, 2012.
2. ***Algorithm and Data Structures***, Levitin, Anany, 2nd Edition , Pearson Publication, Delhi, 2013.
3. ***Algorithm and Data Structures***, M. M. Raghuwanshi, Narosha Publishing House, 2016.

5%

I M.Sc. Computer Science

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG2B9	Design and Analysis of Algorithms	Lecture	4	4

COURSE DESCRIPTION

This course explains many algorithms and how to solve various problems using same or different kind of algorithms with efficient manner.

COURSE OBJECTIVES

- To stress the importance of the efficiency in writing programs
- To write algorithms efficient in terms of design and time complexity

UNIT I : INTRODUCTION (12 hrs)

Introduction: Definition – Algorithm Specification – Performance Analysis – Space Complexity – Time Complexity – Amortized Complexity – Asymptotic Notation - Randomized Algorithms – Basics of Probability Theory – Randomized Algorithms: An Informal Description

UNIT II : DATA STRUCTURES (12 hrs)

Elementary Data Structures: Stacks And Queues – Trees - Binary Trees– Dictionaries - Binary Search Trees– Priority Queues – Heaps – Heapsort – Sets and Disjoint Set Union - Graphs – Introduction – Definitions – Graph Representations

UNIT III : DIVIDE AND CONQUER (12 hrs)

Divide And Conquer: General Method – Binary Search – Finding the Maximum and Minimum – Merge Sort. Greedy Method: The General Method – Container Loading – Knapsack Problem – Minimum Cost Spanning Trees.

UNIT IV : DYNAMIC PROGRAMMING (12 hrs)

Dynamic Programming: The General Method – Multistage Graphs – All Pairs Shortest Paths – Single-Source Shortest Paths: General Weights – Optimal Binary Search Trees – 0/1-Knapsack – The Traveling Salesperson Problem.

UNIT V : BACKTRACKING **(12 hrs)**

Backtracking: The General Method – The 8 Queens Problem – Graph Coloring. NP-Hard and NP-Complete Problems: Basic Concepts – NP-Hard Graph Problems – Clique Decision Problem – Node Cover Decision Problem, Chromatic Number Decision Problem, Directed Hamiltonian Cycle - Travelling Salesperson Decision Problem – AND/OR Graph Decision Problem.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT II

TEXT BOOK

Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni&Sanguthevar Rajasekaran,2nd Edition, University Press, 2017.

Chapters: 1.1,1.2,1.3.1 – 1.3.4, 1.4.1, 1.4.2, 2, 3.1,3.3 – 3.5, 4.1 – 4.3, 4.6, 5.1 – 5.5, 5.7, 5.9, 7.1, 7.2, 7.4, 11.1, 11.3

REFERENCES:

1. ***Design and Analysis of Algorithms***, Prabhakar Gupta, Vineet Agarwal, Manish Varshney, Phi learning Pvt.Ltd, New Delhi, 2012.
2. ***Algorithm and Data Structures***, Levitin, Anany, 2nd Edition, Pearson Publication, Delhi, 2013.
3. ***Algorithm and Data Structures***, M. M. Raghuwanshi, Narosha Publishing House, 2016.

COURSE OUTCOMES (CO)

NO.	COURSE OUTCOMES
CO 1	Analyze the time and space complexity of given Algorithms.
CO 2	Demonstrate operations like searching, insertion, and deletion on various data structures.
CO 3	Identify appropriate sorting/searching technique for given problem.
CO 4	Apply the dynamic programming technique to solve the problems.
CO 5	Discuss advanced tree and graph applications.

2019 – 2020

I M.Sc. Computer Science - II SEMESTER OLD

MAJOR ELECTIVE

19PG2BE1 – COMPUTATIONAL INTELLIGENCE

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Demonstrate the fundamental concepts of soft computing and its applications.

CO2: Explain the concepts of fuzzy sets, knowledge representation using fuzzy rules, and other machine intelligence applications of fuzzy logic.

CO3: Discuss the basics of an evolutionary computing

CO4: Explain genetic algorithms for practical problems.

CO5: Discuss the performance of granular computing in solving specific problems.

SYLLABUS

UNIT I : An Introduction to Computational Intelligence **(15 Hrs)**

Artificial Intelligence – a brief Review, Pitfalls of the Traditional AI, Computational Intelligence- an Emergence of a New Computational Paradigm, Computational Intelligence- a Formal Definition, Soft computing- Definitions, Fundamental Elements of Soft Computing, Computational Learning Theory, Synergism in Soft Computing.

UNIT II : Fuzzy Sets and Relations **(15 Hrs)**

Conventional Sets, Fuzzy Sets, Membership Functions, Continuous and Discrete Membership Functions, Typical Membership Functions, Operations on Fuzzy Sets, Basic Concepts Associated with Fuzzy Sets, Extension Principle of Fuzzy Sets, Fuzzy Relations, Projection of Fuzzy Relations, Fuzzy Pattern Recognition-Introduction, The Fuzzy C-Means Clustering Algorithm, Image Segmentation Using Fuzzy C-Means.

UNIT III : Introduction to Machine Learning Using Neural Nets **(15 Hrs)**

Biological Neural Networks, Artificial Neural Networks, Principles of Learning in a Neural Net, Stability and Convergence, Three Important Theorems for Stability Analysis of Neural Dynamics, Supervised Neural Learning Algorithms-Introduction, McCulloch-Pitts Model, The Perceptron Learning Model, Unsupervised Neural Learning Algorithms-Introduction, Discrete Hopfield Network, Continuous Hopfield Neural Net.

UNIT IV: Evolutionary Computing Algorithms **(15 Hrs)**

Introduction – Genetic algorithm: How does it work? – Deterministic explanation of Holland's observation – Stochastic Explanation of GA – The Markov model for convergence analysis – Application of GA in optimization problems – Application of GA in machine learning – Application of Gain intelligent search – Genetic Programming – Conclusions.

UNIT V : Emerging areas of computational intelligence **(15 Hrs)**

Introduction – Artificial life – particle Swarm optimization – Fuzzy Chaos theory – Rough sets – Granular computing.

TEXT BOOK

Computational Intelligence Principles, Techniques and Applications, Amit Konar, Springer, 2007.
Chapters: 1, 2.1 – 2.10, 5.1 – 5.3, 7, 8.1 – 8.3, 9.1, 9.2.1, 9.2.2, 12, 22.1 – 22.3, 22.5 – 22.7

REFERENCE BOOKS

1. ***Genetic Algorithms in Search, Optimization, and Machine Learning***, D. E.Goldberg, Addison-Wesley, Reading, 1989.
2. ***Introduction to Machine Learning***, E. Alpaydin, Prentice-Hall of India, 2004.
3. ***Computational Intelligence: Principles, Techniques and Applications***, Amit Konar, Springer, 2005.
3. ***First Course on Fuzzy Theory and Applications***, K.H. Lee, Springer, 2005
4. ***Computational Intelligence: An Introduction***, Andries P. Engelbrecht, John Wiley and Sons, 2007.
5. ***Computational Intelligence: Methods and Techniques***, Leszek Rutkowski, Springer 2008.

5%

I M.Sc. Computer Science

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG2BE1	Computational Intelligence	Lecture	5	5

COURSE DESCRIPTION

The expression computational intelligence usually refers to the ability of a computer to learn a specific task from data or experimental observation.

COURSE OBJECTIVES

- Throws light on all categories of Evolutionary Computing
- To motivate to pursue research

SYLLABUS

UNIT I : INTRODUCTION (15 Hrs)

Artificial Intelligence – a brief Review, Pitfalls of the Traditional AI, Computational Intelligence- an Emergence of a New Computational Paradigm, Computational Intelligence- a Formal Definition, Soft computing- Definitions, Fundamental Elements of Soft Computing, Computational Learning Theory, Synergism in Softcomputing.

UNIT II : FUZZY SETS AND RELATIONS (15 Hrs)

Conventional Sets, Fuzzy Sets, Membership Functions, Continuous and Discrete Membership Functions, Typical Membership Functions, Operations on Fuzzy Sets, Basic Concepts Associated with Fuzzy Sets, Extension Principle of Fuzzy Sets, Fuzzy Relations, Projection of Fuzzy Relations, Fuzzy Pattern Recognition-Introduction, The Fuzzy C-Means Clustering Algorithm, Image Segmentation Using Fuzzy C-Means.

UNIT III : MACHINE LEARNING USING NEURAL NETS (15 Hrs)

Biological Neural Networks, Artificial Neural Networks, Principles of Learning in a Neural Net, Stability and Convergence, Three Important Theorems for Stability Analysis of Neural Dynamics, Supervised Neural Learning Algorithms-Introduction, McCulloch-Pitts Model, The Perceptron Learning Model, Unsupervised Neural Learning Algorithms-Introduction, Discrete Hopfield Network, Continuous Hopfield Neural Net.

UNIT IV: EVOLUTIONARY COMPUTING ALGORITHMS (15 Hrs)

Introduction – Genetic algorithm: How does it work? – Deterministic explanation of Holland's observation – Stochastic Explanation of GA – The Markov model for convergence analysis – Application of GA in optimization problems – Application of GA in machine learning – Application of Gain intelligent search – Genetic Programming – Conclusions.

UNIT V : EMERGING AREAS OF COMPUTATIONAL INTELLIGENCE (15 Hrs)

Introduction – Artificial life – particle Swarm optimization – Fuzzy Chaos theory – Rough sets – Granular computing.

SELF STUDY : DYNAMISM: (For CIA Only)

UNIT I : Computational Learning Theory, Synergism in Softcomputing.
UNIT II: Fuzzy Pattern Recognition-Introduction, The Fuzzy C-Means Clustering Algorithm, Image Segmentation Using Fuzzy C-Means.
UNIT III: McCulloch-Pitts Model, The Perceptron Learning Model
UNIT IV: Application of GA in optimization problems – Application of GA in machine learning – Application of Gain intelligent search
UNIT V: Artificial life

TEXT BOOK

Computational Intelligence Principles, Techniques and Applications, Amit Konar, Springer, 2007.

Chapters: 1, 2.1 – 2.10, 5.1 – 5.3, 7, 8.1 – 8.3, 9.1, 9.2.1, 9.2.2, 12, 22.1 – 22.3, 22.5 – 22.7

REFERENCE BOOKS

1. ***Genetic Algorithms in Search, Optimization, and Machine Learning***, D. E.Goldberg, Addison-Wesley, Reading, 1989.
2. ***Introduction to Machine Learning***, E. Alpaydin, Prentice-Hall of India, 2004.
3. ***Computational Intelligence: Principles, Techniques and Applications***,AmitKonar, Springer, 2005.
4. ***First Course on Fuzzy Theory and Applications***, K.H. Lee, Springer, 2005
5. ***Computational Intelligence: An Introduction***,Andries P. Engelbrecht, John Wiley and Sons, 2007.

6. ***Computational Intelligence: Methods and Techniques***,Leszek Rutkowski, Springer 2008.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Demonstrate the fundamental concepts of soft computing and its applications.
CO 2	Explain the concepts of fuzzy sets, knowledge representation using fuzzy rules, and other machine intelligence applications of fuzzy logic
CO 3	Discuss the basics of an evolutionary computing
CO 4	Analyze the concept of fuzzy sets, knowledge representation using fuzzy rules, and other machine intelligence applications of fuzzy logic
CO 5	Understand the basics of an evolutionary computing paradigm.

