FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A" Grade by NAAC (3rd Cycle)
74th Rank in India Ranking 2020(NIRF) by MHRD
Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT: COMPUTER SCIENCE

NAME OF THE PROGRAMME : M.SC

PROGRAMME CODE : PSCS

ACADEMIC YEAR : 2021 - 2022

VISION OF THE DEPARTMENT

To be in the Zenith of Scholastic Excellence in Computer Science by imparting Value Based, Skill Based and Career Oriented Education for HolisticDevelopment.

MISSION OF THE DEPARTMENT

- Empower Women and Firstgeneration learners
- Inculcate lateral thinking and make them professionally competent to meet the global challenge in the field of Computer Science
- Develop the programming skills of the young learners to meet the current trends of Computer Science
- Motivate the students to be socially responsible and acquire entrepreneurial skills to become global leaders
- Promote quality and ethics among the students through Value Based Education

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1	Our graduates will be academic, digital and information literates; creative, inquisitive, innovative and committed researchers who would be desirous for the "more" in all aspects
PEO 2	They will be efficient individual and team performers who would deliver excellent professional service exhibiting progress, flexibility, transparency, accountability and in taking up initiatives in their professional work
PEO 3	The graduates will be effective managers of all sorts of real – life and professional circumstances, making ethical decisions, pursuing excellence within the time framework and demonstrating apt leadership skills
PEO 4	They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.

GRADUATE ATTRIBUTES (GA)

Fatima College empowers her women graduates holistically. A Fatimite achieves all-round empowerment by acquiring Social, Professional and Ethical competencies. A graduate would sustain and nurture the following attributes:

I. SOCIAL COMPETENCE	
GA 1	Deep disciplinary expertise with a wide range of academic and digital literacy
GA 2	Hone creativity, passion for innovation and aspire excellence
GA 3	Enthusiasm towards emancipation and empowerment of humanity
GA 4	Potentials of being independent
GA 5	Intellectual competence and inquisitiveness with problem solving abilities befitting the field of research
GA 6	Effectiveness in different forms of communications to be employed in personal and professional environments through varied platforms
GA 7	Communicative competence with civic, professional and cyber dignity and decorum
GA 8	Integrity respecting the diversity and pluralism in societies, cultures and religions
GA 9	All – inclusive skill - sets to interpret, analyse and solve social and environmental issues in diverse environments
GA 10	Self-awareness that would enable them to recognise their uniqueness through continuous self-assessment in order to face and make changes building their strengths and improving on their weaknesses

GA 11	Finesse to co-operate exhibiting team-spirit while working in groups to achieve goals
GA 12	Dexterity in self-management to control their selves in attaining the kind of life that they dream for
GA 13	Resilience to rise up instantly from their intimidating setbacks
GA 14	Virtuosity to use their personal and intellectual autonomy in being life-long learners
GA 15	Digital learning and research attributes
GA 16	Cyber security competence reflecting compassion, care and concern towards the marginalised
GA 17	Rectitude to use digital technology reflecting civic and social responsibilities in local, national and global scenario
II. PROFESSIONAL COMPETENCE	
GA 18	Optimism, flexibility and diligence that would make them professionally competent
GA 19	Prowess to be successful entrepreneurs and employees of trans-national societies
GA 20	Excellence in Local and Global Job Markets
GA 21	Effectiveness in Time Management
GA 22	Efficiency in taking up Initiatives
GA 23	Eagerness to deliver excellent service

GA 24	Managerial Skills to Identify, Commend and tap Potentials
III. ETHICAL COMPETENCE	
GA 25	Integrity and discipline in bringing stability leading a systematic life promoting good human behaviour to build better society
GA 26	Honesty in words and deeds
GA 27	Transparency revealing one's own character as well as self-esteem to lead a genuine and authentic life
GA 28	Social and Environmental Stewardship
GA 29	Readiness to make ethical decisions consistently from the galore of conflicting choices paying heed to their conscience
GA 30	Right life skills at the right moment

PROGRAMME OUTCOMES (PO)

On completion of M.Sc. Computer Science Programme, the learner will be able to

PO 1	Apply acquired scientific knowledge to solve major and complex issues in the society/industry.
PO 2	Attain research skills to solve complex cultural, societal and environmental issues.
PO 3	Employ latest and updated tools and technologies to solve complex issues
PO 4	Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.

PROGRAMME SPECIFIC OUTCOMES (PSO)

On completion of M.Sc. Computer Science programme, the learner will be able to

PSO 1	Develop professionally competent citizens by applying the scientific knowledge of Computer Science with the ability to think clearly, rationally and creatively to support in evolving solutions to the social/public/scientific issues with responsible democratic participation
PSO 2	Enterprising resourcefulness to identify, plan, formulate, design and evaluate solutions for complex computing problems that address the specific needs with appropriate consideration for Societal, Cultural, Environmental and Industrial domains
PSO 3	Holistic development to ignite the lateral thinking ability in problem solving, acquisition of new skills, open-minded and organized way of facing problems with self awareness and evolving analytical solutions
PSO 4	Create and initiate innovations effectively and communicate efficiently with the computing community and society at large to bridge the gap between computing industry and academia
PSO 5	Through Digital Literacy, understand, assess and commit to professional and ethical principles, norms and responsibilities of the cyber world and the ability for work efficacy as a part of a team and engage effectively with diverse stakeholders
PSO 6	Ability and willingness to embark on new ventures and initiatives with critical thinking and desire for more continuous learning focusing on life skills
PSO 7	Use research-based knowledge and research methods to design, analyse, and interpret data and to synthesize information to provide valid findings to serve community

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

COURSE CODE	COURSES	HRS.	CREDITS	SEMESTER IN WHICH THE COURSE IS OFFERED	CIA MKS	ESE MKS	TOTAL MARKS
19PAD2SS	**SOFT SKILLS**	40	3	I	40	60	100
19PADCM	**CONTENT MANAGEMENT SYSTEM** (Offered by Dept. Of Computer Science)	40	4	II	40	60	100
21PADAJ	**Scripting using Angular JS**(Offered by Dept. Of Computer Science)	40	4	II	40	60	100
19PAD4CV	**COMPREHENSIVE VIVA** (Question bank to be prepared for all the papers by the respective course teachers)	-	2	IV	-	-	100
19PAD4RC	**READING CULTURE**	15/ Semester	1	I-IV	-	-	-

EXTRA CREDIT COURSES

Course Code	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
19PGBSL1	**SELF LEARNING COURSE for ADVANCED LEARNERS** BIOINFORMATICS	-	5	I & II	40	60	100
21PGBSL2	**SELF LEARNING COURSE for ADVANCED LEARNERS** DEVELOPING WEB SERVICES	-	5	III & IV	40	60	100
21PGBSL3	**SELF LEARNING COURSES for ADVANCED LEARNERS** EVOLUTIONARY COMPUTING	-	5	III & IV	40	60	100
	MOOC COURSES (Department Specific Courses) * Students can opt other than the listed course from UGC-SWAYAM portal as well as from NPTEL	-	Respective Credits allotted by UGC	-	-	-	100

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:

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.

Digital Open Educational Resources (DOER)

1.https://www.udemy.com/course/advanced-java-programming
2. https://nareshit.in/advanced-java-training/
3.https://www.youtube.com/watch?v=Ae-r8hsbPUo

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I: NETWORKING				
1.1	**Networking:** Networking Basics	1	Chalk & Talk	Black Board
1.2	The Networking Classes and Interfaces – Inet Address -– Inet4Address and Inet6AddressTCP	1	Lecture	Smart Board
1.3	TCP /IP Client Sockets – URL – URL Connection-HttpURLConnection	2	Lecture	Smart Board
1.4	The URI Class – Cookies – TCP/IP Server Sockets – Datagrams.	2	Lecture	Black Board
1.5	Regular Expressions and other Packages:	1	Chalk & Talk	Black Board
1.6	The Core Java API Packages-	1	Discussion	Google classroom
1.7	Regular Expression Processing	2	Lecture	PPT & Smart Board
1.8	Reflection – RMI.	2	Lecture	PPT & Smart Board
UNIT II: SWINGS				
2.1	GUI Programming with Swing: Introducing Swing	1	Chalk & Talk	Black Board
2.2	Two key swing features – The MVG Connection	2	Chalk & Talk	Black Board

2.3	Components and Containers – Swing Packages	1	Discussion	Google classroom
2.4	Event Handling – Swing Applet – Painting in Swing.	2	Lecture	PPT & Smart Board
2.5	Exploring Swing			
2.6	JLabel and ImageIcon – JtextField	1	Lecture	PPT & Smart Board
2.7	The Swing Buttons – JTabbedPane	2	Chalk & Talk	Black Board
2.8	JScrollPane – JList – JComboBox	2	Lecture	PPT & Smart Board
2.9	Trees – JTable.	1	Lecture	PPT & Smart Board
UNIT III: SWINGS MENU				
3.1	Swing Menus: Menu Basics- Overview of JMenuBar, JMenu, and JMenuItem	2	Chalk & Talk	Black Board
3.2	Create a Main Menu – Add Mnemonics and Accelerators to Menu Items	2	Chalk & Talk	Black Board
3.3	Add Images and Tooltips to Menu Items	2	Discussion	Google classroom
3.4	Use JRadioButtonMenuItem and JcheckBoxMenuItem	2	Lecture	PPT & Smart Board
3.5	Create a Popup Menu – Create a Toolbar –Use Actions	2	Chalk & Talk	Black Board
3.6	Entire MenuDemo Program Together	2	Flipped Learning	Online/ E-Content/ Text Books
UNIT IV: JDBC				
4.1	**JDBC- Java Database Connectivity:** Introducing JDBC Driver Types -	1	Lecture	PPT & Smart Board
4.2	Creating Your First First JDBC Program- Performing Batch Updates – Using Save points	1	Chalk & Talk	Black Board

4.3	Configuring the JDBC-ODBC Bridge-Explaining Database Connection pools and data sources	2	Lecture	PPT & Smart Board
4.4	Revisiting DBProcessor-Using the RowSet Interface.	1	Discussion	Black Board
4.5	**Servlets:** The Life Cycle of a Servlet – Servlet Development Options – Using Tomcat	2	Chalk & Talk	Black Board
4.6	Simple Servlet – The Servlet API- The javax.servlet Package- Reading Servlet Parameters-	2	Lecture	PPT & Smart Board
4.7	The javax.servlet.http Package-Handling HTTP Requests and Responses-Using Cookies – Session Tracking	3	Lecture	PPT & Smart Board
UNIT V: JSP				
5.1	JSP: Introducing JSP – Examining MVC and JSP- JSP Scripting Elements and Directives	2	Seminar	PPT & Smart Board
5.2	Working with Variable Scopes – Error pages	1	Seminar	PPT & Smart Board
5.3	Using java Beans – Designing an online Store with JSP – Simple programs using JSP.	2	Seminar	PPT & Smart Board
5.4	Using JSP Tag Extensions– Use of Tag Extensions -	2	Seminar	PPT & Smart Board
5.5	Explaining custom tag concepts	2	Seminar	PPT & Smart Board
5.6	Explaining taglib mapping – Understanding Tag Handlers.	2	Seminar	PPT & Smart Board
5.7	Exploring Dynamic Attributes.	1	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	4	4	-	-	-	8	-	8	20 %
K3	2	2	-	5	-	9	-	9	22.5 %
K4	2	2	-	-	5	9	-	9	22.5 %
K5	2	2	5	-	-	9	-	9	22.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES (CO)

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Describe client/server applications, TCP/IP socket programming and distributed applications using RMI.	K2,K3	PSO1& PSO2	PO1
CO 2	Analyze and design Window based applications using Swing Objects.	K2,K3	PSO3& PSO4	PO2
CO 3	Develop and design Java programs using Swing components	K3,K4	PSO2 &PSO5	PO3
CO 4	Discuss the various JDBC drivers and demonstrate J2EE application using JDBC connection and server side programs with Servlets.	K4,K5	PSO6 &PSO7	PO2 & PO3
CO 5	Write component-based Java programs using. JavaBeans.	K3,K5	PSO1 &PSO3	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO1	2	1					
CO2			3	2			
CO3		3			2		
CO4						2	1
CO5	2		2				

Mapping COs Consistency with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3			
CO2		2		
CO3			2	
CO4		2	1	
CO5				1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2** ♦ Weakly Correlated -**1**

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:

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

Digital Open Educational Resources (DOER)

1. https://www.tutorialspoint.com/distributed-operating-system
2. https://teachcomputerscience.com/distributed-operating-system/
3. https://youtu.be/NYBKXzl5bWU

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I: INTRODUCTION				
1.1	Fundamentals – Distributed computing systems	3	Discussion	Black Board
1.2	Evolution of distributed computing systems	2	Lecture	Smart Board
1.3	Distributed computing system models	1	Chalk & Talk	LCD
1.4	Popularity of distributed computing systems	2	Lecture	Black Board
1.5	Distributed operating system	2	Lecture	Black Board
1.6	Issues in designing a distributed operating system	3	Discussion	Google classroom
1.7	Introduction to distributed computing environment(DCE)	2	Chalk & Talk	Video
UNIT II : MESSAGE PASSING				
2.1	Message Passing – Introduction	2	Discussion	Black Board
2.2	Desirable features of a good message-passing system	1	Lecture	Black Board
2.3	Issues in IPC by message passing	2	Discussion	Google classroom
2.4	Synchronization – Buffering	2	Lecture	PPT

2.5	Multidatagram messages	1	Chalk & Talk	Smart Board
2.6	Remote Procedure Calls – Introduction	3	Lecture	PPT
2.7	The RPC model – Transparency of RPC	2	Lecture	Black Board
2.8	Implementing RPC mechanism	2	Chalk & Talk	Video
UNIT III: DISTRIBUTED SHARED MEMORY				
3.1	Distributed Shared Memory – Introduction	2	Chalk & Talk	Black Board
3.2	General architecture of DSM systems	1	Chalk & Talk	Black Board
3.3	Design and implementation issues of DSM	3	Discussion	Google classroom
3.4	Synchronization – Introduction	2	Lecture	PPT
3.5	Clock Synchronization – Election Algorithms	1	Chalk & Talk	Black Board
3.6	Resource Management – Introduction	1	Chalk & Talk	Black Board
3.7	Desirable features of a good global scheduling algorithm	2	Lecture	Smart Board
3.8	Load Sharing Approach	3	Chalk & Talk	Black Board
UNIT IV: PROCESS MANAGEMENT				
4.1	Process Management – Introduction	1	Lecture	PPT & Smart Board
4.2	Process migration	2	Chalk & Talk	Black Board
4.3	Distributed File Systems – Introduction	2	Lecture	PPT
4.4	Desirable features of a good distributed file system	3	Discussion	Black Board
4.5	File models– File Accessing Models	2	Chalk & Talk	Black Board
4.6	File-Sharing semantics	1	Lecture	Smart Board
4.7	File-Caching schemes	2	Lecture	PPT

4.8	File Replication – Fault Tolerance	2	Discussion	Black Board
UNIT V: LINUX				
5.1	The Linux Shell and File Structure: The Shell	2	Seminar	PPT & Smart Board
5.2	The Command Line – History	1	Seminar	PPT & Smart Board
5.3	Filename Expansion	2	Seminar	PPT & Smart Board
5.4	Standard Input/Output and Redirection	1	Seminar	PPT & Smart Board
5.5	Pipes – Ending Processes	2	Seminar	PPT & Smart Board
5.6	The shell scripts and Programming	1	Seminar	PPT & Smart Board
5.7	Shell Variables – Shell Scripts	3	Seminar	PPT & Smart Board
5.8	Environment Variables and Subshells	2	Seminar	PPT & Smart Board
5.9	Control Structures – TCSH/C Shell Control structures	1	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Discuss the core concepts of distributed systems.	K1/K2	PSO1& PSO2	PO1
CO 2	Analyze various message passing mechanisms with its model.	K3/K4	PSO3	PO2
CO 3	Identify the inherent difficulties that arise due to distribution of computing resources.	K2/K3	PSO4 &PSO5	PO2
CO 4	Explain migration with the process management policies.	K1/K2	PSO6	PO3
CO 5	Explain the basic concepts, design and structure of the LINUX operating system.	K3/K4	PSO7	PO3

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	2	2					
CO2			1				
CO3				2	3		
CO4						3	
CO5							2

Mapping COs Consistency with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2			
CO2		3		
CO3		2		
CO4			2	
CO5			3	

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

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: 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.