OLD

2019 - 2020
I M.Sc. Computer Science - II SEMESTER
MAJOR ELECTIVE
19PG2BE2 – NEURAL NETWORKS

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Explain the basic concepts of Neural Networks.
CO2: Describe the various Neural Network models.
CO3: Explain Learning Rules of Neural Network
CO4: Distinguish Feedback and Feed forward networks
CO5: Compare Special networks and discuss the applications of Neural Network.

SYLLABUS

UNIT I: Introduction to Neural Network and Artificial Neural Networks (15 Hrs)

Introduction to Neural Networks : Neural Process, Overview – The Rise of Neurocomputing
Introduction to Artificial Neural Networks : Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparision between the brain and the computer, Comparison between artificial and biological Neural Network, Basic Building blocks of Artificial Neural Networks, Artificial Neural Netowrk Terminologies.

UNIT II: Models of Artificial Neural Networks and Perceptron Networks (15 Hrs)

Fundamental Models of Artificial Neural Networks: Introduction, McCullach-Pitts Neuron Model, Learning Rules, Hebb Net. Perceptron Networks: Introduction, Single Layer Perceptron, Brief Introduction to Multilayer Perceptron Networks

UNIT III: Learning Rules (15 Hrs)

Associative Memory Networks : Introduction, Algorithm for Pattern Association, Hetero Associative Memory Neural Networks.

UNIT IV : Feedback and Feed forward Network (15 Hrs)

Feedback Networks: Introduction, Discrete HopFiled Net, Continuous Hoppfiled Net, Relation between BAM and Hopfiled Nets. Feed Forward Networks: Introduction, Back Propagation Network, Radial Basis Function Network, Training Algorithm for an RBFN with Fixed Centers.

UNIT V: Special Networks (15 Hrs)

Special Networks: Introduction, Probabilistic Neural Network, Cognitron, Neocognitron, Boltzman Machine, Boltzman Machine with Learning, Support Vector Machine.
Application of Neural Networks: Application of Neural Networks in Arts, Bioinformatics, Knowledge Extraction.

TEXT BOOK

Introduction to Neural Networks Using MATLAB 6.0, S N Sivanandam, S. Sumathi, S.N.Deepa, Published by Tata McGraw – Hill Publishing Company Limited, 2008.
Chapters: 1, 2 3, 4, 6 , 7, 8, 12.1 – 12.6, 12.13, 13.1 – 13.3

REFERENCE BOOKS

1. ***Neural Networks, Fuzzu Logic and Genetic Algorithms,*** S.RAjasekaran, G.A.Vijayalakshmi, PHP Learning Private Limited, Delhi, 2015**.**
2. ***Neural Networks and Fuzzy Systems, Bart Kosko,*** PHP Learning Private Limited, Delhi, 2012**.**
3. ***Neuro-Fuzzy and Soft Computing***, Jhh-shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, Bart Kosko, PHP Learning Private Limited, Delhi, 2012.

5%

I M.Sc. Computer Science

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG2BE2	Neural Networks	Lecture	5	5

COURSE DESCRIPTION

This Course provides a basic knowledge of how the human brain works and using that concept it explains different learning algorithms to processes the previously unseen situations with expected outputs even when the input is noisy, incomplete or inaccurate..

COURSE OBJECTIVES

- To understand the fundamentals of Neural Networks
- To apply various models and learning algorithms for the real world scenario

SYLLABUS

UNIT I: Introduction to Neural Network and Artificial Neural Networks (15 Hrs)

Introduction to Neural Networks : Neural Process, Overview – The Rise of Neurocomputing

Introduction to Artificial Neural Networks : Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison between the brain and the computer, Comparison between artificial and biological Neural Network, Basic Building blocks of Artificial Neural Networks, Artificial Neural Network Terminologies.

UNIT II: Models of Artificial Neural Networks and Perceptron Networks (15 Hrs)

Fundamental Models of Artificial Neural Networks: Introduction, McCullach-Pitts Neuron Model, Learning Rules, Hebb Net. Perceptron Networks: Introduction, Single Layer Perceptron, Brief Introduction to Multilayer Perceptron Networks

UNIT III: Learning Rules (15 Hrs)

Associative Memory Networks : Introduction, Algorithm for Pattern Association, Hetero Associative Memory Neural Networks, Auto Associative Memory Network, Bi-directional Associative Memory.

UNIT IV : Feedback and Feed forward Network (15 Hrs)

Feedback Networks: Introduction, Discrete HopFiled Net, Continuous Hoppfiled Net, Relation between BAM and Hopfiled Nets. Feed Forward Networks: Introduction, Back Propagation Network.

UNIT V: Special Networks (15 Hrs)

Special Networks: Introduction, Probabilistic Neural Network, Cognitron, Neocognitron, Boltzman Machine, Boltzman Machine with Learning, Support Vector Machine.

Application of Neural Networks: Application of Neural Networks in Arts, Bioinformatics, Knowledge Extraction.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT V

TEXT BOOK

Introduction to Neural Networks Using MATLAB 6.0, S N Sivanandam, S.Sumathi, S.N.Deepa, Published by Tata McGraw – Hill Publishing Company Limited, 2008.

Chapters: 1, 2 3, 4, 6 , 7, 8.1-8.2, 12.1 – 12.6, 12.13, 13.1 – 13.3

REFERENCES:

1.***Neural Networks, Fuzzu Logic and Genetic Algorithms,***S.RAjasekaran, G.A.Vijayalakshmi, PHP Learning Private Limited, Delhi, 2015**.**

2. ***Neural Networks and Fuzzy Systems, Bart Kosko,*** PHP Learning Private Limited, Delhi, 2012**.**

3. ***Neuro-Fuzzy and Soft Computing***, Jhh-shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, Bart Kosko, PHP Learning Private Limited, Delhi, 2012.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Explain the basic concepts of Neural Networks.
CO 2	Describe the various Neural Network models
CO 3	Analyze Learning Rules of Neural Network to apply
CO 4	Distinguish Feedback and Feed forward networks
CO 5	Compare Special networks and discuss the applications of Neural Network.

2019 - 2020
I M.Sc. Computer Science - II SEMESTER
MAJOR ELECTIVE
19PG2BE3 – SOFTWARE TESTING

OLD

HRS/WEEK : 5 **CREDITS : 5**

COURSE OUTCOMES

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

CO1: Discuss various software application domains and different process model used in software development.

CO2: Demonstrate the basics of software quality assurance and defect prevention.

CO3: Compare different testing strategies and tactics.

CO4: Describe the software testing techniques in different environments.

CO5: Explain high performance testing using Jmeter.

SYLLABUS

UNIT I: Software Quality In Global Business Context **(15 Hrs)**

Introduction, Quality Attributes, Quality Challenges in Globally Outsources Business, importance of Quality as a Business Driver, Understanding Life cycle Models, Object Oriented Life cycle Models, Choosing the right type of Life cycle model for software project.

UNIT II: SQA Role In An Organization **(15 Hrs)**

Introduction, Understanding the SQA function. Managing SQA Operations **:** SQA : Organizational Level Initiatives, Defect Prevention, Quality Assurance – Important Dimensions for the QA Analyst.

UNIT III: Testing For Quality Validation **(15 Hrs)**

Introduction , The Purpose of Testing , Testing is not same as Inspection and Audit, Testing is not the same as Debugging , The Testing Life Cycle, Roles and Responsibilities in Testing, Test Artefacts, The Test Plan and Test Techniques.

UNIT IV: Testing Models And Techniques **(15 Hrs)**

Testing Phases with the V-Model and W-Model – Testing Techniques – Risk-based Approach to Testing – Test Process Automation and Test Tool Selection.

UNIT V : Testing Tools **(15 Hrs)**

Load Runner – Overview of LoadRunner – Creating Vuser script using Virtual User Generator – Creating Virtual Users Using Loadrunner Controller – JMeter – JMeter Overview – JDBC Test – HTTP Test.

TEXT BOOKS

1. ***Software Quality Assurance : Principles and Practice for the New Paradigm,*** N.S.Godbole, 2nd Edition, Narosa Publishing House, 2017.
   Chapters: 1, 2.1, 2.5, 4.4 - 4.6, 6.1 - 6.12
2. ***Software Testing Tools,*** Dr.K.V.K.K.Prasad, Published by Dreamtech Press, Edition, 2012.
   Chapters : 7 , 8

REFERENCE BOOKS

1. ***Software Quality and Testing: A Concise Study,*** S. A. Kelkar, 3rd Edition, PHI Learning, 2012.
2. ***Software Testing - Principles, Techniques and Tools,*** M.G. Limaye, Tata McGraw-Hill Education Private Ltd., 2017.

NEW

I M.Sc. Computer Science

SEMESTER –II

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	**19PG2BE3**	**SOFTWARE TESTING**	Lecture	5	5

COURSE DESCRIPTION

To study fundamental concepts in software testing, planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.

COURSE OBJECTIVES

- To give strong foundation in software quality assurance by teaching standards, models and measurement techniques.
- To enhance the knowledge of the students to provide innovative solutions to various quality assurances related problems.

SYLLABUS

UNIT I:SOFTWARE QUALITY IN GLOBAL BUSINESS CONTEXT (15 Hrs)

Introduction, Quality Attributes, Quality Challenges in Globally Outsources Business, importance of Quality as a Business Driver, Understanding Life cycle Models, Object Oriented Life cycle Models, Choosing the right type of Life cycle model for software project.

UNIT II: SQA ROLE IN AN ORGANIZATION (15 Hrs)

Introduction, Understanding the SQA function. Managing SQA Operations **:**SQA : Organizational Level Initiatives, Defect Prevention, Quality Assurance – Important Dimensions for the QA Analyst.

UNIT III: TESTING FOR QUALITY VALIDATION (15 Hrs)

Introduction , The Purpose of Testing , Testing is not same as Inspection and Audit, Testing is not the same as Debugging , The Testing Life Cycle, Roles and Responsibilities in Testing, Test Artefacts, The Test Plan and Test Techniques.

UNIT IV: TESTING MODELS AND TECHNIQUES (15 Hrs)

Testing Phases with the V-Model and W-Model – Testing Techniques – Risk-based Approach to Testing – Test Process Automation and Test Tool Selection.

UNIT V :TESTING TOOLS (15 Hrs)

Load Runner – Overview of LoadRunner – Creating Vuser script using Virtual User Generator – Creating Virtual Users Using Loadrunner Controller – JMeter – JMeter Overview – JDBC Test – HTTP Test.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT 5

TEXT BOOKS

1. ***Software Quality Assurance : Principles and Practice for the New Paradigm,***N.S.Godbole, 2nd Edition, Narosa Publishing House, 2017.
Chapters: 1, 2.1, 2.5, 4.4 - 4.6, 6.1 - 6.12
2. ***Software Testing Tools,*** Dr.K.V.K.K.Prasad, Published by Dreamtech Press, Edition, 2012. Chapters : 7 , 8

REFERENCES:

1. ***Software Quality and Testing: A Concise Study,*** S. A. Kelkar, 3rd Edition, PHI Learning, 2012.
2. ***Software Testing - Principles, Techniques and Tools,*** M.G. Limaye, Tata McGraw-Hill Education Private Ltd., 2017.