Digital Open Educational Resources (DOER)

1. https://www.oreilly.com/library/view/software-engineering/9788131758694/xhtml/chapter007.xhtml
2. https://www.javatpoint.com/software-engineering-object-oriented-design

3. https://www.tutorialride.com/software-engineering/oo-design-concept-in-software-engineering.htm
4. http://cs-exhibitions.uni-klu.ac.at/index.php?id=448

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
Unit -1 - INTRODUCTION				
1.1	Generic view of Process – Software Engineering – A layered technology	3	Chalk & Talk	Black Board
1.2	A process framework – The capability Maturity Model Integration (CMMI)	2	Discussion	LCD
1.3	Process patterns – Process Assessment – Personal and Team Process Models	4	Flipped Learning	PPT & White board
1.4	Technology – Product and Process – Specialized Process Models	3	Lecture	Black Board
1.5	The Unified Process –Agility –Agile Process – Agile Process Models.	3	Lecture	Black Board
Unit -2 - SYSTEM MODELING REQUIREMENTS				
2.1	System Engineering - Computer Based Systems - System Modeling Requirements Engineering	4	Lecture	PPT & White board
2.2	A bridge to design and construction	2	Lecture	PPT & White board
2.3	Requirements engineering tasks, developing Use-Cases Building the analysis model	3	Chalk & Talk	Black Board
2.4	Requirement Analysis – Analysis modeling approaches	3	Chalk & Talk	Black Board
2.5	Data modeling concepts – Object-Oriented Analysis – Class based modelling	4	Chalk & Talk	Black Board
Unit -3 DESIGN ENGINEERING				
3.1	Design Engineering – Design within the context of Software Engineering	5	Lecture	PPT & White board

3.2	Design Process and Design Quality Creating an Architectural Design – Software Architecture	4	Lecture	PPT & White board
3.3	Data design Modeling Component level design –Component-Designing Class-Based Components	5	Chalk & Talk	Black Board
Unit -4 USER INTERFACE DESIGN				
4.1	Performing User Interface Design – The Golden Rules	4	Lecture	PPT &White board
4.2	User Interface analysis and Design Testing Strategies	4	Lecture	PPT & White board
4.3	A strategic approach to software testing	4	Chalk & Talk	Black Board
4.4	Object-Oriented Software Testing Tactics – Object Oriented Testing Methods	3	Chalk & Talk	Black Board
Unit – 5: UML				
5.1	Introducing the UML	3	Chalk & Talk	PPT & White board
5.2	Classes – Class Diagrams	4	Chalk & Talk	PPT & White board
5.3	Use cases- Use case diagrams.	4	Chalk & Talk	Black Board
5.4	Case Study	4	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Differentiate traditional and object oriented software engineering	K2	PSO1& PSO2	PO2
CO 2	Explain various SDLC methods of OOSE	K2, K3	PSO3& PSO4	PO3
CO 3	Describe techniques used in OOSE	K2, K4	PSO5	PO4
CO 4	Explain OOSE testing methods	K2, K3 & K4	PSO6	PO4
CO 5	Analyze and choose necessary method for a particular project	K3& K5	PSO7	PO5

Mapping COs Consistency with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	2	2					
CO 2			3	2			
CO 3					3		
CO 4						2	
CO 5							2

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4	PO5
CO 1		2			
CO 2			3		
CO 3				2	
CO 4				2	
CO 5					3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

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 :
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*

Digital Open Educational Resources (DOER)

1. **https://youtu.be/ZjjAbFxjxLQ**
2. **https://www.geeksforgeeks.org/theory-of-computation-automata-tutorials/**
3. **https://youtu.be/-aIRqNnUvEg**

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
	UNIT I: SET THEORY			
1.1	Set Theory- Introduction – Sets and Elements	2	Chalk & Talk	Black Board
1.2	Universal Set and Empty Set – Subsets, Venn Diagrams –Set Operations	2	Flipped Learning	PPT & White board
1.3	Algebra of sets and duality, Finite, Infinite Sets and Counting Principle	2	Lecture	Black Board
1.4	The Inclusion – Exclusion Principle	2	Chalk & Talk	Black Board
1.5	Classes of Sets, Power Sets, Partitions	2	Discussion	PPT & White board
1.6	Mathematical Induction, Multisets.	2	Chalk & Talk	Black Board
	UNIT II : RELATIONS			
2.1	Relations- Introduction	2	Lecture	PPT & White board
2.2	Product Sets	1	Lecture	PPT & White board
2.3	Pictorial Representations of Relations – Composition of Relations	2	Chalk & Talk	Black Board
2.4	Types of Relations	3	Chalk & Talk	Black Board
2.5	Closure Properties – Equivalence Relations	3	Chalk & Talk	Black Board
2.6	Partial Ordering Relations – n-Ary Relations	3	Discussion	PPT & White board
2.7	Relational Model for Databases.	1	Lecture	PPT & White board

UNIT III : FINITE AUTOMATA & REGULAR EXPRESSIONS				
3.1	Finite state systems-Basic definitions	2	Chalk & Talk	PPT & White board
3.2	Non-deterministic Finite Automata (NFA)	3	Chalk & Talk	PPT & White board
3.3	Finite Automata with output	3	Chalk & Talk	Black Board
3.4	The pumping lemma for regular set-	2	Chalk & Talk	Black Board
3.5	Closure properties of regular set	2	Chalk & Talk	Black Board
UNIT IV : CONTEXT-FREE GRAMMARS & PUSHDOWN AUTOMATA				
4.1	Context-Free Grammars**:** Motivation and introduction	3	Lecture	PPT & White board
4.2	Derivation trees	2	Lecture	PPT & White board
4.3	Chomsky Normal Form.	2	Chalk & Talk	Black Board
4.4	Greibach Normal Form	2	Chalk & Talk	Black Board
4.5	–. Pushdown Automata **:** Informal description – Definitions	3	Lecture	PPT & White board
UNIT V : TURING MACHINES				
5.1	Introduction-The Turing Machine Model-	3	Chalk & Talk	PPT & White board
5.2	Computable Languages and functions-	3	Chalk & Talk	PPT & White board
5.3	Techniques for Turing machines Constructions	6	Chalk & Talk	Black Board

EVALUATION PATTERN

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1	T2	Seminar	Assignment	OBT/PPT				
	10 Mks.	10 Mks.	5 Mks.	5 Mks	5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	4	4	-	-	-	8	-	8	20 %
K3	2	2	-	5	-	9	-	9	22.5 %
K4	2	2	-	-	5	9	-	9	22.5 %
K5	2	2	5	-	-	9	-	9	22.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse, **K5**-Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Demonstrate an in-depth understanding of theories, concept and techniques in automata and their link to computation.	K1,K2	PSO1& PSO4	PO1
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.	K1,K2	PSO3	PO1 & PO2
CO 3	Analyze the computational strengths and weaknesses of these machines	K3,K4	PSO4 &PSO5	PO1 & PO2
CO 4	Explain Context-Free Grammar.	K1,K2	PSO6	PO3
CO 5	Apply automata concepts and techniques in designing systems that address real world problems.	K2,K3	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3			3			
CO 2			3				
CO 3				3	2		
CO 4						3	
CO 5							2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2			
CO2	3	2		
CO3	3	2		
CO4			3	
CO5				2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG1B5	LAB I - Advanced Programming in Java	Practical	5	3

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

Programs are written using the following concepts

1. NETWORKS- TCP/IP
2. REGULAR EXPRESSION
3. RMI
4. GUI Programming with Swing and Swing Components
5. Java Database Connectivity
6. SERVLET
7. JSP

EVALUATION PATTERN

SCHOLASTIC		NON - SCHOLASTIC	MARKS		
C1	C2	C3	CIA	ESE	Total
25	10	5	40	60	100

C1 – Average of Two Monthly Tests

C2–Average of Weekly Tests

C3 – Non – Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	PSOs ADDRESSED
CO 1	Implementation of java applications that illustrate professionally acceptable coding and performance standards.	K2	PSO1& PSO2	PO1& PO2
CO 2	Develop distributed applications using RMI.	K2, K3	PSO3& PSO4	PO1& PO2
CO 3	Design and develop event-driven programming and graphical user interfaces using Swing-based GUI.	K2, K4	PSO5	PO3 & PO4
CO 4	Design and develop Java programs using JDBC connection for data access and also Develop server side programs with Servlets.	K2, K3 & K4	PSO6	PO3 & PO4
CO 5	Design and develop component-based Java programs using JavaBeans.	K3& K5	PSO7	PO3 & PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	2	2					
CO 2			3				
CO 3				3	2		
CO 4						2	
CO 5							2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2		
CO2	3	3		
CO3			2	3
CO4			3	3
CO5			2	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

M.Sc. Computer Science

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG1B6	LAB II – OPERATING SYSTEM	Practical	5	3

COURSE DESCRIPTION

In this lab students are able to describe and use the fundamental LINUX system tools and utilities.

COURSE OBJECTIVES

- To introduce the students to LINUX kernel programming
- To make the students aware of the features and capabilities of Linux so that they can utilize its improved functionalities
- To develop new Linux based software and can also contribute to the development of the operating system itself.

Programs are written using the following concepts:

Shell Script using Linux:

- To demonstrate various Shell commands like cat, grep, ls, more, ps, chmod, finger, ftp, etc.,
- Shell script to perform simple mathematical operations
- Shell script to perform string operations
- Shell script program to manipulate files
- Shell script to illustrate various system configurations
- Creating user accounts, switching user accounts, setting umask
- Linux general purpose utilities
- Shell script to customize user environment

EVALUATION PATTERN

SCHOLASTIC		NON - SCHOLASTIC	MARKS		
C1	C2	C3	CIA	ESE	Total
25	10	5	40	60	100

C1 – Average of Two Monthly Tests

C2 – Average of Weekly Tests

C3 – Non – Scholastic

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Utilize basic LINUX Utilities.	K3/K4	PSO1& PSO2	PO1
CO 2	Write different LINUX shell scripts and execute various shell programs.	K3/K4	PSO3& PSO7	PO2
CO 3	Apply LINUX system calls.	K3/K4	PSO5	PO2
CO 4	Compute various file permissions and have a basic understanding of system security.	K3/K4	PSO4	PO3
CO 5	Demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment.	K1/K2	PSO6	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	2	3					
CO 2			3				2
CO 3					1		
CO 4				2			
CO 5						3	

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2			
CO2		3		
CO3		3		
CO4			3	
CO5				2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19B1EDC	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:

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.

Digital Open Educational Resources (DOER)

1. https://www.tutorialspoint.com/html5/index.htm
2. https://www.w3schools.com/html/default.asp
3. https://www.tutorialrepublic.com/html-tutorial/
4. https://www.cs.uct.ac.za/mit_notes/web_programming.html

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I OVERVIEW OF HTML				
1.1	Fundamentals of HTML - Root Elements-Metadata Elements-	3	Chalk & Talk	Black Board
1.2	Section Elements-Heading Elements-Flow Elements- Phrasing Elements-Embedded Elements- Interactive Elements	2	Lecture	Smart Board
1.3	Working with Headings-Character Entities	2	Lecture	Smart Board
1.4	Horizontal Rules – Line Breaks – Paragraph	1	Lecture	Black Board
1.5	Citations – Quotations – Definitions - Comments.	1	Chalk & Talk	Black Board
UNIT II: WORKING WITH TEXT				
2.1	Working with Text - Formatting Text with HTML Elements	4	Chalk & Talk	Black Board
2.2	Physical styles – Logical styles – Defining the MARK Element-	3	Chalk & Talk	Black Board

2.3	Defining the STRONG Element- Defining the CODE Element- Defining the SMALL Element.	3	Discussio n	Google classroom
UNIT III: ORGANIZING TEXT				
3.1	Organizing Text in HTML -Arranging text – Allowing Word Breaks- Defining the preformatted Text - DIV Element and SPAN Element – Formatting Text in Tables -	3	Chalk & Talk	Black Board
3.2	Creating Ruby (Captioned) Text – Displaying List-Immediate Solutions : Allowing Word Breaks Using the WBR Element	3	Chalk & Talk	Black Board
3.3	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.	4	Discussio n	Google classroom
UNIT IV: CREATING TABLES				
4.1	Creating Tables - Understanding Tables – Describing the TABLE Elements	3	Lecture	PPT & Smart Board
4.2	CAPTION –COLGROUP – COL – TBODY – THEAD – TFOOT – TR – TD and TH - Creating a Simple Table – Adding a Title to a Table – Caption to a Table –	4	Chalk & Talk	Black Board
4.3	Specifying the Properties of the Columns – Spanning Rows and Columns – Using Images in a Table.	3	Lecture	PPT & Smart Board
UNIT V: UNDERSTANDING CSS				

5.1	Overview of CSS – Discussing the Evolution of CSS –	3	Seminar	PPT & Smart Board
5.2	Understanding the Syntax of CSS – Exploring CSS Selectors –	3	Seminar	PPT & Smart Board
5.3	Inserting CSS in an HTML Document	4	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Define various tags of HTML	K1	PSO1& PSO2	PO1
CO 2	Design a web page with attractive display	K3	PSO3& PSO7	PO2

CO 3	Create a Layout for a webpage using Block tags	K3	PSO4	PO4
CO 4	Explain how and where to apply CSS	K3	PSO6	PO3
CO 5	Analyze content to design website	K4	PSO5	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	**2**	**3**	**1**	**2**	**2**	**2**	**1**
CO 2	**1**	**1**	**2**	**2**	**2**	**2**	**3**
CO 3	**2**	**2**	**2**	**3**	**2**	**2**	**2**
CO 4	**2**	**2**	**2**	**1**	**1**	**2**	**1**
CO 5	**2**	**2**	**2**	**1**	**3**	**1**	**1**

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO 1	**2**	**1**	**2**	**2**
CO 2	**1**	**3**	**2**	**2**

CO 3	**2**	**2**	**1**	**3**
CO 4	**2**	**2**	**2**	**1**
CO 5	**2**	**2**	**1**	**3**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

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:

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.
7.