COURSE OUTCOMES (CO)

NO.	COURSE OUTCOMES
CO 1	Discuss various software application domains and different process model used in software development.
CO 2	Demonstrate the basics of software quality assurance and defect prevention.
CO 3	Compare different testing strategies and tactics.
CO 4	Describe the software testing techniques in different environments.
CO 5	Explain high performance testing using Jmeter.

2019 – 2020

OLD

I M.Sc. Computer Science - II SEMESTER

MAJOR ELECTIVE

19PG2BE4 – EMBEDDED SYSTEMS

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Explain the concepts of embedded systems
CO2: Analyze the architecture of embedded systems
CO3: Describe about the processors and memory organization
CO4: Distinguish when and where to apply embedded concepts
CO5: Describe different embedded system design technologies

SYLLABUS

UNIT I : Introduction **(15 Hrs)**

Embedded System-Design Goals For Embedded Software-Real Time –Multitasking-Embedded Processors-Programming Languages-Real Time Kernel – Building an Embedded Application Unique. Data Representation: Fixed –Precision Binary Numbers-Integers-Real Numbers,-ASCII Representation of Text-Binary –Coded Decimal (BCD).

UNIT II: Getting the most out of C **(15 Hrs)**

Integer data types-mixing data types-manipulating bits in memory-manipulating bit in I/O ports-Accessing Memory mapped I/O Devices-structures-variant Access. A programmers view of computer organization: Memory –the central processing unit(CPU)-Input/output(I/O) - Intel architecture.

UNIT III: Mixing C and Assembly **(15 Hrs)**

Programming in Assembly-Register Usage Conventions-Typical Use of Addressing Options-Instruction Sequencing-Procedure Call and Return- Parameter Passing-Retrieving Parameters- Everything is Pass by Value-Temporary Variables.Input/Output Programming: The Intel I/O Instructions-Interrupt –Driven I/O.

UNIT IV: Concurrent Software **(15 Hrs)**

Foreground/Background Systems-Multithreaded Programming-Shared Resources And Critical Sections Scheduling: Thread States-Pending Threads-Context Switching-Round robin Scheduling-Priority –Based Scheduling- Assigning Priorities-Deadlock.

UNIT V: Memory Management **(15 Hrs)**

Object in C-Scope-Lifetime -Automatic Allocation-Static Allocation –Dynamic Allocation-Recursive Functions and Memory Allocation Problems. Shared Memory: Recognizing Shared Objects-Reentrant Functions.

TEXT BOOK:

Fundamentals of Embedded Software: Where C and Assembly Meet, Daniel W.Lewis, PHI Learning Pvt. Ltd, 2011.
Chapter 1,2,3,4,5,6,7,8,9

REFERENCE BOOKS:

1. ***Making Embedded Systems***, O.Relly Elecia White, 2011.
2. ***Embedded Systems:Architecture, Programming And Design***, Raj Kamal, 2011.
3. ***Embedded System Design,*** Santanu Chattopadhyay, 2013.

NEW

I M.Sc. Computer Science

SEMESTER –II

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG2BE4	Embedded Systems	Lecture	5	5

COURSE DESCRIPTION

This Course gives fundamental requirements of embedded systems and the interaction between hardware and software in those systems. And explain the basic steps of hardware design and issues of real time embedded system.

COURSE OBJECTIVES

- To create interest in low level system programming
- To help students venture in to embedded designing concepts

SYLLABUS

UNIT I :INTRODUCTION (15 Hrs)

Embedded System-Design Goals For Embedded Software-Real Time – Multitasking-Embedded Processors- Programming Languages-Real Time Kernel – Building an Embedded Application Unique. Data Representation: Fixed – Precision Binary Numbers-Integers-Real Numbers,-ASCII Representation of Text-Binary –Coded Decimal (BCD).

UNIT II:GETTING THE MOST OUT OF C (15 Hrs)

Integer data types-mixing data types-manipulating bits in memory-manipulating bit in I/O ports-Accessing Memory mapped I/O Devices-structures-variant Access. A programmers view of computer organization: Memory –the central processing unit(CPU)-Input/output(I/O) - Intel architecture.

UNIT III:MIXING C AND ASSEMBLY (15 Hrs)

Programming in Assembly-Register Usage Conventions-Typical Use of Addressing Options-Instruction Sequencing-Procedure Call and Return- Parameter Passing-Retrieving Parameters- Everything is Pass by Value-Temporary Variables.Input/Output Programming: The Intel I/O Instructions-Interrupt – Driven I/O.

UNIT IV:CONCURRENT SOFTWARE (15 Hrs)

Foreground/Background Systems-Multithreaded Programming-Shared Resources And Critical Sections Scheduling: Thread States-Pending Threads-Context Switching-Round robin Scheduling-Priority –Based Scheduling- Assigning Priorities-Deadlock.

UNIT V:MEMORY MANAGEMENT (15 Hrs)

Object in C-Scope-Lifetime -Automatic Allocation-Static Allocation –Dynamic Allocation-Recursive Functions and Memory Allocation Problems. Shared Memory: Recognizing Shared Objects-Reentrant Functions.

SELF STUDY : DYNAMISM: (For CIA Only)

UNIT I :Data Representation: Fixed –Precision Binary Numbers-Integers-Real Numbers,-ASCII Representation of Text-Binary –Coded Decimal (BCD).
UNIT II: Intel architecture.
UNIT III: The Intel I/O Instructions-Interrupt –Driven I/O
UNIT IV: Deadlock.
UNIT V**:** Shared Memory: Recognizing Shared Objects-Reentrant Functions.

TEXT BOOK

Fundamentals of Embedded Software: Where C and Assembly Meet, Daniel W.Lewis, PHI Learning Pvt. Ltd, 2011.
Chapter 1,2,3,4,5,6,7,8,9

REFERENCES:

1. ***Making Embedded Systems***, O.RellyElecia White, 2011.
2. ***Embedded Systems:Architecture, Programming And Design***, Raj Kamal, 2011.
3. ***Embedded System Design,***Santanu Chattopadhyay, 2013.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Explain the concepts of embedded systems
CO 2	Analyze the architecture of embedded systems
CO 3	Describe about the processors and memory organization
CO 4	Distinguish when and where to apply embedded concepts
CO 5	Describe different embedded system design technologies

2019 - 2020
II M.Sc. Computer Science - III SEMESTER
MAJOR CORE
PG3B12 – DIGITAL IMAGE PROCESSING

OLD

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Explain the representation of digital image and its manipulations
CO2: Analyze image sampling and quantization requirements and implications
CO3: Describe various Transformation and Filtering Techniques
CO4: Demonstrate Restoration And Reconstruction models
CO5: Utilize Image Compression And Segmentation for efficient storage

SYLLABUS

UNIT I : Introduction **(15 Hrs)**

Introduction- What is Digital Image Processing- The Origins of Digital Image Processing – Examples of Fields that Use Digital Image Processing – Fundamental Steps in Digital Image Processing – Components of an Image Processing System.

UNIT II : Digital Image Fundamentals **(15 Hrs)**

Elements of Visual Perception – Light and the Electromagnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – image interpolation - Some Basic Relationships between Pixels – An Introduction to the Mathematical Tools Used in Digital Image Processing.

UNIT III: Intensity Transformations And Spatial Filtering **(15 Hrs)**

Background-Some Basic Intensity Transformation Functions - Histogram Processing – Fundamentals of Spatial Filtering – Smoothing Spatial Filters – Sharpening Spatial Filters – Combining Spatial Enhancement Methods.

UNIT IV: Image Restoration And Reconstruction **(15 Hrs)**

A Model of the Image Degradation/Restoration Process-Noise Models - Restoration in the Presence of Noise Only-Spatial Filtering. **Color Image Processing:** Color Fundamentals – Color Models

UNIT V: Image Compression And Segmentation **(15 Hrs)**

Fundamentals – Huffman coding – Golomb coding- Arithmetic coding – LZW coding- Runlength coding - Segmentation Fundamentals - Point, Line and Edge Detection.

TEXT BOOK

Digital Image Processing, Rafael.C.Gonzalez and Richard E.Woods, 3rd Edition, Pearson Publications, 2014.
Chapters: 1, 2, 3.1 – 3.7, 5.1 – 5.3, 6.1, 6.2, 8.1 - 8.2.5, 10.1, 10.2

REFERENCE BOOKS

1. ***Fundamentals of Digital image processing***, Anil Jain, PHI Learning Pvt Ltd. 2011.
2. ***Digital Image Processing & Analysis***, B.Chanda, D.Dutta Majumder, 2nd Edition, PHI Learning Pvt Ltd. 2013.
3. ***Digital Image Processing***, Chaturvedi, 1st Edition, Vayu Educaton India Publisher, 2013.
4. ***Digital Image Processing: Principles and Applications***, Wilhelm **Burger and Mark J. Burge,** 2nd Edition, Springer, 2016.

I M.Sc. Computer Science

SEMESTER –III

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSCS	19PG3B12	Digital Image Processing	Lecture	5	5

COURSE DESCRIPTION

The course helps to create interest in image processing techniques and infuse research thirst in this area

COURSE OBJECTIVES

- To inculcate ideas and create interest in processing images techniques.
- To provide a research orientation inducing them to pursue research.

SYLLABUS

UNIT I : INTRODUCTION (15 Hrs)

Introduction- What is Digital Image Processing- The Origins of Digital Image Processing – Examples of Fields that Use Digital Image Processing – Fundamental Steps in Digital Image Processing – Components of an Image Processing System.

UNIT II : DIGITAL IMAGE FUNDAMENTALS (15 Hrs)

Elements of Visual Perception – Light and the Electromagnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – image interpolation - Some Basic Relationships between Pixels – An Introduction to the Mathematical Tools Used in Digital Image Processing.

UNIT III: INTENSITY TRANSFORMATIONS AND SPATIAL FILTERING (15 Hrs)

Background-Some Basic Intensity Transformation Functions - Histogram Processing – Fundamentals of Spatial Filtering – Smoothing Spatial Filters – Sharpening Spatial Filters – Combining Spatial Enhancement Methods.

UNIT IV: IMAGE RESTORATION AND RECONSTRUCTION (15 Hrs)

A Model of the Image Degradation/Restoration Process-Noise Models - Restoration in the Presence of Noise Only-Spatial Filtering. **Color Image Processing:** Color Fundamentals – Color Models

UNIT V: IMAGE COMPRESSION AND SEGMENTATION (15 Hrs)

Fundamentals – Huffman coding – Golomb coding- Arithmetic coding – LZW coding- Runlength coding - Segmentation Fundamentals - Point, Line and Edge Detection.

SELF STUDY : DYNAMISM: (For CIA Only)

UNIT I :Examples of Fields that Use Digital Image Processing

UNIT II : Elements of Visual Perception – Light and the Electromagnetic Spectrum

UNIT III: Combining Spatial Enhancement Methods.

UNIT IV :Color Models

UNIT V : Edge Detection

TEXT BOOK

Digital Image Processing, Rafael.C.Gonzalez and Richard E.Woods, 3rd Edition, Pearson Publications, 2014.