Digital Open Educational Resources (DOER)

1. https://www.tutorialspoint.com/asp.net/index.htm
2. https://www.w3schools.com/asp/default.ASP
3. https://www.youtube.com/watch?v=vZIOI136IKY

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I: INTRODUCING ASP .NET				
1.1	The Evolution of Web Development	1	Chalk & Talk	Black Board
1.2	Seven Important Facts about ASP .NET	2	Lecture	Smart Board
1.3	ASP .NET 3.5.	2	Lecture	Smart Board
1.4	*Web Forms:* Page Processing	2	Lecture	Black Board
1.5	Web Forms Processing Stages	2	Chalk & Talk	Black Board
1.6	The Page As a Control Container	1	Discussion	Google classroom
1.7	The Page Class	2	Lecture	PPT & Smart Board
UNIT II: SERVER CONTROLS				
2.1	Types of Server Controls	1	Chalk & Talk	Black Board
2.2	HTML Server Controls	2	Chalk & Talk	Black Board
2.3	Web Controls- The List Controls	1	Discussion	Google classroom
2.4	Input Validation Controls- Rich Controls	2	Lecture	PPT & Smart Board
2.5	*State Management:* ASP .NET State Management		Lecture	PPT & Smart Board
2.6	View State – Transferring Information Between Pages	1	Lecture	PPT & Smart Board
2.7	Cookies	2	Chalk & Talk	Black Board
2.8	Session State	2	Lecture	PPT & Smart Board
2.9	Application State	1	Lecture	PPT & Smart Board
UNIT III: ADO .NET FUNDAMENTALS				

3.1	The ADO.NET Architecture	1	Chalk & Talk	Black Board
3.2	The Connection Class	1	Chalk & Talk	Black Board
3.3	The Command and Data Reader Classes	1	Discussion	Google classroom
3.4	Transactions – Provider – Agnostic Code.	2	Lecture	PPT & Smart Board
3.5	*Data Components and the DataSet:* Building a Data Access Component	2	Chalk & Talk	Black Board
3.6	Disconnected Data – The DataSet	1	Chalk & Talk	Black Board
3.7	The DataAdapter Class	2	Flipped Learning	Online/ E-Content/ Text Books
3.8	The DataView Class – Typed DataSets	2	Lecture	PPT & Smart Board
UNIT IV: DATA BINDING				
4.1	Basic Data Binding – Data Source Controls	1	Lecture	PPT & Smart Board
4.2	The SQLDataSource	1	Chalk & Talk	Black Board
4.3	The ObjectDataSource	2	Lecture	PPT & Smart Board
4.4	The Limits of the Data Source Controls	1	Discussion	Black Board
4.5	*Rich Data Controls:* The GridView- Formatting the GridView	2	Chalk & Talk	Black Board
4.6	GridView Row Selection	1	Lecture	PPT & Smart Board
4.7	Sorting the GridView- Paging the GridView	1	Lecture	PPT & Smart Board
4.8	GridView Templates – The ListView	1	Chalk & Talk	Black Board
4.9	The DetailsView and FormView – Advanced Grids.	2	Chalk & Talk	Black Board
UNIT V: THEMES AND MASTER PAGE				
5.1	Cascading Style Sheets – Themes	1	Seminar	PPT & Smart Board

5.2	Standardizing Website Layout	1	Seminar	PPT & Smart Board
5.3	Master Page Basics	2	Seminar	PPT & Smart Board
5.4	Advanced Master Pages.	2	Seminar	PPT & Smart Board
5.5	*Website Navigation:* Pages with Multiple Views	2	Seminar	PPT & Smart Board
5.6	Site Maps	2	Seminar	PPT & Smart Board
5.7	The TreeView Control	1	Seminar	PPT & Smart Board
5.8	The Menu Control.	1	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1	T2	Seminar	Assignment	OBT/PPT				
	10 Mks.	10 Mks.	5 Mks.	5 Mks	5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Design and develop web applications using different Server Controls.	K1,K2	PSO1& PSO2	PO1 & PO2
CO 2	Implement web applications with different state managements	K2,K3, K4	PSO2 & PSO4	PO2 & PO3
CO 3	Create Data Access Technology using ADO.NET architecture.	K2,K3	PSO3 & PSO4	PO3 & PO4
CO 4	Design and utilize Data Sources using SQL Data Source , Object Data Source for data manipulation operation.	K2,K3,K4	PSO5 & PSO6	PO2 & PO3
CO 5	Design and develop web sites.	K3,K4	PSO7	PO3 & PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	2	3					
CO 2		3		2			
CO 3			3		2		
CO 4						3	
CO 5							2

Mapping COs Consistency with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2		
CO2		2	1	
CO3			2	1
CO4		3	2	
CO5			2	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science

SEMESTER –II

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:
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 Editorial Services &Pradeep Kothari Published By Dreamtech Press 2017

Digital Open Educational Resources (DOER)

1. https://www.tutorialspoint.com/android/index.htm
2. https://www.youtube.com/watch?v=fis26HvvDII
3. https://www.javatpoint.com/android-tutorial

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT -1	**WIRELESS COMMUNICATION FUNDAMENTALS**			
1.1	Introduction : Wireless Communication Fundamentals	2	Discussion	PPT & White board
1.2	Wireless transmission	4	Chalk & Talk	Black Board
1.3	Signal Propagation	3	Chalk & Talk	Black Board
1.4	Multiplexing	3	Chalk & Talk	Black Board
UNIT -2	**TELECOMMUNICATION NETWORKS&SATELLITE SYSTEMS**			
2.1	Telecommunication Networks: GSM: Mobile Services	3	Lecture	PPT & White board
2.2	Telecommunication Networks System Architecture	3	Lecture	PPT & White board
2.3	Satellite Systems: Basics (GEO,LEO,MEO)	3	Chalk & Talk	Black Board

2.3	Routing – Localization – Handover	3	Chalk & Talk	Black Board
UNIT -3 MOBILE NETWORK & TRANSPORT LAYERS				
3.1	Mobile IP : Goals, assumptions and requirements	3	Lecture	PPT & White board
3.2	IP packet delivery, Agent discovery, Registration,	3	Lecture	PPT & White board
3.3	Tunnelling and Encapsulation, Optimizations, Reverse Tunnelling	3	Lecture	Black Board
3.4	Mobile Transport Layer : Traditional TCP – Classical TCP improvements	3	Chalk & Talk	Black Board
UNIT -4 MOBILE APPLICATION DEVELOPMENT				
4.1	Application Design : The Screen Layout and the main.xml File - Component IDs - A Few Simple Controls	3	Lecture	PPT & White board
4.2	Creating and Configuring an Android Emulator - Communicating with the Emulator	3	Lecture	PPT &White board
4.3	Controls and User Interface : Check Boxes - Radio Buttons	3	Chalk & Talk	Black Board
4.4	The Spinner DatePicker - Follow-Up - Key Classes Used in the controls	3	Chalk & Talk	Black Board
Unit – 5 MULTISCREEEN APPLICATIONS & WORKING WITH IMAGES				
5.1	**Multiscreen Applications :** Stretching the Screen - Pop-Up Dialog Boxes and Toasts	3	Chalk & Talk	PPT & White board
5.2	Menus on the Android Device - Follow-Up. - Key Classes Used in Multiscreen Applications	4	Chalk & Talk	PPT & White board
5.3	**Working with Images :** Displaying Images, Using Images Stored on the Android Device, Follow-Up, Key Classes Used in working with images	5	Lecture	PPT & White board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Design scripts to meet given interface and media control requirements	K1/K2/K3	PSO1& PSO2	PO1
CO 2	Utilize variables, properties and other code elements appropriately to implement the code design	K1/K2/K3	PSO3& PSO4	PO1& PO2
CO 3	Implement and evaluate techniques for the installation of mobile applications	K1/K2/K3/K4	PSO5	PO1 & PO2
CO 4	Explain the principles of technologies which support media production and delivery on a variety of platforms	K1/K2/K3	PSO6	PO3
CO 5	Evaluate alternative mobile frameworks, and contrast different programming platforms	K1/K2/K3/K4	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2					
CO2			3	3			
CO3					3		
CO4						3	
CO5							2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2			
CO2	3	2		
CO3	3	2		
CO4			3	
CO5				2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

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: 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.

Digital Open Educational Resources (DOER)

1. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
2. https://www.javatpoint.com/daa-tutorial
3. https://www.guru99.com/design-analysis-algorithms-tutorial.html

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I: INTRODUCTION				
1.1	Introduction: Definition – Algorithm Specification	3	Chalk & Talk	Black Board
1.2	Performance Analysis – Space Complexity	2	Lecture	Smart Board
1.3	Time Complexity – Amortized Complexity	3	Lecture	LCD
1.4	Asymptotic Notation - Randomized Algorithms	2	Lecture	Black Board
1.5	Basics of Probability Theory	2	Chalk & Talk	Black Board
1.6	Randomized Algorithms: An Informal Description	3	Discussion	Google classroom
UNIT II : DATA STRUCTURES				
2.1	Elementary Data Structures: Stacks And Queues	2	Discussion	Black Board
2.2	Trees - Binary Trees	2	Chalk & Talk	Black Board
2.3	Dictionaries - Binary Search Trees	3	Discussion	Google classroom
2.4	Priority Queues – Heaps – Heapsort	2	Lecture	PPT
2.5	Sets and Disjoint Set Union	1	Lecture	Smart Board
2.6	Graphs – Introduction	2	Discussion	PPT & Smart Board
2.7	Definitions – Graph Representations	3	Lecture	Black Board
UNIT III : DIVIDE AND CONQUER				
3.1	Divide And Conquer: General Method	2	Chalk & Talk	Black Board

3.2	Binary Search – Finding the Maximum and Minimum	3	Chalk & Talk	Black Board
3.3	Merge Sort	2	Discussion	Google classroom
3.4	Greedy Method: The General Method	2	Lecture	PPT
3.5	Container Loading – Knapsack Problem	1	Chalk & Talk	Black Board
3.6	Minimum Cost Spanning Trees	3	Discussion	LCD
3.8	Load Sharing Approach	2	Lecture	Smart Board
UNIT IV : DYNAMIC PROGRAMMING				
4.1	Dynamic Programming: The General Method	2	Lecture	PPT
4.2	Multistage Graphs	2	Chalk & Talk	Black Board
4.3	All Pairs Shortest Paths	1	Lecture	Smart Board
4.4	Single-Source Shortest Paths	3	Discussion	Black Board
4.5	General Weights – Optimal Binary Search Trees	2	Chalk & Talk	Black Board
4.6	0/1-Knapsack	2	Lecture	PPT
4.7	The Traveling Salesperson Problem	3	Discussion	Smart Board
UNIT V : BACKTRACKING				
5.1	Backtracking: The General Method	2	Seminar	PPT & Smart Board
5.2	The 8 Queens Problem – Graph Colouring	1	Seminar	PPT & Smart Board
5.3	NP-Hard and NP-Complete Problems	2	Seminar	PPT & Smart Board
5.4	Basic Concepts – NP-Hard Graph Problems	1	Seminar	PPT & Smart Board
5.5	Clique Decision Problem	2	Seminar	PPT & Smart Board

5.6	Node Cover Decision Problem, Chromatic Number Decision Problem	1	Seminar	PPT & Smart Board
5.7	Directed Hamiltonian Cycle	2	Seminar	PPT & Smart Board
5.8	Travelling Salesperson Decision Problem	2	Seminar	PPT & Smart Board
5.9	AND/OR Graph Decision Problem	2	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Analyze the time and space complexity of given Algorithms.	K3/K4	PSO1& PSO2	PO3
CO 2	Demonstrate operations like searching, insertion, and deletion on various data structures.	K1/K2	PSO3& PSO4	PO2

CO 3	Identify appropriate sorting/searching technique for given problem.	K3/K4	PSO5	PO1
CO 4	Apply the dynamic programming technique to solve the problems.	K3/K4	PSO6	PO4
CO 5	Discuss advanced tree and graph applications.	K1/K2	PSO7	PO3

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	1	2					
CO 2			2	1			
CO 3					3		
CO 4						2	
CO 5							3

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1			2	
CO2		3		
CO3	3			
CO4				2
CO5			2	

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science
SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG2B10	Lab III- Extreme Programming - ASP.NET	Lecture	5	3

COURSE DESCRIPTION

This course consists of 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 design and develop dynamic Control and validate the inputs by validation controls
- To design and develop different State Management Techniques..
- To implement ADO.NET classes and also develop data manipulation operation using SQL Data Source controls and Object Data Source
- To design and developWeb Site Layout and web site navigations.

SYLLABUS

Programs are written using the following concepts

- Validation of Server controls, Application using Server controls and State Management such as view state, session state, Application state.
- ADO.NET classes and Data Bound controls such as Data Adapter, Data Set , Data Table and SQL Data Source controls and Object Data Source.
- Implementing DML operation using SQL Data Source controls and Object Data Source.
- ASP.NET Application using Rich Data Control such as Data Grid, Data List, Repeater and GridView, Detail View, Form View.
- Standardizing Web Site Layout – Master Page Basics and Advanced Master Pages.
- Website navigation using Sitemap Control,Treeview Control and Menu View Control.

EVALUATION PATTERN

SCHOLASTIC		NON - SCHOLASTIC	MARKS		
C1	C2	C3	CIA	ESE	Total
25	10	5	40	60	100

C1 – Average of Two Monthly Tests

C2 – Average of Weekly Tests

C3 – Non – Scholastic

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Design and develop web applications using different Server Controls.	K1,K3	PSO1& PSO2	PO1
CO 2	Develop web applications using different state management's techniques.	K2, K4	PSO3 & PSO4	PO2
CO 3	Implement web applications using ADO.NET architecture.	K2,K3,K4	PSO3 &PSO5	PO3
CO 4	DML(Data Manipulation Language) Operations are implemented using SQL Data Source , Object Data Source.	K3,K4	PSO4 & PSO6	PO3
CO 5	Create simple web sites using different data sources.	K3,K4	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	2	3					
CO 2			3	2			
CO 3			2		3		
CO 4				3		3	
CO 5							2

Mapping COs Consistency with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3			
CO2		2		
CO3			2	
CO4			3	
CO5				3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG2B11	LAB IV – Mobile Application Development Using Android Studio	Lecture	5	3

COURSE DESCRIPTION

To Mobile User Interface (UI) Design is also essential in the creation of Mobile Apps. mobile UI considers constraints, context, screen, input, and mobility as outlines for design.

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

SYLLABUS

Programs are written using the following concepts

- Simulate mobile application that uses GUI components.
- Simulate mobile application that uses Layout Managers and event listeners.
- Simulate mobile application to create native calculator application.
- Simulate mobile application that makes use of database.
- Simulate mobile application that makes use of RSS Feed.
- Simulate mobile a native application that uses GPS location information.
- Simulate mobile application that writes data to the SD card.
- Simulate mobile application that creates an alert upon receiving a message.
- Write a mobile application that creates alarm clock.

EVALUATION PATTERN

SCHOLASTIC		NON - SCHOLASTIC	MARKS		
C1	C2	C3	CIA	ESE	Total
25	10	5	40	60	100

- **C1** – Average of Two Monthly Tests
- **C2** – Average of Weekly Tests
- **C3** – Non – Scholastic

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Develop enterprise-level mobile solutions.	K1/K2/K3	PSO1& PSO2	PO1 & PO2
CO 2	Install and configure Android application development tools	K1/K2/K3	PSO4 & PSO5	PO1
CO 3	Demonstrate Save State information across important operating system events	K1/K2/K3/K4	PSO3	PO2
CO 4	Develop advanced application programs using Android	K1/K2/K3	PSO6	PO3
CO 5	Design and develop mobile applications.	K1/K2/K3	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO 1	3	3					
CO 2				3	3		
CO 3			3				
CO 4						3	
CO 5							2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3		
CO2	3			
CO3		2		
CO4			2	
CO5				3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

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 :

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.