Chapters: 1, 2, 3.1 – 3.7, 5.1 – 5.3, 6.1, 6.2, 8.1 - 8.2.5, 10.1, 10.2

REFERENCES:

1. ***Fundamentals of Digital image processing***, Anil Jain, PHI Learning Pvt Ltd. 2011.
2. ***Digital Image Processing & Analysis***, B.Chanda, D.Dutta Majumder, 2nd Edition, PHI Learning Pvt Ltd. 2013.
3. ***Digital Image Processing***, Chaturvedi, 1st Edition, Vayu Educaton India Publisher, 2013.
4. ***Digital Image Processing: Principles and Applications***, Wilhelm **Burger and Mark J. Burge,** 2nd Edition, Springer, 2016.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Explain the representation of digital image and its manipulations
CO 2	Analyze image sampling and quantization requirements and implications
CO 3	Describe various Transformation and Filtering Techniques
CO 4	Demonstrate Restoration And Reconstruction models
CO 5	Utilize Image Compression And Segmentation for efficient storage

2019 – 2020 OLD

II M.Sc. Computer Science - III SEMESTER

MAJOR CORE

PG3B13 - DATA MINING AND DATA WAREHOUSING

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Explain the fundamental concept of Data Mining and analyze and evaluate the data cleaning, integration , transformation and reduction techniques.

CO2:Design multidimensional data using Data Warehouse architecture.

CO3:Design and evaluate Classification algorithms.

CO4:Identify the types of data in Cluster Analysis and categorize the Cluster Methods.

CO5: Utilize the Data Mining techniques in various real applications and in major issues

SYLLABUS

UNIT I: Introduction **(15 Hrs)**

Introduction to Data Mining-its importantance — Data Mining on what kind of Data- Data Mining Functionalities-What Kinds of Patterns Can Be Mined – Are All of the Patterns Interesting – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of Data Mining System with a Database or Data Warehouse System – Major Issues in Data Mining.

UNIT II: Data Preprocessing **(15 Hrs)**

Need to Preprocess the Data - Descriptive Data Summarization – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation. Data Warehouse and OLAP Technology : An Overview - What is a Data Warehouse – A Multidimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – From Data Warehousing to a Data Mining.

UNIT III: Classification and Prediction **(15 Hrs)**

Classification - Prediction – Issues Regarding Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification – Rule-Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification: Classification by Association Rule Analysis – Lazy Learners (or Learning from Your Neighbors) – Other Classification Methods.

UNIT IV: Cluster Analysis **(15 Hrs)**

What is Cluster Analysis – Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical Methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods.

UNIT V: Applications and Trends in Data Mining **(15 Hrs)**

Data Mining Applications – Data Mining System Products and Research Prototypes – Additional Themes on Data Mining – Social Impacts of Data Mining – Trends in Data Mining.

TEXT BOOK

Data Mining Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Morgan Kaufmann Publishers An Imprint of Elsevier, 2009.

Chapters: 1, 2, 3, 6.1 - 6.10, 7.1 – 7.8, 11

REFERENCE BOOKS

1. ***Data Mining Techniques and Applications: An Introduction,*** Hongbo DLL, Cengage Lmg Business Press, 2010.
2. ***Data Warehousing: Concepts, Techniques, Products and Applications***, 3rd Edition, PHI Learning, Delhi, 2012.
3. ***Data Mining & Data Warehousing***, Udit Agarwal, 1st Edition, S.K.Kataria & sons Publication, 2016.
4. ***Data Mining: Concepts and Techniques***, Jiawei Han, Micheline Kamber, 3rd Edition Morgan Kauffmann Publishers, 2011.

NEW

5%

II M.Sc. Computer Science

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG3B13	Data Mining And Data Warehousing	Lecture	5	5

COURSE DESCRIPTION

Data Mining and Data Warehousing consists of introduction about data mining, data pre-processing, mining frequent pattern, association, classification and cluster analysis and applications of data mining

COURSE OBJECTIVES

- To interpret the contribution of data mining and data warehousing to the decision support level of organizations
- To understand different models used for OLAP and data pre-processing
- To categorize and differentiate between situations for applying different data mining techniques: mining frequent pattern, association, classification and cluster analysis
- To utilize Data Mining techniques in various real applications

SYLLABUS

UNIT I: INTRODUCTION (15 Hrs)

Introduction to Data Mining-its importance — Data Mining on what kind of Data- Data Mining Functionalities-What Kinds of Patterns Can Be Mined – Are All of the Patterns Interesting – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of Data Mining System with a Database or Data Warehouse System – Major Issues in Data Mining.

UNIT II: DATA PREPROCESSING (15 Hrs)

Need to Pre-process the Data - Descriptive Data Summarization – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation. Data Warehouse and OLAP Technology : An Overview - What is a Data Warehouse – A Multidimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – From Data Warehousing to a Data Mining.

UNIT III: MINING FREQUENT PATTERNS AND CLASSIFICATION (15 Hrs)

Efficient and Scalable Frequent Itemset Mining Methods: The Apriori Algorithm : Finding Frequent Itemsets Using Candidate Generation- Generating Association Rules from Frequent Itemsets- Improving the Efficiency of Apriori – Mining Frequent Itemsets without Candidate Generation- Mining Frequent Itemsets Using Vertical Data Format – Mining Closed Frequent Itemsets. Classification - Prediction – Issues Regarding Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification – Rule-Based Classification – Classification by Back propagation – Support Vector Machines.

UNIT IV: CLUSTER ANALYSIS (15 Hrs)

What is Cluster Analysis – Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical Methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods.

UNIT V: APPLICATIONS AND TRENDS IN DATA MINING (15 Hrs)

Data Mining Applications – Data Mining System Products and Research Prototypes – Additional Themes on Data Mining – Social Impacts of Data Mining – Trends in Data Mining.

SELF STUDY: DYNAMISM: (For CIA Only)

UNIT I: Integration of Data Mining System with a Database or Data Warehouse System

UNIT II: A Multidimensional Data Model – Data Warehouse Architecture

UNIT IV: Grid-Based Methods – Model-Based Clustering Methods.

UNIT V: Data Mining System Products and Research Prototypes – Additional Themes on Data Mining

TEXT BOOK

Data Mining Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Morgan Kaufmann Publishers An Imprint of Elsevier, 2009.
Chapters:1, 2, 3, 5.2, 6.1 - 6.7, 7.1 – 7.8, 11

REFERENCES:

1. ***Data Mining Techniques and Applications: An Introduction,***Hongbo DLL, Cengage Lmg Business Press, 2010.
2. ***Data Warehousing: Concepts, Techniques, Products and Applications***, 3rd Edition, PHI Learning, Delhi, 2012.
3. ***Data Mining & Data Warehousing***, Udit Agarwal, 1st Edition, S.K.Kataria& sons Publication, 2016.
4. ***Data Mining: Concepts and Techniques***, Jiawei Han, Micheline Kamber, 3rd Edition Morgan Kauffmann Publishers, 2011.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Explain the fundamental concept of Data Mining andanalyze and evaluate the data cleaning, integration , transformation and reduction techniques
CO 2	Design multidimensional data using Data Warehouse architecture.
CO 3	Design and evaluate Classification algorithms
CO 4	Identify the types of data in Cluster Analysis and categorize the Cluster Methods
CO 5	Utilize the Data Mining techniques in various real applications and in major issues

2019 – 2020
II M.Sc. Computer Science - III SEMESTER
MAJOR ELECTIVE
PG3BE5 - MOBILE COMPUTING

OLD

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Explain the concept of the MAC layer and the components available within various telecommunication systems.

CO2: Describe the concepts of satellite and broadcasting systems.

CO3: Analyze the sources of WLAN.

CO4: Compare wired and wireless LAN and to explain the mobile deduction mechanisms.

CO5: Analyze the layers of Mobile Network

SYLLABUS

UNIT I : Wireless Communication Fundamentals **(15 Hrs)**

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA.

UNIT II : Telecommunication Networks **(15 Hrs)**

Telecommunication systems – GSM –DECT – UMTS – IMT-2000 – Satellite Systems - Basics (GEO,LEO,MEO) – Routing - Localization– Handover - Broadcast Systems – DAB - DVB.

UNIT III : Wireless Lan **(15 Hrs)**

Wireless LAN – Infrared vs radio transmission – Infrastructure and ad-hoc network - IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a - 02.11b standards – HIPERLAN – Blue Tooth.

UNIT IV : Mobile Network Layer **(15 Hrs)**

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics.

UNIT V : Transport And Application Layers **(15 Hrs)**

Traditional TCP – Classical TCP improvements – WAP, WAP 2.0.

TEXT BOOK

Mobile Communications, Jochen Schiller, 2nd Edition, PHI/Pearson Education, 2016.
Chapters: 1, 2.1 – 2.7, 3.1 – 3.5, 4.1, 4.2, 4.4, 5.3 – 5.6, 6.3, 6.4, 7, 8.1 – 8.3.4, 9.1, 9.2, 10.3, 10.6

REFERENCE BOOKS

4. ***Wireless Networks***, Client Smith & Daniel Collins, 3rd Edition, McGraw Hill Publication, 2014.
5. ***Mobile Computing***, *Raj Kamal, 2nd Edition,Oxford University Press, 2014.*
6. ***Mobile Computing,*** *Asoke K Talukder,Hasan Ahmed, Roopa R Yavagal, 2nd Edition,* McGraw Hill Publication, 2017.

5%

II M.Sc.

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG3BE5	Python Programming	Lecture	5	5

COURSE DESCRIPTION

Python is an interpreted, high-level, general-purpose programming language. it provides constructs that enable clear programming on both small and large scales.

COURSE OBJECTIVES

- To understand why python is a useful scripting language for developers.
- To learn how to design and program python applications.
- To learn how to use lists, tuples, and dictionaries in python programs

SYLLABUS

UNIT I: BASIC OF PYTHON PROGRAMMING (15 HRS)

Features of Python-History of Python-The Future of Python-Writing and Executing First Python Program-Literal Constants-Variables and Identifiers-Data Types- Input Operation-Comments-Reserved Words-Indentation-Operation and Expressions-Expression in Python –Operations on Strings-Other Data Types-Type Conversion.

UNIT II: DECISION CONTROL STATEMENTS (15 HRS)

Introduction to Decision Control Statements-Selection /Conditional Branching Statements-Basic Loop Structure /Iterative Statements-Nested Loops-The Break Statement-The Continue Statement-The Pass Statement-The Else Statement used with Loops. Functions and Modules: Introduction – Function Declaration and Definition-Function Call-Variables Scope and Lifetime-The Return Statement-More On Defining Function-Lambda Functions or Anonymous Functions-Documentation Strings.

UNIT III: PYTHON STRINGS REVISITED (15 HRS)

Concatenating ,Appending ,and Multiplying Strings-String Formatting Operator-Build in String Methods and Functions-Slice Operation-Ord()and Chr()

Function-Comparing String-Iteration String –The String Module-Regular Expressions-Metacharacters in Regular Expression. File Handling: File Path-Types of Files-Opening and Closing Files-Reading and Writing Files-File Positions-Renaming and Deleting Files-Directory Methods.

UNIT IV: DATA STRUCTURES (15 HRS)

Sequence-Lists-Functional Programming-Tuple-Sets-Dictionaries Classes and Objects:Classes and Objects-Class Methods and Self Arguments,Constructer-Class Variables and Object Variables-Other Special Methods-Public and Private Data Members-Private Methods-Built in Function-Built in Class Attributes-Garbage Collection-Class Methods-Static Methods

UNIT V: INHERITANCE (15 HRS)

Inheriting Classes in Python-Types of Inheritance-Composition-Abstract Classes and Interfaces-Metaclass. Operator overloading: Introduction-Implementing Operator Overloading-Reverse Adding-Overriding –Getitem-(),Setitem-(),Methods-Overriding the in Operator-Overloading Miscellaneous Function-Overriding the –Call-() Method. Error and Exception Handling: Introduction to Errors and Exceptions-Handling Exceptions-Multiple Except Blocks-Multiple Exceptions in A Single Block-Except Block without Exception – The else Clause- Raising Exception-Instantiating Exceptions-Handling Exception in Invoked Functions.