Digital Open Educational Resources (DOER)

1. https://www.youtube.com/watch?v=57HXAUSrZ_E
2. https://youtu.be/rln_kZbYaWc
3. https://youtu.be/fgtUFzxNztA

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
	UNIT I: INTRODUCTION			
1.1	Artificial Intelligence – a brief Review, Pitfalls of the Traditional AI, Computational Intelligence-	4	Chalk & Talk	Black Board
1.2	An Emergence of a New Computational Paradigm, Computational Intelligence- a Formal Definition,	4	Lecture	Smart Board
1.3	Soft computing- Definitions	3	Lecture	LCD
1.4	Fundamental Elements of Soft Computing, Computational Learning Theory, Synergism in Softcomputing.	4	Lecture	Black Board
	UNIT II : FUZZY SETS AND RELATIONS			
2.1	Conventional Sets, Fuzzy Sets, Membership Functions, Continuous and Discrete Membership Functions, Typical Membership Functions,	4	Discussion	Black Board
2.2	Operations on Fuzzy Sets, Basic Concepts Associated with Fuzzy Sets,	4	Chalk & Talk	Black Board

2.3	Extension Principle of Fuzzy Sets, Fuzzy Relations, Projection of Fuzzy Relations, Fuzzy Pattern Recognition-Introduction,	3	Discussion	Google classroom
2.4	The Fuzzy C-Means Clustering Algorithm, Image Segmentation Using Fuzzy C-Means.	4	Lecture	PPT
UNIT III : MACHINE LEARNING USING NEURAL NETS				
3.1	Biological Neural Networks, Artificial Neural Networks,	2	Chalk & Talk	Black Board
3.2	Principles of Learning in a Neural Net, Stability and Convergence,	3	Chalk & Talk	Black Board
3.3	Three Important Theorems for Stability Analysis of Neural Dynamics, Supervised Neural Learning	3	Discussion	Google classroom
3.4	Algorithms-Introduction, McCulloch-Pitts Model, The Perceptron Learning Model,	2	Lecture	PPT
3.5	Unsupervised Neural Learning Algorithms-Introduction,	2	Chalk & Talk	Black Board
3.6	Discrete Hopfield Network, Continuous Hopfield Neural Net.	3	Discussion	LCD
UNIT IV : EVOLUTIONARY COMPUTING ALGORITHMS				
4.1	Introduction – Genetic algorithm: How does it work? –	3	Lecture	PPT
4.2	Deterministic explanation of Holland's observation – Stochastic Explanation of GA –	4	Chalk & Talk	Black Board
4.3	The Markov model for convergence analysis	2	Lecture	Smart Board
4.4	Application of GA in optimization problems – Application of GA in	4	Discussion	Black Board

	machine learning – Application of Gain intelligent search –			
4.5	Genetic Programming – Conclusions	2	Chalk & Talk	Black Board
UNIT V : EMERGING AREAS OF COMPUTATIONAL INTELLIGENCE				
5.1	Introduction – Artificial life–	3	Seminar	PPT & Smart Board
5.2	particle Swarm optimization	3	Seminar	PPT & Smart Board
5.3	Fuzzy Chaos theory	3	Seminar	PPT & Smart Board
5.4	Rough sets	3	Seminar	PPT & Smart Board
5.5	Granular computing	3	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Demonstrate the fundamental concepts of soft computing and its applications.	K1/K2/K3	PSO2& PSO3	PO1
CO 2	Explain the concepts of fuzzy sets, knowledge representation using fuzzy rules, and other machine intelligence applications of fuzzy logic	K1/K2/K3	PSO1 & PSO4	PO2
CO 3	Discuss the basics of an evolutionary computing	K1/K2/K3	PSO5	PO3
CO 4	Analyze the concept of fuzzy sets, knowledge representation using fuzzy rules, and other machine intelligence applications of fuzzy logic	K1/K2/K3/K4	PSO6	PO4
CO 5	Understand the basics of an evolutionary computing paradigm.	K1/K2/K3	PSO7	PO3

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1		**2**	**2**				
CO 2	**3**			**3**			
CO 3					**3**		
CO 4						**2**	

CO 5							**2**

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	**3**			
CO2		**3**		
CO3			**3**	
CO4				**2**
CO5				**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**
♦ Weakly Correlated -**1**

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: 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.

Digital Open Educational Resources (DOER)

1. https://deepai.org/machine-learning-glossary-and-terms/neural-network
2. https://youtu.be/aircAruvnKk

3. https://youtu.be/vpOLiDyhNUA

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I: Introduction to Neural Network and Artificial Neural Networks				
1.1	Introduction to Neural Networks : Neural Process, Overview – The Rise of Neurocomputing	3	Chalk & Talk	Black Board
1.2	Introduction to Artificial Neural Networks : Introduction, Artificial Neural Networks	2	Discussion	LCD
1.3	Historical Development of Neural Networks, Biological Neural Networks	4	Flipped Learning	PPT & White board
1.4	Comparison between the brain and the computer, Comparison between artificial and biological Neural Network	3	Lecture	Black Board
1.5	Basic Building blocks of Artificial Neural Networks, Artificial Neural Netowrk Terminologies.	3	Lecture	Black Board
UNIT II: Models of Artificial Neural Networks and Perceptron Networks				
2.1	Fundamental Models of Artificial Neural Networks: Introduction	4	Lecture	PPT & White board
2.2	McCullach-Pitts Neuron Model	2	Lecture	PPT & White board

2.3	Learning Rules, Hebb Net	3	Chalk & Talk	Black Board
2.4	Perceptron Networks: Introduction	3	Chalk & Talk	Black Board
2.5	Layer Perceptron, Brief Introduction to Multilayer Perceptron Networks	4	Chalk & Talk	Black Board
UNIT II: Models of Artificial Neural Networks and Perceptron Networks				
3.1	Associative Memory Networks : Introduction	5	Lecture	PPT & White board
3.2	Algorithm for Pattern Association	4	Lecture	PPT & White board
3.3	Hetero Associative Memory Neural Networks	5	Chalk & Talk	Black Board
UNIT IV : Feedback and Feed forward Network				
4.1	Feedback Networks: Introduction, Discrete HopFiled Net	4	Lecture	PPT & White board
4.2	Continuous Hoppfiled Net, Relation between BAM and Hopfiled Nets	4	Lecture	PPT & White board
4.3	Round robin Scheduling-Priority – Based Scheduling- Assigning Priorities	4	Chalk & Talk	Black Board
4.4	Deadlock	3	Chalk & Talk	Black Board
UNIT V: Special Networks				
5.1	Memory Management :Object in C-Scope-Lifetime	3	Chalk & Talk	PPT & White board

5.2	Automatic Allocation-Static Allocation –Dynamic Allocation	4	Chalk & Talk	PPT & White board
5.3	Recursive Functions and Memory Allocation Problems.	4	Chalk & Talk	Black Board
5.4	Shared Memory: Recognizing Shared Objects-Reentrant Functions.	4	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	PSOs ADDRESSED
CO 1	Explain the basic concepts of Neural Networks.	K1	PSO3 & PSO4	PO1
CO 2	Describe the various Neural Network models	K2	PSO1 & PSO2	PO3

CO 3	Analyze Learning Rules of Neural Network to apply	K4	PSO5	PO4
CO 4	Distinguish Feedback and Feed forward networks	K2	PSO7	PO3
CO 5	Compare Special networks and discuss the applications of Neural Network.	K2	PSO5	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	1	1	2	3	2	2	2
CO 2	3	2	2	2	2	2	2
CO 3	2	2	2	2	3	1	1
CO 4	2	2	2	2	1	1	3
CO 5	2	2	2	2	2	1	1

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO 1	2	2	2	2
CO 2	2	2	2	1

CO 3	**2**	**2**	**1**	**3**
CO 4	**2**	**2**	**2**	**1**
CO 5	**2**	**2**	**1**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science

SEMESTER –II

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: 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.

Digital Open Educational Resources (DOER)

1. https://www.guru99.com/software-testing.html
2. https://www.tutorialspoint.com/software_testing/index.htm
3. https://www.javatpoint.com/software-testing-tutorial

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT -1 SOFTWARE QUALITY IN GLOBAL BUSINESS CONTEXT				
1.1	Introduction, Quality Attributes, Quality Challenges in Globally Outsources Business, importance of Quality as a Business Driver,	5	Chalk & Talk	Black Board
1.2	Understanding Life cycle Models, Object Oriented Life cycle Models,	5	Discussion	LCD
1.3	Choosing the right type of Life cycle model for software project.	5	Flipped Learning	PPT & White board
UNIT -2SQA ROLE IN AN ORGANIZATION				
2.1	Introduction, Understanding the SQA function..	5	Lecture	PPT & White board
2.2	Managing SQA Operations **:**SQA : Organizational Level Initiatives, Defect Prevention,	5	Lecture	PPT & White board
2.3	Quality Assurance – Important Dimensions for the QA Analyst	5	Chalk & Talk	Black Board
UNIT -3TESTING FOR QUALITY VALIDATION				
3.1	Introduction , The Purpose of Testing , Testing is not same as Inspection and Audit, Testing is not the same as Debugging ,	5	Lecture	PPT & White board

3.2	The Testing Life Cycle, Roles and Responsibilities in Testing,	5	Lecture	PPT & White board
3.3	Test Artefacts, The Test Plan and Test Techniques.	5	Chalk & Talk	Black Board
UNIT -4 TESTING MODELS AND TECHNIQUES				
4.1	Testing Phases with the V-Model and W-Model –	5	Lecture	PPT & WHITE BOARD
4.2	Testing Techniques – Risk-based Approach to Testing –	5	Lecture	PPT & White board
4.3	Test Process Automation and Test Tool Selection.	5	Chalk &Talk	Black Board
UNIT V : TESTING TOOLS				
5.1	Load Runner – Overview of LoadRunner – Creating Vuser script using Virtual User Generator –	5	Chalk & Talk	PPT & White board
5.2	Creating Virtual Users Using Loadrunner Controller –	5	Chalk & Talk	PPT & White board
5.3	JMeter – JMeter Overview – JDBC Test – HTTP Test.	5	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	4	4	-	-	-	8	-	8	20 %
K3	2	2	-	5	-	9	-	9	22.5 %
K4	2	2	-	-	5	9	-	9	22.5 %
K5	2	2	5	-	-	9	-	9	22.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Discuss various software application domains and different process model used in software development.	K1	PSO1	PO3
CO 2	Demonstrate the basics of software quality assurance and defect prevention.	K1 & K2	PSO3	PO4
CO 3	Compare different testing strategies and tactics.	K2 & K3	PSO2 & PSO5	PO2
CO 4	Describe the software testing techniques in different environments.	K2 & K3	PSO4	PO1
CO 5	Explain high performance testing using Jmeter.	K2 & K3	PSO6, PSO7	PO1

Mapping COs Consistency with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	1	2	2	2	2	2	2
CO 2	1	1	2	2	2	2	2
CO 3	1	3	2	1	3	2	2
CO 4	2	2	2	3	2	2	2
CO 5	2	2	2	1	2	3	2

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO 1	2	2	3	1
CO 2	1	1	2	2
CO 3	1	3	2	1
CO 4	3	2	2	2
CO 5	3	1	2	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science

SEMESTER –II

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 :

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.

Digital Open Educational Resources (DOER)

1. https://www.electronics-notes.com/articles/digital-embedded-processing/embedded-systems/basics-primer.php
2. https://www.circuitstoday.com/embedded-systems-an-introduction
3. https://www.elprocus.com/basics-of-embedded-system-and-applications/
4. https://profile.iiita.ac.in/bibhas.ghoshal/IEMB_2018/Lectures/ES_basics.pdf

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I :INTRODUCTION				
1.1	Introduction of Embedded System, Design Goals For Embedded Software, Real Time	3	Chalk & Talk	Black Board
1.2	Multitasking, Embedded Processors	2	Discussion	LCD
1.3	Programming Languages, Real Time Kernel, Building an Embedded Application Unique.	4	Flipped Learning	PPT & White board
1.4	Data Representation: Fixed – Precision Binary Numbers-Integers-Real Numbers-	3	Lecture	Black Board
1.5	ASCII Representation of Text-Binary –Coded Decimal (BCD).	3	Lecture	Black Board
UNIT II:GETTING THE MOST OUT OF C				
2.1	Getting The Most Out Of C: IntroductionInteger data types-mixing data types-manipulating bits in memory-manipulating bit in I/O ports	4	Lecture	PPT & White board
2.2	Accessing Memory mapped I/O Devices-structures-variant Access.	4	Lecture	PPT & White board
2.3	A programmers view of computer organization: Memory –the central processing unit(CPU)	4	Chalk & Talk	Black Board
2.4	Input/output(I/O) - Intel architecture.	3	Chalk & Talk	Black Board

UNIT III:MIXING C AND ASSEMBLY				
3.1	Mixing C And Assembly**:** Programming in Assembly -Register Usage Conventions-	4	Lecture	PPT & White board
3.2	Typical Use of Addressing Options-Instruction Sequencing	4	Lecture	PPT & White board
3.3	Procedure Call and Return-Parameter Passing-Retrieving Parameters- Everything is Pass by Value	4	Chalk & Talk	Black Board
3.4	Temporary Variables.Input/Output Programming: The Intel I/O Instructions-Interrupt –Driven I/O.	3	Chalk & Talk	Black Board
UNIT IV:CONCURRENT SOFTWARE				
4.1	Concurrent Software : Foreground/Background Systems - Multithreaded Programming	4	Lecture	PPT & White board
4.2	Shared Resources And Critical Sections Scheduling: Thread States-Pending Threads-Context Switching	4	Lecture	PPT & White board
4.3	Round robin Scheduling-Priority – Based Scheduling- Assigning Priorities	4	Chalk & Talk	Black Board
4.4	Deadlock	3	Chalk & Talk	Black Board
UNIT V:MEMORY MANAGEMENT				
5.1	Memory Management :Object in C-Scope-Lifetime	3	Chalk & Talk	PPT & White board
5.2	Automatic Allocation-Static Allocation –Dynamic Allocation	4	Chalk & Talk	PPT & White board

5.3	Recursive Functions and Memory Allocation Problems.	4	Chalk & Talk	Black Board
5.4	Shared Memory: Recognizing Shared Objects-Reentrant Functions.	4	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	4	4	-	-	-	8	-	8	20 %
K3	2	2	-	5	-	9	-	9	22.5 %
K4	2	2	-	-	5	9	-	9	22.5 %
K5	2	2	5	-	-	9	-	9	22.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	35

Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	PSOs ADDRESSED
CO 1	Explain the concepts of embedded systems	**K1**	PSO1& PSO2	PO1
CO 2	Analyze the architecture of embedded systems	**K4**	PSO3& PSO4	PO2
CO 3	Describe about the processors and memory organization	**K2**	PSO5	PO3
CO 4	Distinguish when and where to apply embedded concepts	**K2**	PSO6	PO2

CO 5	Describe different embedded system design technologies	**K2**	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO1	**3**	**2**	**1**	**2**	**2**	**2**	**1**
CO2	**2**	**2**	**3**	**3**	**1**	**2**	**1**
CO3	**2**	**2**	**2**	**2**	**2**	**1**	**1**
CO4	**2**	**2**	**2**	**2**	**2**	**3**	**1**
CO5	**2**	**2**	**2**	**2**	**2**	**1**	**3**

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO 1	**2**	**1**	**2**	**2**
CO 2	**1**	**3**	**2**	**1**
CO 3	**2**	**1**	**3**	**2**
CO 4	**2**	**3**	**1**	**1**
CO 5	**2**	**1**	**1**	**3**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PGB2EDC	Web Development	Extra Departmental Course	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.

SYLLABUS

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:

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 Nos.) : 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.

Digital Open Educational Resources (DOER)

1. https://www.tutorialspoint.com/html5/index.htm
2. https://www.w3schools.com/html/default.asp

   https://www.tutorialrepublic.com/html-tutorial/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I OVERVIEW OF HTML				
1.1	Fundamentals of HTML - Root Elements-Metadata Elements-	3	Chalk & Talk	Black Board
1.2	Section Elements-Heading Elements-Flow Elements- Phrasing Elements-Embedded Elements- Interactive Elements	2	Lecture	Smart Board
1.3	Working with Headings-Character Entities	2	Lecture	Smart Board
1.4	Horizontal Rules – Line Breaks – Paragraph	1	Lecture	Black Board
1.5	Citations – Quotations – Definitions - Comments.	1	Chalk & Talk	Black Board
UNIT II: WORKING WITH TEXT				
2.1	Working with Text - Formatting Text with HTML Elements	4	Chalk & Talk	Black Board

2.2	Physical styles – Logical styles – Defining the MARK Element-	3	Chalk & Talk	Black Board
2.3	Defining the STRONG Element- Defining the CODE Element- Defining the SMALL Element.	3	Discussion	Google classroom
UNIT III: ORGANIZING TEXT				
3.1	Organizing Text in HTML -Arranging text – Allowing Word Breaks- Defining the preformatted Text - DIV Element and SPAN Element – Formatting Text in Tables -	3	Chalk & Talk	Black Board
3.2	Creating Ruby (Captioned) Text – Displaying List-Immediate Solutions : Allowing Word Breaks Using the WBR Element	3	Chalk & Talk	Black Board
3.3	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.	4	Discussion	Google classroom
UNIT IV: CREATING TABLES				
4.1	Creating Tables - Understanding Tables – Describing the TABLE Elements	3	Lecture	PPT & Smart Board
4.2	CAPTION –COLGROUP – COL – TBODY – THEAD – TFOOT – TR – TD and TH - Creating a Simple Table – Adding a Title to a Table – Caption to a Table –	4	Chalk & Talk	Black Board
4.3	Specifying the Properties of the Columns – Spanning Rows and Columns – Using Images in a Table.	3	Lecture	PPT & Smart Board

UNIT V: UNDERSTANDING CSS				
5.1	Overview of CSS – Discussing the Evolution of CSS –	3	Seminar	PPT & Smart Board
5.2	Understanding the Syntax of CSS – Exploring CSS Selectors –	3	Seminar	PPT & Smart Board
5.3	Inserting CSS in an HTML Document	4	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	4	4	-	-	-	8	-	8	20 %
K3	2	2	-	5	-	9	-	9	22.5 %
K4	2	2	-	-	5	9	-	9	22.5 %

K5	**2**	**2**	**5**	**-**	**-**	**9**	**-**	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	**-**		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	**COURSE OUTCOMES**	**KNOWLEDGE LEVEL (ACCORDING TO REVISED**	**PSOs ADDRESSED**	**POs ADDRESSED**

		BLOOM'S TAXONOMY)		
CO 1	Define various tags of HTML	K1	PSO1& PSO2	PO1
CO 2	Design a web page with attractive display	K3	PSO3& PSO7	PO2
CO 3	Create a Layout for a webpage using Block tags	K3	PSO4	PO4
CO 4	Explain how and where to apply CSS	K3	PSO6	PO3
CO 5	Analyze content to design website	K4	PSO5	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	**3**	**3**	**1**	**3**	**2**	**2**	**1**
CO 2	**1**	**1**	**3**	**1**	**2**	**2**	**3**
CO 3	**2**	**2**	**2**	**3**	**2**	**2**	**2**
CO 4	**2**	**2**	**2**	**1**	**1**	**3**	**2**
CO 5	**2**	**2**	**2**	**1**	**3**	**1**	**2**

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO 1	3	1	2	2
CO 2	1	3	2	2
CO 3	2	2	1	3
CO 4	2	2	3	1
CO 5	2	2	1	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science

SEMESTER –III

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 :

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.

Digital Open Educational Resources (DOER)

1. https://youtu.be/q0AnFKYl7sg
2. https://www.tutorialspoint.com/dip/index.htm
3. https://www.geeksforgeeks.org/digital-image-processing-basics/

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I : INTRODUCTION				
1.1	Definition Of Digital Image Processing	3	Chalk & Talk	Black Board
1.2	The Origins Of Digital Image Processing	2	Discussion	LCD
1.3	Examples Of Fields That Use Digital Image Processing	4	Flipped Learning	PPT & White board
1.4	Fundamental Steps In Digital Image Processing	3	Lecture	Black Board
1.5	Components Of An Image Processing System.	3	Lecture	Black Board
UNIT II : DIGITAL IMAGE FUNDAMENTALS				
2.1	Elements Of Visual Perception Light And Electromagnetic Spectrum	2	Lecture	PPT & White board
2.2	Image Sensing And Acquisition	2	Lecture	PPT & White board
2.3	Image Sampling And Quantization	2	Chalk & Talk	Black Board
2.4	Image Interpolation	3	Chalk & Talk	Black Board

2.5	Some Basic Relationships Between Pixels	3	Chalk & Talk	Black Board
2.6	An Introduction To The Mathematical Tools Used In Digital Image Processing	3	Discussio n	PPT & White board
UNIT III: INTENSITY TRANSFORMATIONS AND SPATIAL FILTERING				
3.1	Intensity Transformations And Spatial Filtering	2	Lecture	PPT & White board
3.2	Background	1	Lecture	PPT & White board
3.3	Some Basic Intensity Transformation Functions	2	Chalk & Talk	Black Board
3.4	Histogram Processing	3	Chalk & Talk	Black Board
3.5	Fundamentals Of Spatial Filtering	2	Chalk & Talk	Black Board
3.6	Smoothing Spatial Filters	2	Chalk & Talk	PPT & White board
3.7	Sharpening Spatial Filters	2	Chalk & Talk	PPT & White board
3.8	Combining Spatial Enhancement Methods	1	Discussio n	PPT & White board
UNIT IV: IMAGE RESTORATION AND RECONSTRUCTION				
4.1	A Model Of The Image Degradation/Restoration Process	2	Lecture	PPT & White board
4.2	Noise Models	3	Lecture	PPT & White board
4.3	Restoration In The Presence Of Noise Only	3	Chalk & Talk	Black Board

4.4	Spatial Filtering	3	Chalk & Talk	Black Board
4.5	Color Image Processing: Color Fundamentals	2	Lecture	PPT & White board
4.6	Color Models	2	Lecture	PPT & White board
UNIT V: IMAGE COMPRESSION AND SEGMENTATION				
5.1	Image Compression And Segmentation- Fundamentals	2	Chalk & Talk	PPT & White board
5.2	Huffman Coding	2	Chalk & Talk	PPT & White board
5.3	Golomb Coding-	1	Chalk & Talk	Black Board
5.4	Arithmetic Coding	1	Chalk & Talk	Black Board
5.5	LZW Coding	2	Chalk & Talk	Black Board
5.6	Runlength Coding	2	Chalk & Talk	PPT & White board
5.7	Segmentation Fundamentals	2	Discussion	PPT & White board
5.8	Point Detection	1	Lecture	PPT & White board
5.9	Line Detection	1	Lecture	PPT & White board
5.10	Edge Detection	1	Lecture	PPT & White board

vels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	4	4	-	-	-	8	-	8	20 %
K3	2	2	-	5	-	9	-	9	22.5 %
K4	2	2	-	-	5	9	-	9	22.5 %
K5	2	2	5	-	-	9	-	9	22.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Explain the representation of digital image and its manipulations	K1	PSO1& PSO2	PO1
CO 2	Analyze image sampling and quantization requirements and implications	K3	PSO3& PSO4	PO2
CO 3	Describe various Transformation and Filtering Techniques	K3	PSO5	PO1
CO 4	Demonstrate Restoration And Reconstruction models	K3	PSO6	PO1
CO 5	Utilize Image Compression And Segmentation for efficient storage	K4	PSO7	PO3

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	1	1	1	2	2
CO 2	1	1	3	2	1	2	2
CO 3	2	2	2	2	3	2	2
CO 4	2	2	2	2	1	3	1
CO 5	2	2	2	2	1	1	3

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	2	2
CO2	1	3	2	2
CO3	3	1	2	2
CO4	3	2	2	2
CO5	1	2	2	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

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:

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.

Digital Open Educational Resources (DOER)

1. https://hanj.cs.illinois.edu/bk3/bk3_slidesindex.htm
2. https://www.guru99.com/data-mining- tutorial.html
3. https://www.youtube.com/watch?v=syY4tCAxGfk

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I: INTRODUCTION				
1.1	Introduction to Data Mining-its importance – Data Mining on what kind of Data	4	Chalk & Talk	Black Board
1.2	Data Mining Functionalities- What Kinds of Patterns Can Be Mined	2	Discussion	LCD
1.3	Are All of the Patterns Interesting – Classification of Data Mining Systems	4	Flipped Learning	PPT & White board
1.4	Data Mining Task Primitives	2	Lecture	Black Board
1.5	Major Issues in Data Mining	3	Lecture	Black Board
UNIT -2 DATA PREPROCESSING				
2.1	Need to Preprocess the Data - Descriptive Data Summarization	2	Lecture	PPT & White board
2.2	Data Cleaning – Data Integration and Transformation	3	Lecture	PPT & White board
2.3	Data Reduction – Data Discretization and Concept Hierarchy Generation.	3	Chalk & Talk	Black Board

2.4	An Overview - What is a Data Warehouse	2	Chalk & Talk	Black Board
2.5	Data Warehouse Implementation	3	Chalk & Talk	Black Board
2.6	From Data Warehousing to a Data Mining.	2	Discussion	PPT & White board
UNIT -3 : MINING FREQUENT PATTERNS AND CLASSIFICATION				
3.1	Efficient and Scalable Frequent Itemset Mining Methods: The Apriori Algorithm : Finding Frequent Itemsets Using Candidate Generation	2	Lecture	PPT & White board
3.2	Generating Association Rules from Frequent Itemsets- Improving the Efficiency of Apriori	2	Lecture	PPT & White board
3.3	Mining Frequent Itemsets without Candidate Generation	2	Chalk & Talk	Black Board
3.4	Mining Frequent Itemsets Using Vertical Data Format	2	Chalk & Talk	Black Board
3.5	Classification - Prediction – Issues Regarding Classification and Prediction	2	Chalk & Talk	Black Board
3.6	Classification by Decision Tree Induction	2	Chalk & Talk	PPT & White board
3.7	Bayesian Classification	2	Chalk & Talk	PPT & White board
3.8	Rule-Based Classification	1	Discussion	PPT & White board
UNIT IV: CLUSTER ANALYSIS				
4.1	What is Cluster Analysis – Types of Data in Cluster Analysis	3	Lecture	PPT & White board
4.2	A Categorization of Major Clustering Methods	3	Lecture	PPT & White board
4.3	Partitioning Methods	3	Chalk & Talk	Black Board
4.4	Hierarchical Methods	3	Chalk & Talk	Black Board

4.5	DENSITY-BASED METHODS	3	LECTURE	PPT & White board
UNIT – 5APPLICATIONS AND TRENDS IN DATA MINING				
5.1	Data Mining Applications	3	Chalk & Talk	PPT & White board
5.2	Data Mining System Products and Research Prototypes	4	Chalk & Talk	PPT & White board
5.3	Social Impacts of Data Mining	4	Chalk & Talk	Black Board
5.4	Trends in Data Mining.	4	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**

Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Explain the fundamental concept of Data Mining and analyze and evaluate the data cleaning, integration , transformation and reduction techniques	K1	PSO1& PSO2	PO1
CO 2	Design multidimensional data using Data Warehouse architecture.	K1,,K2	PSO3& PSO4	PO2
CO 3	Design and evaluate Classification algorithms	K1,K3,K4	PSO7	PO3
CO 4	Identify the types of data in Cluster Analysis and categorize the Cluster Methods	K3,K4	PSO5	PO3

CO 5	Utilize the Data Mining techniques in various real applications and in major issues	K1,K2	PSO6, PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	1	3	1	1	2	2
CO 2	1	2	1	2	1	2	2
CO 3	2	2	2	2	1	1	3
CO 4	2	2	2	2	3	1	3
CO 5	2	2	2	2	1	3	2

Mapping COs Consistency with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	1	2	2
CO2	1	2	2	2
CO3	2	2	3	1
CO4	2	2	3	1
CO5	2	2	1	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSCS	19PG3B14	LAB V- Digital Image Processing	Practical	5	3

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

Programs are written using the following concepts

Image Enhancement Techniques

Histogram Processing, Median Filtering, Spatial Filtering, Filtering in Frequency Domain.

Image Analysis and Segmentation

Feature Extraction, Edge deduction, Thresholding

Image Compression Techniques

Scalar and Vector Quantisation, Huffman encoding, Run Length encoding., Transform image coding

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

SCHOLASTIC		NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**CIA**	**ESE**	**Total**
25	**10**	**5**	**40**	**60**	**100**

- **C1** – Average of Two Monthly Tests
- **C2** – Average of Weekly Tests
- **C3** – Non – Scholastic

COURSE OUTCOMES (CO)

NO.	COURSE OUTCOME	KNOWLEDGE LEVEL (ACCORDING TO BLOOM'S TAXONOMY)	PSOS ADDRESSED	POS ADDRESSED
CO 1	Demonstrate Fundamental Steps involved in Digital Image Processing	K3	PSO1& PSO2	PO1
CO 2	Analyze and use Mathematical Tools for Digital Image Processing	K4	PSO3& PSO4	PO2
CO 3	Apply Intensity Transformation functions and Spatial filtering methods	K3,K4	PSO5	PO3
CO 4	Utilize Color Image Processing with different Color Models	K3,K4	PSO6	PO3
CO 5	Implement Image Segmentation Techniques and Image Compression Techniques using Huffman , Golomb and Arithmetic coding algorithms	K4	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	**3**	**3**	**1**	**3**	**1**	**2**	**2**
CO 2	**1**	**1**	**3**	**3**	**1**	**2**	**2**
CO 3	**2**	**2**	**2**	**2**	**3**	**1**	**1**

CO 4	**2**	**2**	**2**	**2**	**1**	**3**	**1**
CO 5	**2**	**2**	**2**	**2**	**1**	**1**	**3**

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	**2**	**1**	**2**	**2**
CO2	**1**	**3**	**2**	**2**
CO3	**2**	**2**	**3**	**1**
CO4	**2**	**2**	**3**	**1**
CO5	**2**	**2**	**1**	**3**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG3B15	LAB VI – Data Mining And Data Warehousing	Practical	5	3

COURSE DESCRIPTION

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

COURSE OBJECTIVES

- To assess data pre-processing steps involved in different datasets
- To evaluate classification algorithms using Weka tool with sample data.
- To evaluate clusters algorithms using Weka tool with sample data .

SYLLABUS

DATA MINING AND DATA WAREHOUSE PROGRAM - WEKA TOOL

1. Rules for identifying attributes.
2. Listing of categorical attributes and the real-valued attributes separately.
3. Demonstration of preprocessing on dataset student.arff
4. Demonstration of Association rule process on dataset weather-nominal.arff using apriorialgorithm
5. Demonstration of Mining Frequent Itemsets without Candidate Generation using supermarker.arff.
6. Test on classification of decision tree using segment-test.arff
7. Demonstration of classification rule process on dataset contact-lens.arff using j48 algorithm.
8. Demonstration of classification rule process on dataset iris.arff using id3 algorithm
9. Demonstration of classification rule process on dataset labor.arff using naïve bayes algorithm.
10. Demonstration of clustering rule process on dataset vote.arff using k-means algorithm

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

SCHOLASTIC		**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**CIA**	**ESE**	**Total**
25	**10**	**5**	**40**	**60**	**100**

- **C1** – Average of Two Monthly Tests
- **C2** – Average of Weekly Tests
- **C3** – Non – Scholastic

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Utilize Weka tool to evaluate Data Mining algorithms.	K1,K2	PSO1& PSO2	PO1
CO 2	Demonstrate pre-processing steps involved in different datasets.	K2,K3	PSO3	PO2
CO 3	Develop the decision tree algorithm using different datasets	K3,K4	PSO4	PO3
CO 4	Demonstrate the classification and clusters algorithms using large datasets.	K3,K4	PSO5 & PSO6	PO4
CO 5	Analyze Data Mining techniques for realistic data.	K1, K3, K4	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	1	1	1	2	2
CO 2	2	1	3	1	1	2	2
CO 3	2	2	2	3	1	2	2

CO 4	**2**	**2**	**2**	**1**	**3**	**3**	**1**
CO 5	**2**	**2**	**2**	**1**	**2**	**2**	**3**

Mapping COs Consistency with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	**3**	**1**	**2**	**2**
CO2	**1**	**2**	**2**	**2**
CO3	**2**	**2**	**3**	**1**
CO4	**2**	**2**	**1**	**3**
CO5	**2**	**2**	**1**	**3**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG3BSI	Summer Internship/ Training/ Online Certification	Major Core	-	3

It is a summer training programme undertaken by the students in a company of their choice. This is aimed to help them have an experience of the real time environment. It will act as a platform for the future placement.