UNIT VI: SIMPLE WEB APPLICATION DEVELOPMENT (INTERNAL)

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT II

TEXT BOOK

1. ***Python Programming using Problem Solving Approach,*** Reema Thareja,Published By Oxford Higher Education, 2017

REFERENCES:

1. ***Problem Solving and Python Programming,*** S.A. Kulkarni, Published ByYesdee, 2017
2. ***Python for Software Design How to Think Like a computer scientist,*** Allen B.Downey Cambridge University Press, 2018
3. ***Introduction to Programming using Python ,***Y.DanielLiang,Published By Pearson, 2018.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Understand python is a useful scripting language for developers.
CO 2	Apply to lists, tuples, and dictionaries in python programs
CO 3	Identify the structure and components of a python program.
CO 4	Analyze the design philosophy that emphasizes code readability, notably using significant whitespace.
CO 5	Utilizing a new software tool.

2019 – 2020

II M.Sc. Computer Science - III SEMESTER OLD

MAJOR ELECTIVE

PG3BE6 – CRYPTOGRAPHY AND NETWORK SECURITY

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Explain the various symmetric encryption techniques and demonstrate the functionalities of DES algorithm.
CO2: Analyze public key algorithms.
CO3: Evaluate the authentication concept and hash algorithms.
CO4: Apply the concepts of key management techniques.
CO5: Analyze the vulnerabilities in data communication through networks.

SYLLABUS

UNIT I: Introduction **(15 Hrs)**

Classical Encryption Techniques: Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Rotor Machines – Steganography, Block Ciphers and the DES**:** Traditional Block Cipher Structure – The Data Encryption Standard – A DES Example – The Strength of DES – Block Cipher Design Principles.

UNIT II: Public Key Cryptography **(15 Hrs)**

Public Key Cryptography and RSA: Principles of Public-key Cryptosystems – The RSA Algorithm, Other Public Key Cryptosystems: Diffie-Hellman key Exchange – Elgamal Cryptographic System - Elliptic Curve Arithmetic and Cryptography.

UNIT III: Authentication And Hash Function **(15 Hrs)**

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions-Two Simple Hash Functions – Requirements and Security – Hash Functions based on cipher block chaining - SHA, Message Authentication Codes: Message Authentication Requirements - Message Authentication Functions – Requirements of Message Authentication Codes – Security of MACs - MACs based on hash functions: HMAC.

UNIT IV: Digital Signatures and Key Management **(15 Hrs)**

Digital Signatures: properties – Attacks And Forgeries – Digital Signature Requirements – Direct Digital Signature – Elgammal Digital Signature Scheme – Schnorr Digital Signature Scheme – NIST Digital Signature Algorithm, Key Management and Distribution: Symmetric Key Distribution Using Symmetric and Asymmetric Encryption – Distribution of Public Keys.

UNIT V: Network Security **(15 Hrs)**

User Authentication: Remote user authentication principles – Kerberos Version 5, Electronic Mail Security: PGP - S/MIME, IP Security: Overview - IP Security Policy – Encapsulating Security Payload.

TEXT BOOK

Cryptography and Network Security Principles and Practices, W.Stallings, 6th Edition, Pearson Publications, 2015.
Chapters: 1, 2, 8, 9.1 - 9.4, 10.1 - 10.5, 11.1 - 11.5, 12.1 - 12.4, 13.1 - 13.3, 14.1, 14.3, 17.1, 17.2, 18.1 - 18.3

REFERENCE BOOKS

1. ***Cryptography and Network Security***, Behrouz A.Forouzan and Debdeep Mukhopadhyay, The McGraw Hill Publication, 2010.
2. ***Cryptography and Network Security***, Atul Kahate, 3rd Edition, McGraw Hill Education (India) Pvt. Ltd., 2013.
3. ***Network Security Essentials Applications and Standards,*** WilliamStallings,Pearson Education Publications, 2013.
4. ***Cryptography and Network Security***, PS Gill, Trinity Publish, 2014.

NEW

II M.Sc. Computer Science

SEMESTER –III

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG3BE6	Cryptography and Network Security	Lecture	5	5

COURSE DESCRIPTION

To understand design issues in Network Security and to understand security threats, security services and mechanisms to counter them.

COURSE OBJECTIVES

- To know the methods of conventional encryption.
- To understand the concepts of public key encryption
- To understand authentication and Hash functions.
- To know the network security tools and applications.
- To understand the system level security used.

SYLLABUS

UNIT I: INTRODUCTION (15 Hrs)

Classical Encryption Techniques: Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Rotor Machines – Steganography, Block Ciphers and the DES**:** Traditional Block Cipher Structure – The Data Encryption Standard – A DES Example – The Strength of DES – Block Cipher Design Principles.

UNIT II: PUBLIC KEY CRYPTOGRAPHY (15 Hrs)

Public Key Cryptography and RSA:Principles of Public-key Cryptosystems – The RSA Algorithm, Other Public Key Cryptosystems: Diffie-Hellman key Exchange – Elgamal Cryptographic System - Elliptic Curve Arithmetic and Cryptography.

UNIT III: AUTHENTICATION AND HASH FUNCTION (15 Hrs)

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions-Two Simple Hash Functions – Requirements and Security – Hash Functions based on cipher block chaining - SHA, Message Authentication Codes: Message Authentication Requirements - Message Authentication Functions – Requirements of Message Authentication Codes – Security of MACs - MACs based on hash functions: HMAC.

UNIT IV: DIGITAL SIGNATURES AND KEY MANAGEMENT (15 Hrs)

Digital Signatures: properties – Attacks And Forgeries – Digital Signature Requirements – Direct Digital Signature – Elgammal Digital Signature Scheme – Schnorr Digital Signature Scheme – NIST Digital Signature Algorithm, Key Management and Distribution: Symmetric Key Distribution Using Symmetric and Asymmetric Encryption – Distribution of Public Keys.

UNIT V: NETWORK SECURITY (15 Hrs)

User Authentication: Remote user authentication principles – Kerberos Version 5, Electronic Mail Security: PGP - S/MIME, IP Security: Overview - IP Security Policy – Encapsulating Security Payload.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT 1: Classical Encryption Techniques: Symmetric Cipher Model – Substitution Techniques – Transposition Techniques.

UNIT IV: Key Management and Distribution: Symmetric Key Distribution Using Symmetric and Asymmetric Encryption – Distribution of Public Keys**.**

TEXT BOOK

Cryptography and Network Security Principles and Practices, W.Stallings, 6th Edition, Pearson Publications, 2015.

Chapters: 1, 2, 8, 9.1 - 9.4, 10.1 - 10.5, 11.1 - 11.5, 12.1 - 12.4, 13.1 - 13.3, 14.1, 14.3, 17.1, 17.2, 18.1 - 18.3

REFERENCES:

1. Cryptography and Network Security, Behrouz A.Forouzan and Debdeep Mukhopadhyay, The McGraw Hill Publication, 2010.

2. Cryptography and Network Security, Atul Kahate, 3rd Edition, McGraw Hill Education (India) Pvt. Ltd., 2013.

3. Network Security Essentials Applications and Standards,WilliamStallings,Pearson Education Publications, 2013.

4. Cryptography and Network Security, PS Gill, Trinity Publish, 2014.

COURSE OUTCOMES (CO)

NO.	COURSE OUTCOMES
CO 1	Explain the various symmetric encryption techniques and demonstrate the functionalities of DES algorithm.
CO 2	Analyze public key algorithms.
CO 3	Evaluate the authentication concept and hash algorithms.
CO 4	Apply the concepts of key management techniques.
CO 5	Analyze the vulnerabilities in data communication through networks.

2019 – 2020

OLD

II M.Sc. Computer Science - III SEMESTER

MAJOR ELECTIVE

PG3BE7 – DISTRIBUTED DATABASE

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Compare normal and distributed DBMS and to explain various approaches of DDBMS.

CO2: Formulate various kinds of retrieving statements to retrieve information from DDB.

CO3: Explain multiple processes dealing with distributed database system without clash

CO4: Describe the set of protocols used in DDBMS to make effective communication.

CO5: Discuss object concepts and object models.

SYLLABUS

UNIT I : Overview Of Distributed Database (15 Hrs)

Distributed Data Processing - What is a Distributed Database System? - Data Delivery Alternatives - Promises of DDBSs- Complicating factors - Problem Areas16 -Distributed Database Design - Top-Down Design Process - Bottom-up Design Process - Distribution Design - Fragmentation – Allocation.

UNIT II : Overview Of Query Processing (15 Hrs)

Query Processing Problem - Objectives of Query Processing - Complexity of Relational Algebra Operations - Characterization of Query Processors - Layers of Query Processing - Query Decomposition - Localization of Distributed Data.

UNIT III : Distributed Concurrency Control (15 Hrs)

Serializability Theory - Taxonomy of Concurrency Control Mechanisms - Locking-Based Concurrency Control Algorithms - Timestamp-Based Concurrency Control Algorithms - Optimistic Concurrency Control Algorithms - Deadlock Management - "Relaxed" Concurrency Control.

UNIT IV : Reliability And Replication (15 Hrs)

Reliability Concepts and Measures - Failures in Distributed DBMS – Local Reliability Protocols - Distributed Reliability Protocols – Dealing with Site - Network Partitioning - Consistency of Replicated Databases - Replication Protocols - Group Communication - Replication and Failures.

UNIT V : Distributed Object Database Management (15 Hrs)

Fundamental Object Concepts and Object Models - Object Distribution Design - Architectural Issues - Object Management - Distributed Object Storage - Object Query Processing - Transaction Management.

TEXT BOOK

Principles of Distributed Database Systems, M. Tamer Özsu and Patrick Valduriez, 3rd Edition, Springer, 2010.
Chapters: 1, 3, 6, 7, 11, 12, 13, 15.

REFERENCE BOOKS

1. ***Principles of Distributed database systems,*** M.T. Ozsu and S. Sridhar, Pearson Education Publication, 2008.
2. ***Distributed Database Systems***, Chhanda Ray, Pearson Education, India, 2009.
3. ***Distributed Database Management Systems: A Practical Approach,*** Saeed K.Rahini & Frank.S.Haug, Wiley-IEEE Computer Society Press, 2010.

II M.Sc. Computer Science

SEMESTER –III

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSCS	19PG3BE7	Distributed Database Management System	Lecture	5	5

COURSE DESCRIPTION

- Distributed Database contains Overview of Distributed Database, Query Processing , Distributed Concurrency Control , Reliability and Replication, Distributed Object Database Management

COURSE OBJECTIVES

- To understand basic concepts of Distributed Database
- To interpret Objectives of Query Processing
- To understandConcurrency Control of Distributed Database
- To describeReliability and Replication protocols and understand fundamental Object Concepts and Object Models

SYLLABUS

UNIT I : Overview Of Distributed Database (15 Hrs)

Distributed Data Processing - What is a Distributed Database System? - Data Delivery Alternatives - Promises of DDBSs- Complicating factors - Problem Areas16 -Distributed Database Design - Top-Down Design Process - Bottom-up Design Process - Distribution Design - Fragmentation – Allocation.