The students are mandated to complete one online course in the area of their interest.

The students have to submit a report after the internship. This report will be assessed through a viva-voce internal exam.

EVALUATION PATTERN

SCHOLASTIC					MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
15	5	10	5	5	40	60	100

PG CIA COMPONENTS

C1 - Report Review - 15

C2 - Conference participation - 5

C3 - Paper Presentation - 10

C4 - Online Course Completion - 5

C5 - Model Presentation - 5

Total - 40

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Identify employment contacts leading directly to a full-time job following course completion	K2	PSO1& PSO2	PO2
CO 2	Create communication, interpersonal and other soft skills essential for the job interview process	K2, K3	PSO3	PO4
CO 3	Analyse the project requirements and engages in continuing professional development	K2, K4	PSO5	PO3
CO 4	Analyze a problem and identify the computing requirements appropriate to its solution.	K2, K3 & K4	PSO6	PO3
CO 5	Utilizing a new software tool.	K3& K5	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	1	1	1	2	2
CO 2	1	1	3	1	1	2	2
CO 3	2	2	2	2	3	1	1
CO 4	2	2	2	3	1	3	1
CO 5	2	2	2	2	1	1	3

Mapping COs Consistency with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	1	3	2	1
CO2	2	2	2	3
CO3	2	2	3	1
CO4	2	2	3	1
CO5	2	2	1	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

I M.Sc. Computer Science

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: 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.

Digital Open Educational Resources (DOER)

1. https://hanj.cs.illinois.edu/bk3/bk3_slidesindex.htm
2. https://www.guru99.com/data-mining- tutorial.html
3. https://www.youtube.com/watch?v=syY4tCAxGfk

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I: BASIC OF PYTHON PROGRAMMING				
1.1	Features of Python-History of Python-The Future of Python-	2	Chalk & Talk	Black Board
1.2	Writing and Executing First Python Program-Literal Constants-Variables and Identifiers-	3	Lecture	LCD
1.3	Data Types- Input Operation-Comments-Reserved Words-Indentation-	3	Lecture	Smart Board
1.4	Operation and Expressions-Expression in Python –Operations on Strings-	4	Lecture	PPT
1.5	Other Data Types-Type Conversion.	3	Chalk & Talk	Black Board
UNIT II: DECISION CONTROL STATEMENTS				
2.1	Introduction to Decision Control Statements-Selection /Conditional Branching Statements-	3	Chalk & Talk	Black Board
2.2	Basic Loop Structure /Iterative Statements-Nested Loops-	3	Chalk & Talk	Black Board
2.3	The Break Statement-The Continue Statement-The Pass Statement-The Else Statement used with Loops.	3	Discussion	Google classroom
2.4	Functions and Modules: Introduction – Function Declaration and Definition-Function Call-Variables Scope and Lifetime-The Return Statement	3	Lecture	PPT

2.5	More On Defining Function-Lambda Functions or Anonymous Functions-Documentation Strings	3	Lecture	Smart Board
UNIT III: PYTHON STRINGS REVISITED				
3.1	Concatenating ,Appending ,and Multiplying Strings-String Formatting Operator, Build in String Methods and Functions	5	Chalk & Talk	Black Board
3.2	Slice Operation-Ord()and Chr() Function-Comparing String-Iteration String –The String Module-Regular Expressions-Metacharacters in Regular Expression.	5	Chalk & Talk	Black Board
3.3	File Handling: File Path-Types of Files-Opening and Closing Files-Reading and Writing Files-File Positions-Renaming and Deleting Files-Directory Methods	5	Chalk & Talk	Black Board
UNIT IV: DATA STRUCTURES				
4.1	Sequence-Lists-Functional Programming-Tuple-Sets-Dictionaries	2	Lecture	PPT & Smart Board
4.2	Classes and Objects:Classes and Objects-Class Methods and Self Arguments,	2	Chalk & Talk	Black Board
4.3	Constructer-Class Variables and Object Variables-Other Special Methods-	3	Lecture	PPT
4.4	Public and Private Data Members-Private Methods-Built in Function-	2	Discussion	Black Board
4.5	Built in Class Attributes-Garbage Collection-Class Methods-Static Methods	2	Chalk & Talk	Black Board
UNIT V: INHERITANCE				
5.1	Inheriting Classes in Python-Types of Inheritance-Composition-.	3	Seminar	PPT & Smart Board
5.2	Abstract Classes and Interfaces-Metaclass.	4	Seminar	PPT & Smart Board

5.3	Operator overloading: Introduction-Implementing Operator Overloading-Reverse Adding-Overriding –Getitem-(),Setitem-(),Methods-Overriding the in Operator-Overloading Miscellaneous Function-Overriding the –Call-() Method.	4	Seminar	PPT & Smart Board
5.4	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	4	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Understand python is a useful scripting language for developers.	K2	PSO1& PSO2	PO1
CO 2	Apply to lists, tuples, and dictionaries in python programs	K2, K3	PSO3& PSO4	PO1
CO 3	Identify the structure and components of a python program.	K2, K4	PSO5	PO2
CO 4	Analyze the design philosophy that emphasizes code readability,notably using significant whitespace.	K2, K3 & K4	PSO6	PO2

CO 5	Utilizing a new software tool.	K3& K5	PSO7	PO3

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	1	2	2	2	2
CO 2	1	1	2	2	3	1	2
CO 3	2	2	2	2	3	1	2
CO 4	2	2	2	2	1	3	2
CO 5	2	2	2	2	1	1	3

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	1	1
CO2	2	1	1	1
CO3	1	2	1	1
CO4	1	2	1	1
CO5	1	1	2	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –III

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:

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.

Digital Open Educational Resources (DOER)

1. https://www.edn.com/cryptography-and-network-security-the-basics-part-i/
2. https://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf
3. https://www.geeksforgeeks.org/cryptography-and-network-security-principles/

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I: INTRODUCTION				
1.1	Classical Encryption Techniques: Symmetric Cipher Model	3	Chalk & Talk	Black Board
1.2	Substitution Techniques	2	Lecture	LCD
1.3	Rotor Machines – Steganography	1	Lecture	Smart Board
1.4	Block Ciphers and the DES	2	Lecture	PPT
1.5	Traditional Block Cipher Structure	2	Chalk & Talk	Black Board
1.6	The Data Encryption Standard – A DES Example	1	Discussion	Google classroom
1.7	The Strength of DES	2	Lecture	Black Board
1.8	Block Cipher Design Principles	2	Discussion	LCD
UNIT II: PUBLIC KEY CRYPTOGRAPHY				
2.1	Public Key Cryptography and RSA	3	Chalk & Talk	Black Board
2.2	Principles of Public-key Cryptosystems	1	Chalk & Talk	Black Board
2.3	The RSA Algorithm	2	Discussion	Google classroom
2.4	Other Public Key Cryptosystems	3	Lecture	PPT
2.5	Diffie-Hellman key Exchange	1	Lecture	Smart Board
2.6	Elgamal Cryptographic System	3	Discussion	PPT & Smart Board
2.7	Elliptic Curve Arithmetic and Cryptography	2	Lecture	Black Board
UNIT III: AUTHENTICATION AND HASH FUNCTION				
3.1	Cryptographic Hash Functions: Applications	2	Chalk & Talk	Black Board
3.2	Two Simple Hash Functions	2	Chalk & Talk	Black Board
3.3	Requirements and Security	1	Discussion	Google classroom
3.4	Hash Functions based on cipher block chaining – SHA	2	Lecture	PPT
3.5	Message Authentication Codes, Requirements & Functions	2	Chalk & Talk	Black Board

3.6	Requirements of Message Authentication Codes	1	Chalk & Talk	Black Board
3.7	Security of MACs	2	Discussion	Smart Board
3.8	MACs based on hash functions: HMAC	3	Lecture	Black Board
UNIT IV: DIGITAL SIGNATURES AND KEY MANAGEMENT				
4.1	Digital Signatures: properties – Attacks And Forgeries	2	Lecture	PPT & Smart Board
4.2	Digital Signature Requirements – Direct Digital Signature	2	Chalk & Talk	Black Board
4.3	Elgammal Digital Signature Scheme	3	Lecture	PPT
4.4	Schnorr Digital Signature Scheme – NIST Digital Signature Algorithm	2	Discussion	Black Board
4.5	Key Management and Distribution	2	Chalk & Talk	Black Board
4.6	Symmetric Key Distribution Using Symmetric and Asymmetric Encryption	2	Lecture	Smart Board
4.7	Distribution of Public Keys	2	Chalk & Talk	LCD
UNIT V: NETWORK SECURITY				
5.1	User Authentication	2	Seminar	PPT & Smart Board
5.2	Remote user authentication principles	1	Seminar	PPT & Smart Board
5.3	Kerberos Version 5	2	Seminar	PPT & Smart Board
5.4	Electronic Mail Security: PGP	2	Seminar	PPT & Smart Board
5.5	S/MIME, IP Security	1	Seminar	PPT & Smart Board
5.6	Node Cover Decision Problem, Chromatic Number Decision Problem	2	Seminar	PPT & Smart Board

5.7	Overview - IP Security Policy	3	Seminar	PPT & Smart Board
5.8	Encapsulating Security Payload	2	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Explain the various symmetric encryption techniques and demonstrate the functionalities of DES algorithm.	K1/K2	PSO1& PSO2	PO1
CO 2	Analyze public key algorithms.	K3/K4	PSO3& PSO4	PO2
CO 3	Evaluate the authentication concept and hash algorithms.	K2/K3	PSO5	PO3
CO 4	Apply the concepts of key management techniques.	K3/K4	PSO6	PO4
CO 5	Analyze the vulnerabilities in data communication through networks.	K3/K4	PSO7	PO3

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	1	2	2	2	2	2	2
CO2	1	1	2	2	1	2	2
CO3	2	2	2	2	3	2	2
CO4	2	2	2	2	1	3	1
CO5	2	2	2	2	1	2	3

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	2	1	2	2
CO2	1	3	2	2
CO3	2	2	3	1
CO4	2	2	1	3
CO5	2	2	3	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –III

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 :

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.

Digital Open Educational Resources (DOER)

1. https://cs.uwaterloo.ca/~tozsu/courses/cs856/F02/lecture-1-ho.pdf
2. https://docs.oracle.com/cd/B19306_01/server.102/b14231/ds_concepts.htm

https://www.brainkart.com/article/Distributed-Database-Concepts_11590/

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I: Overview Of Distributed Database				
1.1	Distributed Data Processing - What is a Distributed Database System?	1	Chalk & Talk	Black Board
1.2	Data Delivery Alternatives - Promises of DDBSs	2	Lecture	Smart Board
1.3	Complicating factors	2	Lecture	Smart Board
1.4	Problem Areas16	2	Lecture	Black Board
1.5	Distributed Database Design - Top-Down Design Process	2	Chalk & Talk	Black Board
1.6	Bottom-up Design Process -	2	Discussion	Google classroom
1.7	Distribution Design - Fragmentation	2	Lecture	PPT & Smart Board
1.8	Allocation	2	Lecture	PPT & Smart Board
UNIT II: Overview Of Query Processing				
2.1	Query Processing Problem	1	Chalk & Talk	Black Board
2.2	Objectives of Query Processing	2	Chalk & Talk	Black Board
2.3	Complexity of Relational Algebra Operations	3	Discussion	Google classroom
2.4	Characterization of Query Processors	2	Lecture	PPT & Smart Board
2.5	Layers of Query Processing	3	Chalk & Talk	Black Board
2.6	Query Decomposition	2	Lecture	PPT & Smart Board
2.7	Localization of Distributed Data	2	Chalk & Talk	Black Board
UNIT III: Distributed Concurrency Control				

3.1	Serializability Theory	1	Chalk & Talk	Black Board
3.2	Taxonomy of Concurrency Control Mechanisms	2	Chalk & Talk	Black Board
3.3	Locking-Based Concurrency Control Algorithms	2	Lecture	PPT & Smart Board
3.4	Timestamp-Based Concurrency Control Algorithms	3	Lecture	PPT & Smart Board
3.5	Optimistic Concurrency Control Algorithms	3	Chalk & Talk	Black Board
3.6	Deadlock Management	2	Flipped Learning	Online/ E-Content/ Text Books
3.7	Relaxed" Concurrency Control	2	Chalk & Talk	Black Board
UNIT IV: Reliability And Replication				
4.1	Reliability Concepts and Measures	1	Lecture	PPT & Smart Board
4.2	Failures in Distributed DBMS	1	Chalk & Talk	Black Board
4.3	Local Reliability Protocols	2	Lecture	PPT & Smart Board
4.4	Distributed Reliability Protocols	2	Discussion	Black Board
4.5	Dealing with Site	2	Chalk & Talk	Black Board
4.6	Network Partitioning	2	Lecture	PPT & Smart Board
4.7	Consistency of Replicated Databases	2	Lecture	PPT & Smart Board
4.8	Replication Protocols - Group Communication	2	Flipped Learning	Online/ E-Content/ Text Books
4.9	Replication and Failures	1	Lecture	PPT & Smart Board
UNIT V: Distributed Object Database Management				

5.1	Fundamental Object Concepts and Object Models	1	Seminar	PPT & Smart Board
5.2	Object Distribution Design	2	Seminar	PPT & Smart Board
5.3	Architectural Issues	2	Seminar	PPT & Smart Board
5.4	Object Management	3	Seminar	PPT & Smart Board
5.5	Distributed Object Storage	3	Seminar	PPT & Smart Board
5.6	Object Query Processing	2	Seminar	PPT & Smart Board
5.7	Transaction Management	2	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA

Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Compare normal and distributed DBMS and to explain various approaches of DDBMS.	K1	PSO1& PSO2	PO1
CO 2	Formulate various kinds of retrieving statements to retrieve information from DDB.	K1,,K2	PSO3& PSO4	PO2
CO 3	Explain multiple processes dealing with distributed database system without clash	K1K2	PSO5	PO1
CO 4	Describe the set of protocols used in DDBMS to make effective communication.	K3,K4	PSO6	PO3
CO 5	Discuss object concepts and object models.	K1,K2	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	2	2	2	2	2
CO 2	1	1	3	3	1	2	2
CO 3	2	2	2	2	3	2	2
CO 4	2	2	2	2	1	3	1
CO 5	2	2	2	2	1	3	1

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	1	1	1
CO2	1	3	1	1
CO3	3	1	1	1
CO4	1	1	2	1
CO5	1	1	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –III

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:

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*

Digital Open Educational Resources (DOER)

1. https://www.vssut.ac.in/lecture_notes/lecture1422914957.pdf
2. https://www.guru99.com/compiler-design-tutorial.html
3. http://www.svecw.edu.in/Docs%5CCSECDLNotes2013.pdf

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I - INTRODUCTION TO COMPILING				
1.1	Compilers – Analysis of the source program	3	Chalk & Talk	Black Board
1.2	Phases of a compiler	2	Lecture	Smart Board
1.3	Cousins of the Compiler	1	Discussion	PPT
1.4	Grouping of Phases	2	Lecture	Black Board
1.5	Compiler construction tools	2	Chalk & Talk	Black Board
1.6	Lexical Analysis – Role of Lexical Analyzer	3	Discussion	Google classroom
1.7	Input Buffering – Specification of Tokens	2	Lecture	LCD
UNIT II - SYNTAX ANALYSIS				
2.1	Role of the parser	2	Chalk & Talk	Black Board
2.2	Context-Free Grammars	3	Chalk & Talk	LCD
2.3	Writing Grammars	2	Discussion	Google classroom
2.4	Top Down parsing	2	Lecture	Video
2.5	Bottom-up parsing	1	Discussion	Smart Board
2.6	Operator Precedent Parsing	3	Lecture	PPT
2.7	LR Parsers	2	Chalk & Talk	Black Board
UNIT III - INTERMEDIATE CODE GENERATION				
3.1	Intermediate languages	2	Chalk & Talk	LCD
3.2	Declarations – Assignment Statements	3	Chalk & Talk	Black Board

3.3	Boolean Expressions	2	Discussion	Google classroom
3.4	Case Statements	2	Lecture	PPT
3.5	Back patching	2	Chalk & Talk	Smart Board
3.6	Procedure calls	4	Discussion	Black Board
UNIT IV - CODE GENERATION				
4.1	Issues in the design of code generator	2	Lecture	PPT
4.2	The target machine – Runtime Storage management	3	Chalk & Talk	Black Board
4.3	Basic Blocks and Flow Graphs	2	Lecture	PPT & Smart Board
4.4	Next-use Information – A simple Code generator	1	Discussion	Black Board
4.5	Register allocation and Assignment	2	Chalk & Talk	Black Board
4.6	DAG representation of Basic Blocks	3	Lecture	PPT
4.7	Peephole Optimization	2	Chalk & Talk	Smart Board
UNIT V - CODE OPTIMIZATION				
5.1	Introduction– Principal Sources of Optimization	4	Seminar	PPT & Smart Board
5.2	Optimization of basic Blocks	3	Seminar	PPT & Smart Board
5.3	Loops in flow Graphs	4	Seminar	PPT & Smart Board
5.4	Introduction to Global Data Flow Analysis	4	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse, **K5**-Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Describe the phases of Compiler	K1/K2/K3	PSO1& PSO2	PO1
CO 2	Explain the role and type of Parser	K1/K2/K3	PSO3& PSO4	PO1
CO 3	Analyze and use Intermediate languages	K1/K2/K3/K4	PSO5	PO2
CO 4	Describe the design of code generation with register utilization	K1/K2/K3	PSO6	PO3
CO 5	Demonstrate code optimization techniques.	K1/K2/K3	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO 1	3	3	1	1	1	2	2
CO 2	1	1	3	3	1	2	2
CO 3	2	2	2	2	3	2	2
CO 4	2	2	2	2	1	3	1
CO 5	2	2	2	2	1	2	2

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	1	2	2
CO2	3	1	2	2
CO3	2	3	2	2
CO4	2	2	3	2
CO5	2	2	1	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

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:
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.

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1. https://www.networkworld.com/article/2212919/the-key-concepts-of-cloud-computing.html
2. https://www.esds.co.in/blog/cloud-computing-basic-concepts/#sthash.Gfm5LMfP.dpbs
3. https://www.guru99.com/cloud-computing-for-beginners.html

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I - INTRODUCTION TO COMPILING				
1.1	Introduction : Cloud Computing at a Glance	3	Lecture	Black Board
1.2	Historical Developments - Building Cloud Computing Environments	2	Discussion	Smart Board
1.3	Computing Platforms and Technologies	1	Chalk & Talk	LCD
1.4	Principles of Parallel and Distributed Computing	2	Lecture	Video
1.5	Eras of Computing - Parallel vs. Distributed Computing	2	Chalk & Talk	Black Board
1.6	Elements of Parallel Computing	1	Lecture	Google classroom
1.7	Elements of Distributed Computing	2	Discussion	Smart Board
1.8	Technologies for Distributed Computing	2	Chalk & Talk	Black Board
UNIT II: Virtualization & Cloud Computing Architecture				
2.1	Virtualization: Introduction - Characteristics of Virtualized Environments	2	Chalk & Talk	Black Board
2.2	Taxonomy of Virtualization Techniques	2	Lecture	Black Board
2.3	Virtualization and Cloud Computing	1	Discussion	Google classroom
2.4	Pros and Cons of Virtualization	3	Chalk & Talk	PPT & Smart Board
2.5	Cloud Computing Architecture : Introduction	1	Lecture	LCD
2.6	Cloud Reference Model - Types of Clouds	3	Lecture	PPT & Smart Board

2.7	Economics of the Cloud - Open Challenges	3	Discussion	
UNIT III: Concurrent and High-Throughput Computing				
3.1	Concurrent Computing: Thread Programming	2	Discussion	LCD
3.2	Introducing Parallelism for Single Machine Computation	3	Chalk &Talk	Black Board
3.3	Programming Applications with Threads	3	Chalk & Talk	Google classroom
3.4	High-Throughput Computing: Task	2	Lecture	PPT
3.5	Programming : Task Computing	2	Chalk & Talk	Smart Board
3.6	Task-based Application Models	3	Discussion	Black Board
UNIT IV: Cloud Platforms and Applications				
4.1	Cloud Platforms in Industry	3	Lecture	PPT
4.2	Amazon Web Services - Google AppEngine	2	Chalk & Talk	Black Board
4.3	Microsoft Azure – Observations	4	Lecture	Smart Board
4.4	Cloud Applications: Scientific Applications	3	Discussion	Black Board
4.5	Business and Consumer Applications	3	Chalk & Talk	PPT
UNIT V: Advanced Topics in Cloud Computing				
5.1	Advanced Topics in Cloud Computing	2	Seminar	PPT & Smart Board
5.2	Energy Efficiency in Clouds	3	Seminar	PPT & Smart Board
5.3	Market Based Management of Clouds	4	Seminar	PPT & Smart Board

5.4	Federated Clouds / InterCloud	3	Seminar	PPT & Smart Board
5.5	Third Party Cloud Services	3	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Identify and use different cloud computing services.	K1/K2	PSO1& PSO2	PO1
CO 2	Explain the basic principles of cloud virtualization.	K1/K2	PSO3& PSO4	PO1
CO 3	Prepare the appropriate cloud computing solutions to meet the requirement of specific applications.	K2/K3	PSO5	PO3
CO 4	Design application by utilizing cloud platforms such as Google app Engine and Amazon Web Services.	K3/K4	PSO6	PO4
CO 5	Analyze different cloud programming models.	K2/K4	PSO7	PO2

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7

CO 1	**1**	**3**	**2**	**2**	**2**	**2**	**2**
CO 2	**1**	**1**	**3**	**3**	**1**	**1**	**1**
CO 3	**2**	**2**	**2**	**2**	**3**	**1**	**1**
CO 4	**2**	**2**	**2**	**2**	**1**	**3**	**1**
CO 5	**2**	**2**	**2**	**2**	**1**	**1**	**2**

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	**3**	**2**	**2**	**2**
CO2	**2**	**2**	**2**	**2**
CO3	**2**	**2**	**3**	**1**
CO4	**2**	**2**	**1**	**3**
CO5	**1**	**3**	**2**	**2**

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –III

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:

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.

Digital Open Educational Resources (DOER)

1. https://en.wikipedia.org/wiki/Computer_graphics
2. http://what-when-how.com/advanced-methods-in-computer-graphics/introduction-to-advanced-methods-in-computer-graphics/
3. https://inst.eecs.berkeley.edu/~cs294-13/fa09/

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT I: Output Primitive Of Attributes				
1.1	Points and Lines – Line-drawing algorithms	3	Lecture	Black Board
1.2	Loading the frame buffer – Line function	2	Lecture	Video
1.3	Circle-generating algorithms – Ellipse-generating algorithms	1	Chalk & Talk	Smart Board
1.4	Other curves – Parallel curve algorithms	2	Lecture	LCD
1.5	Curve functions – Pixel addressing	2	Discussion	Black Board
1.6	Filled-area primitives – Line attributes	1	Chalk & Talk	Google classroom
1.7	Curve attributes – Color and grayscale levels	3	Lecture	Black Board
1.8	Area-fill attributes – Character attributes	1	Chalk & Talk	Smart Board

UNIT II: Two-Dimensional Geometric Transformations				
2.1	Basic Transformations	3	Chalk & Talk	LCD
2.2	Matrix representations	4	Chalk & Talk	Black Board
2.3	Composite transformations	3	Discussion	Google classroom
2.4	Other transformations	3	Lecture	PPT & Smart Board
2.5	Transformations between coordinate systems	2	Lecture	Black Board
UNIT III: Two-Dimensional Viewing				
3.1	The viewing pipeline	2	Discussion	Smart Board
3.2	Viewing coordinate reference frame	3	Chalk & Talk	Black Board
3.3	Window-to-viewport coordinate transformation	2	Discussion	Google classroom
3.4	Two-Dimensional viewing functions	2	Lecture	PPT
3.5	Clipping operations – Point clipping	1	Chalk & Talk	Black Board
3.6	Line clipping – Polygon clipping	2	Lecture	Black Board
3.7	Curve clipping – Text clipping	3	Discussion	LCD
UNIT IV: Introduction To Animation, Interpolation				
4.1	Perception	2	Lecture	PPT & Smart Board
4.2	The heritage of animation	3	Chalk & Talk	Black Board
4.3	Animation production	3	Lecture	PPT & Smart Board

4.4	Interpolation	4	Discussion	Black Board
4.5	Controlling the motion of a point	3	Chalk & Talk	Black Board
UNIT V: Interpolation-Based Animation				
5.1	Key-frame systems	4	Seminar	PPT & Smart Board
5.2	Animation languages	6	Seminar	PPT & Smart Board
5.3	Deforming objects	5	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**

Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Explain the basic concepts in computer graphics.	K2	PSO1& PSO2	PO1
CO 2	Analyze various algorithms and to convert the basic geometrical primitives.	K2, K3	PSO3& PSO4	PO2
CO 3	Demonstrate the importance of viewing and clipping.	K2, K4	PSO5	PO4
CO 4	Discuss the fundamentals of animation	K2, K3 & K4	PSO6	PO2
CO 5	Describe Interpolation-Based Animation	K3& K5	PSO7	PO3

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	1	1	1	2	2
CO 2	1	1	3	3	1	2	2
CO 3	2	2	2	2	3	2	2
CO 4	2	2	2	2	1	3	1
CO 5	2	2	2	2	1	1	3

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	2	2	2	2
CO2	1	3	1	1
CO3	2	2	2	3
CO4	1	2	1	1
CO5	2	2	2	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –III

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 Mo
del- 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: 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.

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1. https://www.tutorialspoint.com/big_data_analytics/index.htm
2. https://www.youtube.com/watch?v=OP8BsGnqi9c
3. https://www.youtube.com/watch?v=zez2Tv-bcXY

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
	UNIT I: INTRODUCTION			
1.1	Introduction to Big Data: Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data –	5	Chalk & Talk	Black Board
1.2	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	5	Lecture	LCD
1.3	A Typical Data warehouse Environment – A Typical Hadoop Environment – What is New Today – What is Changing in the Realms of Big Data.	5	Lecture	Smart Board
	UNIT II: BIG DATA ANALYTICS			
2.1	Big Data Analytics: Classification of Analytics – Greatest Challenges that Prevent Businesses from Capitalizing on Big Data – Top Challenges Facing Big Data –	3	Chalk & Talk	Black Board
2.2	Why is Big Data Analytics Important – What kind of Technologies are we Looking	3	Chalk & Talk	Black Board

	Toward to Help Meet the Challenges Posed by Big Data –			
2.3	Data Science – Data Scientist Your New Best Friend - Terminologies Used in Big Data Environments –	3	Lecture	Smart Board
2.4	Basically Available Soft State Eventual Consistency – Few Top Analytics Tools	3	Discussion	Google classroom
UNIT III: THE BIG DATA TECHNOLOGY				
3.1	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 –	3	Chalk & Talk	Black Board
3.2	Integrated Hadoop System Offered by Leading Markers Vendors- Cloud – based Hadoop Solutions.	3	Chalk & Talk	Black Board
3.3	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	3	Chalk & Talk	Black Board
3.4	Managing Resources and Applications with Hadoop YARN (Yet Another Resource Negotiator) – Interacting with Hadoop Ecosystem.	3	Chalk & Talk	Black Board
UNIT IV: INTRODUCTION TO MAP REDUCE PROGRAMMING				
4.1	Introduction to MAP REDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression.	5	Lecture	PPT & Smart Board
4.2	Introduction to Machine Learning: Introduction to Machine Learning – Machine Learning Algorithm-Regression Model-	5	Chalk & Talk	Black Board

4.3	Linear Regression- Clustering- Collaboration filtering- Association Rule Mining- Decision Tree	5	Lecture	PPT
UNIT V: RECOMMENDATION ENGINES				
5.1	Introduction to Recommendation Engines: Recommendation engine definition – Need for Recommender Systems – Big Data Driving the Recommender Systems – Types of Recommender Systems –	4	Seminar	PPT & Smart Board
5.2	Evolution of Recommender Systems with Technology. Evolution of Recommendation Engines Explained: Evolution of Recommendation Engines – Nearest Neighborhood-based Recommendation Engines –	3	Seminar	PPT & Smart Board
5.3	Content-based Recommender Systems –	4	Seminar	PPT & Smart Board
5.4	Hybrid Recommender Systems – Model-based Recommender Systems.	4	Seminar	PPT & Smart Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1	T2	Seminar	Assignment	OBT/PPT				
	10 Mks.	10 Mks.	5 Mks.	5 Mks	5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Explain Characteristics and challenges of Big Data	K1	PSO1& PSO2	PO1
CO 2	Describe Big Data Analytics	K1,K2	PSO3& PSO4	PO2
CO 3	Utilize Hadoop for Big Data Technologies	K1K2	PSO5	PO3
CO 4	Demonstrate MAP REDUCE Programming	K3,K4	PSO6	PO4
CO 5	Describe types of Recommendation Systems using Big Data Analytics.	K1,K2	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	1	2	1	2	3	2	2
CO2	2	1	3	2	1	2	2
CO3	2	2	2	2	3	2	2
CO4	2	2	2	2	1	3	1
CO5	2	2	2	2	2	1	3

Mapping COs Consistency with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	2	1
CO2	1	3	1	1
CO3	1	1	3	2
CO4	2	2	2	3
CO5	2	2	2	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**
♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –III

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 :

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.