UNIT II : Overview Of Query Processing (15 Hrs)

Query Processing Problem - Objectives of Query Processing - Complexity of Relational Algebra Operations - Characterization of Query Processors - Layers of Query Processing - Query Decomposition - Localization of Distributed Data.

UNIT III : Distributed Concurrency Control (15 Hrs)

Serializability Theory - Taxonomy of Concurrency Control Mechanisms - Locking-Based Concurrency Control Algorithms - Timestamp-Based Concurrency Control Algorithms - Optimistic Concurrency Control Algorithms - Deadlock Management - “Relaxed” Concurrency Control.

UNIT IV : Reliability And Replication (15 Hrs)

Reliability Concepts and Measures - Failures in Distributed DBMS – Local Reliability Protocols - Distributed Reliability Protocols – Dealing with Site -

Network Partitioning - Consistency of Replicated Databases - Replication Protocols - Group Communication - Replication and Failures.

UNIT V : Distributed Object Database Management (15 Hrs)

Fundamental Object Concepts and Object Models - Object Distribution Design - Architectural Issues - Object Management - Distributed Object Storage - Object Query Processing - Transaction Management.

SELF STUDY : DYNAMISM: (For CIA Only)

UNIT I: Overview of Distributed Database: - Promises of DDBSs- Complicating factors

UNIT II: Query Processing Problem - Objectives of Query Processing

UNIT III: Optimistic Concurrency Control Algorithms

UNIT IV: **Reliability And Replication** :Failures in Distributed DBMS, Dealing with Site

UNIT V: **Distributed Object Database Management** : Architectural Issues

TEXT BOOK

Principles of Distributed Database Systems, M. Tamer Özsu and Patrick Valduriez, 3rd Edition, Springer, 2010. Chapters:1, 3, 6, 7, 11, 12, 13, 15.

REFERENCES:

1. ***Principles of Distributed database systems,*** M.T. Ozsu and S. Sridhar, Pearson Education Publication, 2008.
2. ***Distributed Database Systems***, Chhanda Ray, Pearson Education, India, 2009.
3. ***Distributed Database Management Systems: A Practical Approach,*** Saeed K.Rahini&Frank.S.Haug, Wiley-IEEE Computer Society Press, 2010.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Compare normal and distributed DBMS and to explain various approaches of DDBMS.
CO 2	Formulate various kinds of retrieving statements to retrieve information from DDB.
CO 3	Explain multiple processes dealing with distributed database system without clash
CO 4	Describe the set of protocols used in DDBMS to make effective communication.
CO 5	Discuss object concepts and object models.

2019 – 2020

OLD

II M.Sc. Computer Science - III SEMESTER

MAJOR ELECTIVE

PG3BE8 – COMPILER DESIGN

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

CO1: Describe the phases of Compiler.
CO2: Explain the role and type of Parser
CO3: Analyze and use Intermediate languages
CO4: Describe the design of code generation with register utilization.
CO5: Demonstrate code optimization techniques.

SYLLABUS

UNIT I - INTRODUCTION TO COMPILING **(15 Hrs)**

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens.

UNIT II - SYNTAX ANALYSIS **(15 Hrs)**

Role of the parser –Context-Free Grammars – Writing Grammars- Top Down parsing –Bottom-up parsing – Operator Precedent Parsing – LR Parsers.

UNIT III - INTERMEDIATE CODE GENERATION **(15 Hrs)**

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.

UNIT IV - CODE GENERATION **(15 Hrs)**

Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator –Register allocation and Assignment – DAG representation of Basic Blocks – Peephole Optimization.

UNIT V - CODE OPTIMIZATION **(15 Hrs)**

Introduction– Principal Sources of Optimization – Optimization of basic Blocks – Loops in flow Graphs – Introduction to Global Data Flow Analysis.

TEXT BOOK

Compilers Principles, Techniques and Tools, Alfred Aho, Ravi Sethi, Jeffrey D Ullman,2nd Edition Pearson Education Asia.2015

Chapter 1,3.1 to 3.3 , 4.1 to 4.7, 8, 9.1 to 9.9, 10.1 to 10.5

REFERENCE BOOKS

1. ***Compiler Design*** *,H.S.Mohan,Narosa Publishing House2014*
2. ***Compiler Design in*** *R. Venkatesh and N. Uma Maheswari and S.Jeyanthi, Yes Dee Publishing Pvt Lid,2015*
3. ***Compiler Design ,****R,Godfrey Winster,S. Aruna Devi, R.Sujatha,Published By Yes Dee Publishing Pvt.Ltd 2017*

II M.Sc. Computer Science

SEMESTER –III

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG3BE8	Compiler Design	Lecture	5	5

COURSE DESCRIPTION

Explore the principles, algorithms, and data structure involved in the design and construction of compilers.

COURSE OBJECTIVES

- To provide knowledge on system oriented concepts
- To help them to write efficient programs, understanding the implementational requirements

SYLLABUS

UNIT I - INTRODUCTION TO COMPILING (15 Hrs)

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens.

UNIT II - SYNTAX ANALYSIS (15 Hrs)

Role of the parser –Context-Free Grammars – Writing Grammars- Top Down parsing –Bottom-up parsing – Operator Precedent Parsing – LR Parsers.

UNIT III - INTERMEDIATE CODE GENERATION (15 Hrs)

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions –Case Statements – Back patching – Procedure calls.

UNIT IV - CODE GENERATION (15 Hrs)

Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator –Register allocation and Assignment – DAG representation of Basic Blocks – Peephole Optimization.

UNIT V - CODE OPTIMIZATION **(15 Hrs)**

Introduction– Principal Sources of Optimization – Optimization of basic Blocks – Loops in flow Graphs – Introduction to Global Data Flow Analysis.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT I:Role of Lexical Analyzer – Input Buffering – Specification of Tokens.
UNIT II**:** LR Parsers.
UNIT III: Procedure calls.
UNIT IV: Peephole Optimization.
UNIT V: Introduction to Global Data Flow Analysis

TEXT BOOK

Compilers Principles, Techniques and Tools, Alfred Aho, Ravi Sethi, Jeffrey D Ullman,2nd Edition Pearson Education Asia.2015

Chapter 1,3.1 to 3.3, 4.1 to 4.7, 8, 9.1 to 9.9, 10.1 to 10.5

REFERENCES:

1.Compiler Design *,H.S.Mohan,Narosa Publishing House,2014*

2. ***Compiler Design in*** *R. Venkatesh and N. Uma Maheswari and S.Jeyanthi, Yes DeePublishing Pvt Lid,2015*

3. ***Compiler Design ,****R,GodfreyWinster,S. Aruna Devi, R.Sujatha,Published By Yes DeePublishing Pvt.Ltd, 2017*

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Describe the phases of Compiler
CO 2	Explain the role and type of Parser
CO 3	Analyze and use Intermediate languages
CO 4	Describe the design of code generation with register utilization
CO 5	Demonstrate code optimization techniques.

2019 – 2020

II M.Sc. Computer Science - III SEMESTER

MAJOR ELECTIVE

PG3BE9 – CLOUD COMPUTING

OLD

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Identify and use different cloud computing services.
CO2: Explain the basic principles of cloud virtualization.
CO3: Prepare the appropriate cloud computing solutions to meet the requirement of specific applications.
CO4: Design application by utilizing cloud platforms such as Google app Engine and Amazon Web Services.
CO5: Analyze different cloud programming models.

SYLLABUS

UNIT I: Introduction **(15 Hrs)**

Introduction : Cloud Computing at a Glance - Historical Developments - Building Cloud Computing Environments - Computing Platforms and Technologies, Principles of Parallel and Distributed Computing: Eras of Computing - Parallel vs. Distributed Computing - Elements of Parallel Computing - Elements of Distributed Computing - Technologies for Distributed Computing.

UNIT II: Virtualization & Cloud Computing Architecture **(15 Hrs)**

Virtualization: Introduction - Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques - Virtualization and Cloud Computing - Pros and Cons of Virtualization, Cloud Computing Architecture : Introduction - Cloud Reference Model - Types of Clouds - Economics of the Cloud - Open Challenges.

UNIT III: Concurrent and High-Throughput Computing **(15 Hrs)**

Concurrent Computing: Thread Programming : Introducing Parallelism for Single Machine Computation - Programming Applications with Threads**,** High-Throughput Computing: Task Programming : Task Computing - Task-based Application Models.

UNIT IV: Cloud Platforms and Applications **(15 Hrs)**

Cloud Platforms in Industry: Amazon Web Services - Google AppEngine - Microsoft Azure – Observations, Cloud Applications: Scientific Applications - Business and Consumer Applications.

UNIT V: Advanced Topics in Cloud Computing **(15 Hrs)**

Advanced Topics in Cloud Computing: Energy Efficiency in Clouds - Market Based Management of Clouds - Federated Clouds / InterCloud - Third Party Cloud Services.

TEXT BOOK

Mastering cloud computing, Rajkumar Buyya, Christian Vecchiola & S.Thamarai selvi, Mc Graw Hill Education, Pvt. Ltd., 2016.

Chapters: 1, 2, 3.1 – 3.5, 4, 6.1, 6.2, 7.1, 7.2, 9, 10, 11

REFERENCE BOOKS

1. ***Cloud Computing A Practical Approach,*** Anthony T.Velte, Toby J. Velte, Robert Elsenpeter Tata-McGraw- Hill, New Delhi, 2010.
2. ***Distributed Systems Concepts and Design***, George Coulouris, Jean Dollimore, Tim Kindberg, 5th Edition, Pearson Education Asia, 2012.
3. ***Boris Lublinsky***, Kevin T. Smith, Alexey Yakubovich, ProfessionalHadoop Solutions, Wrox, Wiley, 2013.
4. ***Distributed and Cloud Computing From Parallel Processing to the Internet of Things***, Kai Hwang, Geofrey C. Fox and Jack J. Dongarra, 1st Edition, Elsevier Science Publication, 2013.

5%

II M.Sc. Computer Science

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG3BE9	Cloud Computing	Lecture	5	5

COURSE DESCRIPTION

This course describes the cloud environment, building software systems and components that scale to millions of users in modern internet.

COURSE OBJECTIVES

- To learn Parallel anddistributed communication
- To understand distributed resource management
- To study about virtualization and cloud resource management

SYLLABUS

UNIT I: Introduction (15 Hrs)

Introduction : Cloud Computing at a Glance - Historical Developments - Building Cloud Computing Environments - Computing Platforms and Technologies, Principles of Parallel and Distributed Computing: Eras of Computing - Parallel vs. Distributed Computing - Elements of Parallel Computing - Elements of Distributed Computing - Technologies for Distributed Computing.

UNIT II: Virtualization & Cloud Computing Architecture (15 Hrs)

Virtualization: Introduction - Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques - Virtualization and Cloud Computing - Pros and Cons of Virtualization, Cloud Computing Architecture : Introduction - Cloud Reference Model - Types of Clouds - Economics of the Cloud - Open Challenges.

UNIT III: Concurrent and High-Throughput Computing (15 Hrs)

Concurrent Computing: Thread Programming : Introducing Parallelism for Single Machine Computation - Programming Applications with Threads**,** High-Throughput Computing: Task Programming : Task Computing - Task-based Application Models.

UNIT IV: Cloud Platforms and Applications (15 Hrs)

Cloud Platforms in Industry: Amazon Web Services - Google AppEngine - Microsoft Azure – Observations, Cloud Applications: Scientific Applications - Business and Consumer Applications.

UNIT V: Advanced Topics in Cloud Computing (15 Hrs)

Advanced Topics in Cloud Computing: Energy Efficiency in Clouds - Market Based Management of Clouds - Federated Clouds / InterCloud - Third Party Cloud Services.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT 1: Introduction : Cloud Computing at a Glance - Historical Developments - Building Cloud Computing Environments - Computing Platforms and Technologies, Principles of Parallel and Distributed Computing: Eras of **Computing.**

UNIT4: Cloud Applications: Scientific Applications - Business and Consumer Applications.

TEXT BOOK

Mastering cloud computing, Rajkumar Buyya, Christian Vecchiola&S.Thamaraiselvi, Mc Graw Hill Education, Pvt. Ltd., 2016.
Chapters: 1, 2, 3.1 – 3.5, 4, 6.1, 6.2, 7.1, 7.2, 9, 10, 11

REFERENCES:

1. ***Cloud Computing A Practical Approach,*** Anthony T.Velte, Toby J. Velte, Robert Elsenpeter Tata-McGraw- Hill, New Delhi, 2010.
2. ***Distributed Systems Concepts and Design***, George Coulouris, Jean Dollimore, Tim Kindberg, 5th Edition, Pearson Education Asia, 2012.
3. ***Boris Lublinsky***, Kevin T. Smith, Alexey Yakubovich, ProfessionalHadoop Solutions, Wrox, Wiley, 2013.
4. ***Distributed and Cloud Computing From Parallel Processing to the Internet of Things***, Kai Hwang, Geofrey C. Fox and Jack J. Dongarra, 1st Edition, Elsevier Science Publication, 2013.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Identify and use different cloud computing services.
CO 2	Explain the basic principles of cloud virtualization.
CO 3	Prepare the appropriate cloud computing solutions to meet the requirement of specific applications.
CO 4	Design application by utilizing cloud platforms such as Google app Engine and Amazon Web Services.
CO 5	Analyze different cloud programming models.

OLD

2019 – 2020
II M.Sc. Computer Science -III SEMESTER
MAJOR ELECTIVE
PG3BE10– ADVANCED COMPUTER GRAPHICS & ANIMATION

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Explain the basic concepts in computer graphics.
CO2: Analyze various algorithms and to convert the basic geometrical primitives.
CO3: Demonstrate the importance of viewing and clipping.
CO4: Discuss the fundamentals of animation
CO5: Describe Interpolation-Based Animation

SYLLABUS

UNIT I: Output Primitive Of Attributes (15 Hrs)

Points and Lines – Line-drawing algorithms – Loading the frame buffer – Line function – Circle-generating algorithms – Ellipse-generating algorithms – Other curves – Parallel curve algorithms – Curve functions – Pixel addressing – Filled-area primitives – Line attributes – Curve attributes – Color and grayscale levels – Area-fill attributes – Character attributes.

UNIT II: Two-Dimensional Geometric Transformations (15 Hrs)

Basic Transformations – Matrix representations – Composite transformations – Other transformations – Transformations between coordinate systems.

UNIT III: Two-Dimensional Viewing (15 Hrs)

The viewing pipeline – Viewing coordinate reference frame – Window-to-viewport coordinate transformation - Two-Dimensional viewing functions – Clipping operations – Point clipping – Line clipping – Polygon clipping – Curve clipping – Text clipping.

UNIT IV: Introduction To Animation, Interpolation (15 Hrs)

Perception – The heritage of animation – Animation production – Interpolation – Controlling the motion of a point.

UNIT V: Interpolation-Based Animation (15 Hrs)

Key-frame systems – Animation languages – Deforming objects.

TEXT BOOKS

1. ***Computer Graphics***, Donald D. Hearn, M. Pauline Baker, 4th Edition, Pearson Education Publication, 2014.

Chapters: 3.1 – 3.11, 4.1 – 4.5, 5.1 – 5.5, 6.1 – 6.10

2. ***Computer Animation-Algorithms and Techniques***, Rick Parent, Morgan Kaufman Publishers, 2nd Edition, 2009.

Chapters: 1.1 – 1.3, 3.1 – 3.2, 4.1 – 4.3

REFERENCE BOOKS

1. ***Computer Graphics, Multimedia and Animation***, Malay K.Pakhira, 2nd Edition, PHI Learning Pvt. Ltd., 2010.
2. ***Interactive Computer Graphics: A top-down approach with OpenGL***, Edward Angel and Dave Shreiner, 6th Edition, Addison Wesley, 2012.
3. ***Computer Graphics Principles and Practice***, Foley, Van Dam, Feiner, Hughes, 3rd Edition, C. Addison Wesley, 2014.

NEW

II M.Sc. Computer Science

SEMESTER –III

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG3BE10	Advanced Computer Graphics & Animation	Lecture	5	5

COURSE DESCRIPTION

To make the students familiar with techniques of clipping, three dimensional graphics and three dimensional transformations.

COURSE OBJECTIVES

- To understand the basics of geometry processing.
- To understand the fundamentals of pipelined rasterization rendering of meshed objects and curved surfaces.
- To understand and work with advanced rendering methods such as radiosity.
- To design programs for advanced animation methods and
- To become proficient at graphics programming using OpenGL

SYLLABUS

UNIT I: Output Primitive Of Attributes (15 Hrs)

Points and Lines – Line-drawing algorithms – Loading the frame buffer – Line function – Circle-generating algorithms – Ellipse-generating algorithms – Other curves – Parallel curve algorithms – Curve functions – Pixel addressing – Filled-area primitives – Line attributes – Curve attributes – Color and grayscale levels – Area-fill attributes – Character attributes.

UNIT II: Two-Dimensional Geometric Transformations (15 Hrs)

Basic Transformations – Matrix representations – Composite transformations – Other transformations – Transformations between coordinate systems.

UNIT III: Two-Dimensional Viewing (15 Hrs)

The viewing pipeline – Viewing coordinate reference frame – Window-to-viewport coordinate transformation - Two-Dimensional viewing functions – Clipping

operations – Point clipping – Line clipping – Polygon clipping – Curve clipping – Text clipping.

UNIT IV: Introduction To Animation, Interpolation (15 Hrs)

Perception – The heritage of animation – Animation production – Interpolation – Controlling the motion of a point.

UNIT V: Interpolation-Based Animation (15 Hrs)

Key-frame systems – Animation languages – Deforming objects.

SELF STUDY: DYNAMISM: (For CIA Only)

UNIT I:Output Primitive: Color& grayscale levels, Area-fill attributes, Character attributes.

UNIT II: Two-Dimensional Geometric Transformations : Basic Transformations– Matrix representations

UNIT III:Two-Dimensional Viewing Window-to-viewport coordinate transformation

UNIT IV:Introduction To Animation, Interpolation : Controlling the motion of a point.

UNIT V:Interpolation-Based Animation: Deforming objects

TEXT BOOKS

1. ***Computer Graphics***, Donald D. Hearn, M. Pauline Baker, 4th Edition, Pearson Education Publication, 2014.

Chapters: 3.1 – 3.11, 4.1 – 4.5, 5.1 – 5.5, 6.1 – 6.10

2. ***Computer Animation-Algorithms and Techniques***, Rick Parent, Morgan Kaufman Publishers, 2ndEdition, 2009.

Chapters: 1.1 – 1.3, 3.1 – 3.2, 4.1 – 4.3

REFERENCES:

1. ***Computer Graphics, Multimedia and Animation***, Malay K.Pakhira, 2nd Edition, PHI Learning Pvt. Ltd., 2010.

2. ***Interactive Computer Graphics: A top-down approach with OpenGL***, Edward Angel and Dave Shreiner, 6th Edition, Addison Wesley, 2012.

3. ***Computer Graphics Principles and Practice***, Foley, Van Dam, Feiner, Hughes, 3rd Edition, C. Addison Wesley, 2014.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Explain the basic concepts in computer graphics.
CO 2	Analyze various algorithms and to convert the basic geometrical primitives.
CO 3	Demonstrate the importance of viewing and clipping.
CO 4	Discuss the fundamentals of animation
CO 5	Describe Interpolation-Based Animation

2019 – 2020

II M.Sc. Computer Science - III SEMESTER

OLD

MAJOR ELECTIVE

PG3BE11- BIG DATA ANALYTICS

HRS/WEEK: 5 **CREDITS: 5**

COURSE OUTCOMES

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

CO1: Explain Characteristics and challenges of Big Data
CO2: Describe Big Data Analytics
CO3: Utilize Hadoop for Big Data Technologies
CO4: Demonstrate MAPREDUCE Programming
CO5: Describe types of Recommendation Systems using Big Data Analytics.

SYLLABUS

UNIT I : **(15 Hrs)**

Introduction to Big Data: Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – What is Big Data – Other Characteristics of Data Which are not Definitional Traits of Big Data – Why Big Data – Are we just an Information Consumer or Do we also Produce Information – Traditional Business Intelligence(BI) versus Big Data – A Typical Data warehouse Environment – A Typical Hadoop Environment – What is New Today – What is Changing in the Realms of Big Data.

UNIT II : **(15 Hrs)**

Big Data Analytics: Where do we Begin – What is Big Data Analytics – What Big Data Analytics Isn't – Why this Sudden Hype Around Big Data Analytics – Classification of Analytics – Greatest Challenges that Prevent Businesses from Capitalizing on Big Data – Top Challenges Facing Big Data – Why is Big Data Analytics Important – What kind of Technologies are we Looking Toward to Help Meet the Challenges Posed by Big Data – Data Science – Data Scientist Your New Best Friend - Terminologies Used in Big Data Environments – Basically Available Soft State Eventual Consistency – Few Top Analytics Tools.

UNIT III: **(15 Hrs)**

The Big Data Technology Landscape:– Hadoop. Features of Hadoop. Key advantages of Hadoop, Version of Hadoop- Overview of hadoop Ecosystems- Hadoop distributios- Hadoop verus SQL – Integrated Hadoop System Offered by Leading Markers Vendors- Cloud – based Hadoop Solutions. Introduction to Hadoop**:** Introducing Hadoop – Why Hadoop – Why not RDBMS – RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview – Use Case of Hadoop – Hadoop Distributors – HDFS (Hadoop Distributed File System) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN (Yet Another Resource Negotiator) – Interacting with Hadoop Ecosystem.

UNIT IV : **(15 Hrs)**

Introduction to MAPREDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression. Introduction to Machine Learning: Introduction to Machine Learning – Machine Learning Algorithm-Regression Model- Linear Regression- Clustering- Collaboration filtering- Association Rule Mining- Decision Tree.

UNIT V : **(15 Hrs)**

Introduction to Recommendation Engines: Recommendation engine definition – Need for Recommender Systems – Big Data Driving the Recommender Systems – Types of Recommender Systems –Evolution of Recommender Systems with Technology. Evolution of Recommendation Engines Explained: Evolution of Recommendation Engines – Nearest Neighborhood-based Recommendation Engines – Content-based Recommender Systems – Hybrid Recommender Systems – Model-based Recommender Systems.

TEXT BOOK

1. Big Data and Analytics, Seema Acharya and Subhashini Chellappan, 2nd edition ,Wiley India Private Limited, 2017. Chapters : 2,3, 4.2 - 5, 8,12.

2. **Building Recommendation Engines. -Suresh Kumar Gorakala,** 1st edition, Packt Publishing Limited, United Kingdom, 2016. Chapters: 1, 3

REFERENCE BOOKS

1. ***Big Data Strategies*** , Pam Baker ,1st edition , Cengage Learning India Private Limited, 2016.
2. ***Big Data,*** Dr. Anil Maheshwari, 1st edition , Published by McGraw Hill Education (India) Private Limited, 2017.
3. ***Big Data Fundamentals Concepts, Driver & Techniques,*** Thomas Erl,Wajid Khattak and Paul Buhler, 3rd Edition, Pearson publication, 2018.

II M.Sc. Computer Science

SEMESTER –III

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
SPB	19PG3BE11	Big Data Analytics	Lecture	5	5

COURSE DESCRIPTION

Big Data Analytics includes Introduction to Big Data, Big Data Analytics, The Big Data Technology, Introduction to MAPREDUCE Programming: and Introduction to Recommendation Engines.

COURSE OBJECTIVES

- To understand Characteristics and challenges of Big Data
- To interpret Big Data Analytics and Big Data Technologies
- To demonstrate MAPREDUCE Programming and Recommendation Systems

SYLLABUS

UNIT I: INTRODUCTION (15 Hrs)

Introduction to Big Data: Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – What is Big Data – Other Characteristics of Data Which are not Definitional Traits of Big Data – Why Big Data – Are we jst an Information Consumer or Do we also Produce Information – Traditional Business Intelligence(BI) versus Big Data – A Typical Data warehouse Environment – A Typical Hadoop Environment – What is New Today – What is Changing in the Realms of Big Data.

UNIT II :BIG DATA ANALYTICS (15 Hrs)

Big Data Analytics: Classification of Analytics – Greatest Challenges that Prevent Businesses from Capitalizing on Big Data – Top Challenges Facing Big Data – Why is Big Data Analytics Important – What kind of Technologies are we Looking Toward to Help Meet the Challenges Posed by Big Data – Data Science – Data Scientist Your New Best Friend - Terminologies Used in Big Data Environments – Basically Available Soft State Eventual Consistency – Few Top Analytics Tools.

UNIT III: THE BIG DATA TECHNOLOGY (15 Hrs)

The Big Data Technology Landscape:– Hadoop. Features of Hadoop. Key advantages of Hadoop, Version of Hadoop- Overview of hadoop Ecosystems- Hadoop distributios- Hadoop verus SQL – Integrated Hadoop System Offered by

Leading Markers Vendors- Cloud – based Hadoop Solutions. Introduction to Hadoop**:** Introducing Hadoop – Why Hadoop – Why not RDBMS – RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview – Use Case of Hadoop – Hadoop Distributors – HDFS (Hadoop Distributed File System) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN (Yet Another Resource Negotiator) – Interacting with Hadoop Ecosystem.

UNIT IV :INTRODUCTION TO MAP REDUCE PROGRAMMING (15 Hrs)

Introduction to MAP REDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression.Introduction to Machine Learning: Introduction to Machine Learning – Machine Learning Algorithm-Regression Model- Linear Regression- Clustering- Collaboration filtering- Association Rule Mining- Decision Tree.

UNIT V: RECOMMENDATION ENGINES (15 Hrs)

Introduction to Recommendation Engines: Recommendation engine definition – Need for Recommender Systems – Big Data Driving the Recommender Systems – Types of Recommender Systems –Evolution of Recommender Systems with Technology. Evolution of Recommendation Engines Explained: Evolution of Recommendation Engines – Nearest Neighborhood-based Recommendation Engines – Content-based Recommender Systems – Hybrid Recommender Systems – Model-based Recommender Systems.

SELF STUDY: **DYNAMISM: (For CIA Only)**

UNIT II

TEXT BOOK

1. Big Data and Analytics, Seema Acharya and Subhashini Chellappan, 2nd edition ,Wiley India Private Limited, 2017. Chapters : 2,3, 4.2 - 5, 8,12.

2**. Building Recommendation Engines. -Suresh Kumar Gorakala,** 1st edition, Packt Publishing Limited, United Kingdom, 2016. Chapters: 1, 3

REFERENCE BOOKS

1. ***Big Data Strategies*** , Pam Baker ,1st edition , Cengage Learning India Private Limited, 2016.
2. ***Big Data,***Dr. Anil Maheshwari, 1st edition , Published by McGraw Hill Education (India) Private Limited, 2017.
3. ***Big Data Fundamentals Concepts, Driver & Techniques,*** Thomas Erl,WajidKhattak and Paul Buhler, 3rd Edition, Pearson publication, 2018.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Explain Characteristics and challenges of Big Data
CO 2	Describe Big Data Analytics
CO 3	Utilize Hadoop for Big Data Technologies
CO 4	Demonstrate MAP REDUCE Programming
CO 5	Describe types of Recommendation Systems using Big Data Analytics.

2019 - 2020

OLD

II M.Sc. Computer Science - III SEMESTER

MAJOR ELECTIVE

PG3BE12 – DEEP LEARNING

HRS/WEEK :5 **CREDITS : 5**

COURSE OUTCOMES

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

CO1: Explain Deep learning
CO2: Analyze different methods used for modelling
CO3: Choose appropriate model according to application
CO4: Compare various learning methods
CO5: Explain Applications in Object Recognition and Computer Vision

SYLLABUS

UNIT I: **(15 Hrs)**

Introduction: Definitions and background, Organization of this monograph;Three Classes of Deep Learning Networks: A three-way categorization, Deep networks for unsupervised or generative, Deep networks for supervised learning, Hybrid deep networks.

UNIT II: **(15 Hrs)**

Deep Autoencoders — Unsupervised Learning: Introduction, Use of deep autoencoders to extract speech features, Stacked denoising autoencoders, Transforming autoencoders; Pre-Trained Deep Neural Networks — A Hybrid: Restricted Boltzmannmachines Unsupervised layer-wise pre-training, Interfacing DNNs with HMMs.

UNIT III: **(15 Hrs)**

Deep Stacking Networks and Variants — Supervised Learning: Introduction-A basic architecture of the deep stacking network - A method for learning the DSN weights-The tensor deep stacking network- The Kernelized deep stacking network; Selected Applications in Speech and Audio Processing Acoustic modeling for speech recognition-Speech synthesis-Audio and music processing.

UNIT IV: **(15 Hrs)**

Selected Applications in Language Modeling and Natural Language Processing: Language modelling - Natural language processing;Selected Applications in Information Retrieval: A brief introduction to information retrieval-SHDA for document indexing and retrieval-DSSMfor document retrieval-Use of deep stacking networks for information retrieval.

UNIT V: **(15 Hrs)**

Selected Applications in Object Recognition and Computer Vision: Unsupervised or generative feature learning - Supervised feature learning and classification Selected Applications in Multimodal and Multi-task Learning: Multi-modalities: Text and image – Multi-modalities: Speech and image-Multi-task learning within the speech, NLP or image.

TEXT BOOK

Deep Learning: Methods and Applications, Li Deng and Dong Yu, Foundations and Trends R_ in Signal Processing Vol. 7, Nos. 3–4 (2013) 197–387_c 2014 DOI: 10.1561/2000000039

REFERENCE BOOKS

1. ***Deep Learning (A Practical Approach),*** Dr. Rajiv Chopra, Edition:2018, Published by: Khanna Book Publishing Co.(P) Ltd.
2. ***Deep Learning***, Ian Gooffellow,Yoshua Benbio, Aaron Courville,2016 Massachusetts Institute of Technology.

II M.Sc. Computer Science

SEMESTER –III

5%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG3BE12	Deep Learning	Lecture	5	5

COURSE DESCRIPTION

The course aims to instil the research acumen in the field of Artificial Intelligence, by providing basic knowledge on the concepts of Deep Learning**.**

COURSE OBJECTIVES

- To provide knowledge about the three classes of Deep Learning
- To understand the difference between supervised and unsupervised learning
- To elaborate on application of Deep Learning in Language processing, Object recognition and Computer Vision for more clarity

SYLLABUS

UNIT I: Deep Feedforward Networks (15 Hrs)

Example: Learning XOR-Gradient-Based Learning-Hidden Units-Architecture Design-Back-Propagation and Other differentiation Algorithm-Historical Notes

UNIT II: Regularization for Deep Learning (15 Hrs)

Regularization for Deep Learning: Parameter Norm Penalties-Norm Penalties as Constrained Optimization-Regularization and Under-Constrained Problem-Dataset Augmentation-Noise Robustness-Semi-Supervised Learning-Multitask Learning-Early Stopping-Parameter Tying and Parameter Sharing-Sparse Representations-Bagging and Other Ensemble Methods

UNIT III: Optimization for Training Deep Models (15 Hrs)

Optimization for Training Deep Models: Learning Differs from Pure Optimization-Challenges in Neural Network Optimization-Basic Algorithms-Parameter Initialization Strategies-Algorithm with Adaptive Learning Rates-Approximate Second-Order Methods-Optimization Strategies and Meta-algorithms

UNIT IV: Structured Probabilistic Models for Deep Learning (15 Hrs)

Structured Probabilistic Models for Deep Learning:The Challenge of Unstructured Modeling-Using Graphs to Describe Model Structure-Sampling from Graphical Models—Advantages of Structured Modeling-Learning about Dependencies-Inference and Approximate Inference-The Deep Learning Approach to Structured Probabilistic Models

UNIT V: Deep Generative Models (15 Hrs)

Deep Generative Models:Boltzmann Machines-Restricted Boltzmann Machines-Deep Belief Networks-Deep Boltzmann Machines-Boltzmann Machines for Real Valued Data-Convolution Boltzmann Machines - Boltzmann Machines for Structured or Sequential Outputs-Other Boltzmann Machines-Back Propagation through Random Operations-Directed Generative Nets

SELF STUDY : DYNAMISM: (For CIA Only)

UNIT I: **Deep Feedforward Networks :**Historical Notes

UNIT II: **Regularization for Deep Learning** :Sparse Representations-Bagging and Other Ensemble Methods

UNIT III: Optimization for Training Deep Models : Challenges in Neural Network Optimization-Basic Algorithms

UNIT IV: **Structured Probabilistic Models for Deep Learning :**The Challenge of Unstructured Modelling- Advantages of Structured Modelling

UNIT V: **Deep Generative Models** : Boltzmann Machines for Structured or Sequential Outputs-Other Boltzmann Machines

TEXT BOOK

Deep Learning, Ian Goodfellow, YoshuaBengio and Aaron Couville, Massachusetts Institute of Technology, 2016. Chap:6, 7, 8, 16, 20.1-20.10

REFERENCES:

1. ***Deep Learning (A Practical Approach),***Dr. Rajiv Chopra, Edition:2018, Published by:
Khanna Book Publishing Co.(P) Ltd.
2.***Deep Learning***, Ian Gooffellow,YoshuaBenbio, Aaron Courville,2016 Massachusetts
Institute of Technology.
3. ***Neural Networks and Deep Learning,*** CharuC.Aggarwal, IBM T.J. Watsn Research
Center,NY,USA, 2018.

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Explain Deep learning
CO 2	Analyze different methods used for modeling
CO 3	Choose appropriate model according to application
CO 4	Compare various learning methods
CO 5	Explain Applications in Object Recognition and Computer Vision

Dr. G. GERMINE MARY
Associate Professor & Head
Department of Computer Scienc
Fatima College (Autonomous)
Madurai - 625 018