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1. https://www.analyticsvidhya.com/blog/2017/05/25-must-know-terms-concepts-for-beginners-in-deep-learning/
2. https://en.wikipedia.org/wiki/Deep_learning
3. https://towardsdatascience.com/ten-deep-learning-concepts-you-should-know-for-data-science-interviews-a77f10bb9662
4. https://dzone.com/articles/top-8-deep-learning-concepts-every-data-science-pr

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Content Delivery Method	Teaching Aids
UNIT -1 DEEP FEEDFORWARD NETWORKS				
1.1	**Deep Feedforward Networks** Example: Learning XOR-	4	Chalk & Talk	Black Board
1.2	Gradient-Based Learning	4	Discussion	LCD
1.3	Hidden Units-	3	Flipped Learning	PPT & White board
1.4	Architecture	4	Lecture	Black Board
UNIT -2REGULARIZATION FOR DEEP LEARNING				
2.1	Regularization for Deep Learning: Parameter Norm Penalties-Norm Penalties as Constrained Optimization-	2	Lecture	PPT & White board
2.2	Regularization and Under-Constrained Problem-	2	Lecture	PPT & White board

2.3	Dataset Augmentation-Noise Robustness	2	Chalk & Talk	Black Board
2.4	Semi-Supervised Learning-Multitask Learning-	3	Chalk & Talk	Black Board
2.5	Early Stopping-Parameter Tying and Parameter Sharing-	3	Chalk & Talk	Black Board
2.6	Sparse Representations-Bagging and Other Ensemble Methods	3	Discussion	PPT & White board
UNIT -3 OPTIMIZATION FOR TRAINING DEEP MODELS				
3.1	Optimization for Training Deep Models: Learning Differs from Pure Optimization-Challenges in Neural Network Optimization-	4	Lecture	PPT & White board
3.2	Basic Algorithms-Parameter Initialization Strategies-	3	Lecture	PPT & White board
3.3	Algorithm with Adaptive Learning Rates- Approximate Second-Order Methods	4	Chalk & Talk	Black Board
3.4	Optimization Strategies and Meta-algorithms	4	Chalk & Talk	Black Board
UNIT IV: STRUCTURED PROBABILISTIC MODELS FOR DEEP LEARNING				
4.1	Structured Probabilistic Models for Deep Learning:	2	Lecture	PPT & White board
4.2	The Challenge of Unstructured Modeling-	3	Lecture	PPT & White board
4.3	Using Graphs to Describe Model Structure-	3	Chalk & Talk	Black Board
4.4	Sampling from Graphical Models—Advantages of Structured Modeling-	3	Chalk & Talk	Black Board
4.5	Learning about Dependencies-Inference and Approximate Inference-	2	Lecture	PPT & White board
4.6	The Deep Learning Approach to Structured Probabilistic Models	2	Lecture	PPT & White board
UNIT – 5: DEEP GENERATIVE MODELS				

5.1	Deep Generative Models: Boltzmann Machines-Restricted Boltzmann Machines-	3	Chalk & Talk	PPT & White board
5.2	Deep Belief Networks-Deep Boltzmann Machines-Boltzmann Machines for Real Valued Data-Convolution Boltzmann Machines	4	Chalk & Talk	PPT & White board
5.3	- Boltzmann Machines for Structured or Sequential Outputs-Other Boltzmann Machines-	4	Chalk & Talk	Black Board
5.4	Back Propagation through Random Operations-Directed Generative Nets	4	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	**4**	**4**	**-**	**-**	**-**	**8**	-	**8**	20 %
K3	**2**	**2**	**-**	**5**	**-**	**9**	-	**9**	22.5 %
K4	**2**	**2**	**-**	**-**	**5**	**9**	-	**9**	22.5 %
K5	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
Non Scholastic	**-**	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA

Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Explain Deep learning	K1	PSO1& PSO2	PO1
CO 2	Analyze different methods used for modeling	K4	PSO3& PSO4	PO3
CO 3	Choose appropriate model according to application	K3	PSO5	PO4
CO 4	Compare various learning methods	K2	PSO6	PO3
CO 5	Explain Applications in Object Recognition and Computer Vision	K1	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	1	2	2	2	2
CO2	1	1	2	3	1	1	1
CO3	2	2	2	2	2	1	1
CO4	2	2	2	2	2	3	2
CO5	2	2	2	2	2	1	3

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO 1	2	1	3	2
CO 2	2	2	3	1
CO 3	2	2	1	3
CO 4	2	2	3	1
CO 5	2	2	1	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**
♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –IV

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG4B16	Principles Of Internet Of Things	Major Core	-	4

COURSE DESCRIPTION

This Course provides knowledge of development cycle of IoT systems with sample systems. And explains the different sources needed with the integration process to build IoT systems

COURSE OBJECTIVES

- To understand the fundamentals of Internet of Things.
- To apply the concept of Internet of Things in the real world scenario.

SYLLABUS

UNIT I: Introduction To Internet Of Things
Introduction- Physical Design of IoT – Logical Design of IoT – IoT Enabling technologies.

UNIT II: Domain Specific Iots
Introduction - Home Automation – Cities – Environment.

UNIT III: IoT and M2M
Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT.

UNIT IV: IoT Platforms Design Methodology
Introduction - IoT Design Methodology – Case Study.

UNIT V: Case Studies – Audrino Studio

TEXT BOOK

Internet of Things – A hands-on approach, ArshdeepBahga, Vijay Madisetti, Universities Press, 2015.

Chapters: 1.1 – 1.4, 2.1 – 2.4, 3.1 – 3.4, 5.1 – 5.3

REFERENCES:

1. ***The Internet of Things: Connecting Objects,***HakimaChaouchi, Wiley Publishers, 2010.
2. ***Internet of Things with the Arduino Yun, (Projects to help you build a world of smarter things***, Marco Schwartz, Packt Publishing, 2014.
3. ***Internet of Things: Principles and Paradigms***, Adrian McEwen and Hakim Cassimally, John wileyand Sons, Led., 2014.
4. ***The Internet of Things***, Samuel Greengard, MIT Press, 2015.

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1. https://en.wikipedia.org/wiki/Internet_of_things
2. https://www.oracle.com/in/internet-of-things/what-is-iot/
3. https://www.iotforall.com/what-is-internet-of-things
4. https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	4	4	-	-	-	8	-	8	20 %
K3	2	2	-	5	-	9	-	9	22.5 %
K4	2	2	-	-	5	9	-	9	22.5 %
K5	2	2	5	-	-	9	-	9	22.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy are:**

K1- Remember**,** **K2-**Understand**,** **K3-**Apply**,** **K4-**Analyse, **K5-**Synthesis

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES (CO)

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Explain the basic concepts of IoT	K1	PSO1& PSO3	PO1
CO 2	Discuss physical and logical design of IoT enabled technologies	K2	PSO2 & PSO4	PO3
CO 3	Analyze how and where IoT can be applied	K3,K4	PSO5	PO4

CO 4	Compare M2M and IoT	K2	PSO6	PO3
CO 5	Describe the features of Python used for IoT implementation	K2	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO1	3	1	3	1	1	2	2
CO2	1	3	1	3	1	2	2
CO3	2	2	2	2	3	2	2
CO4	2	2	2	2	2	3	1
CO5	2	2	2	2	1	1	3

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO 1	3	1	1	2
CO 2	2	2	3	2
CO 3	2	2	1	3
CO 4	2	2	2	1
CO 5	2	2	1	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**
♦ Weakly Correlated -**1**

II M.Sc. Computer Science

SEMESTER –IV

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSCS	19PG4BPR	Project	Major Core	-	6

The project will be of one semester duration. The students will be sent to different organizations involved in IT as per the interest and specialization of students, mostly located in the place of the study. They will have to carry out a project related to the area of interest and submit a project report at the end of the semester. The students shall defend their dissertation in front of a panel of experts during the Viva-Voce examination.

PROJECT PLAN

- ❖ Facilitates experiential learning
- ❖ Students are offered career training as part of the curriculum through this Project.
- ❖ This project work motivates them and also gives insights about Software Development.
- ❖ Encouraged to do Real time projects.
- ❖ At the end of the semester the project is evaluated by conducting viva-voce with presentation of the report.

Phase – I

- Students get acceptance letter to do project in any IT company in and around Madurai
- Problem identification in various IT, Academical, Societal, Commercial and Environmental applications
- Requirements gathering and analysis for selecting tool
- Separate modules individually

Phase – II

- Design UI
- Develop programs module level, test and debug individually

Phase – III

- Integrate the modules and show individual DEMO
- Test the app with the users, improve accordingly and conclude the results
- Document the above process as a report

EVALUATION PATTERN

SCHOLASTIC			MARKS		
C1	C2	C3	CIA	ESE	Total
10	10	20	40	60	100

PG CIA MARK COMPONENTS

C1 - Analysis & Design Review - 10

C2 - Coding & Testing Review - 10

C3 - Model Presentation - 20

Total - 40

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Discuss project development and the associated business processes	K2	PSO1& PSO2	PO3
CO 2	Plan as an individual or in a team in development of technical projects.	K2, K3	PSO3	PO3
CO 3	Communicate with engineers and the community at large in written and oral forms.	K2, K4	PSO5	PO2

CO 4	Create effective communication skills for presentation	K2, K3 & K4	PSO6	PO4
CO 5	Analyse problems and formulate solutions	K3& K5	PSO7	PO3

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO1	1	3	1	1	2	2	2
CO2	2	1	3	3	1	2	2
CO3	2	2	2	2	3	1	1
CO4	2	2	2	2	1	3	1
CO5	2	2	2	2	1	1	3

Mapping COs Consistency with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	2	2	3	2
CO2	2	2	3	2
CO3	1	3	1	2
CO4	2	2	2	3
CO5	1	1	3	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**
♦ Weakly Correlated -**1**

M.Sc. Computer Science

SELF-STUDY COURSES

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	CREDITS
PSCS	19PGBSL1	BIOINFORMATICS	TUTORIAL	5

COURSE DESCRIPTION

Basic concepts and techniques of Bioinformatics and biological database

COURSE OBJECTIVES

- To understand the basic techniques of Bioinformatics
- To understand the biological database
- To analyze the structures of DNA.

UNITS

UNIT I – INTRODUCTION & DATABASE

Introduction, reason for using Bioinformatics, skills required, pharmaceutical companies and bioinformatics, use of Bioinformatics. Database: introduction, sequence DB, structure DB, Molecular visualization, specialized sequence DB Genome mapping DB, Biological culture and stock Collection DB, information retrieval from biological DB, Search Engines, Access to distributed data, Integrated information retrieval-the entreZ system, Sequence DB beyond NCBI, Medical DB, Format vs content, Nucleic acid sequence format in data banks, The DB, The genbank flatfile: a discussion, Sequence submission tools, Bioinformatics Organizations.

UNIT II – SEQUENCE ALIGNMENT & DB SEARCHING

Introduction, Pairwise alignment, reason for multiple sequence alignment, The choice of matrices-either PAM & BLOSUM, Differences between PAM & BLOSUM, The evolutionary basis of sequence alignment, The modular nature of proteins, Optimal alignment methods, Subtitution scores and gap penalties, Statistical significance of

alignment, DB similarity searching, Sequence similarity search with single query sequence, FASTA, BLAST, The BLAST and FASTA program, Low-complexity regions, Repetitive elements.

UNIT III: PREDICTIVE METHODS AND PROTEINS SEQUENCE

Framework, Masking repetitive DNA, DB searches, Genmark – coding region identification tool, Detecting functional sites in the DNA, Integrated gee parsing, Finding tRNA genes, Future prospectsIdentification of protein based on composition, Physical properties based on sequence, Secondary structure and folding classes, specialized structures of features.

UNIT IV: PLASMID MAPPING AND PRIMER DESIGN

Restriction Mapping, Primer Desin on the Web, Primer Design programs and software, Mac Vector, OMIGA, Vector NTI, Gene Construction Kit.

UNIT V: PROTEOMICS AND GENOMICS

Introduction, Human gene project, DNA microarray- genome chip, EST, Techniques involved in Proteomics nd Genomics, Pharmacogenomics. Bioinformatics software and its Applications: List of bioinformatics software.

TEXT BOOK

Fundamentals of Bioiformatics , Harisha S, I.K. International Publishing Limited.
Chapters: 1,2,3,4,5,6,7,9

REFERENCES:

1. Bioinformatics: Databases and Sytems, by Stanley I.Letovsky
2. Bioinformatics Databases: Design, Implementation and Usage, Chapman & Hall/ CRC Mathematical Biology & Medicine), SorinDraghici

Digital Open Educational Resources (DOER)

1. https://www.intechopen.com/books/bioinformatics-updated-features-and-applications/bioinformatics-basics-development-and-future
2. https://global.oup.com/us/companion.websites/9780199936991/
3. https://www.igi-global.com/book/bioinformatics-concepts-methodologies-tools-applications/71953
4. https://www.sciencedirect.com/topics/computer-science/bioinformatics

EVALUATION PATTERN

INTERNAL	EXTERNAL
Assignment – 20 Marks **Test – 20Marks**	**Objective – 20 Marks** **Essay Type Qns. – 40 Marks**
Total – 40Marks	**Total – 60Marks**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Describe the basic concepts of bioinformatics and biological database	K2	PSO1& PSO2	PO1
CO 2	Understand the sequences alignment and DB searching techniques.	K2, K3	PSO3& PSO4	PO2
CO 3	Understand the predictive methods and protein sequence	K2, K4	PSO5	PO2
CO 4	Analyze Plasmid Mapping and Primer Design	K2, K3 & K4	PSO6	PO3
CO 5	Explain Proteomics and Genomics	K3& K5	PSO7	PO1

Mapping COs Consistency with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	1	1	1	2	2
CO 2	1	1	3	3	1	2	2
CO 3	2	2	2	2	3	1	1
CO 4	2	2	2	2	1	3	2
CO 5	2	2	2	2	1	1	3

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	2	2
CO2	1	3	2	2
CO3	2	3	2	2
CO4	1	2	3	2
CO5	3	1	1	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**
♦ Weakly Correlated -**1**

M.Sc. Computer Science

SELF-STUDY COURSES

For those who joined in 2021 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	CREDITS
PSCS	21PGBSL2	DEVELOPING WEB SERVICES	TUTORIAL	5

COURSE DESCRIPTION

To understand the concept of design and implementation in developing web services

COURSE OBJECTIVES

- To understand the Evolution and Emergence of Web Services
- To understand architecture and technologies behind the web services.
- To design and develop web services.
- To implement web services developer packages.
- To understand the security concepts in web services.

UNITS

UNIT I INTRODUCTION

Introduction to Web Services : Basic Operational Model of Web Services - Core Web Services Standards- Industry Standards Supporting Web Services - Known Challenges in Web Services - Web Services Software and Tools
Building the Web Services Architecture : Web Services Architecture and Its Core Building Blocks -Tools of the Trade - Web Services Communication Models - Implementing Web Services -Developing Web Services-Enabled Applications

UNIT – II : SOAP

Developing Web Services Using SOAP: XML-Based Protocols and SOAP - Anatomy of a SOAP Message-SOAP Encoding-SOAP Message Exchange Model-SOAP Communication-SOAP Messaging - SOAP Bindings for Transport Protocols-SOAP Security-Building SOAP Web Services

UNIT III :WSDL

Description and Discovery of Web Services: Web Services Description Language (WSDL) : WSDL in the World of Web Services - Anatomy of a WSDL Definition Document - WSDL Bindings - WSDL Tools - Future of WSDL - Limitations of WSDL

Universal Description, Discovery, and Integration (UDDI): UDDI Registries - Programming with UDDI - Inquiry API -Publishing API - Implementations of UDDI - Registering as a Systinet UDDI Registry User - Publishing Information to a UDDI Registry - Searching Information in a UDDI Registry - Deleting Information from a UDDI Registry - Limitations of UDDI

UNIT IV - Exploring Java Web Services Developer Pack:

Introduction to the Java Web Services Developer Pack (JWSDP) : Java Web Services Developer Pack : Java XML Pack - Java APIs for XML - JavaServer Pages Standard Tag Library - Apache Tomcat Java WSDP Registry Server - ANT Build Tool - Downloading the Web Services Pack

XML Processing and Data Binding with Java APIs: Extensible Markup Language (XML) Basics : XML Syntax - Namespaces - Validation of XML Documents - Java API for XML Processing (JAXP) : JAXP -Uses for JAXP - JAXP API Model - JAXP Implementations - Processing XML with SAX - Processing XML with DOM - XSL Stylesheets: An Overview - Transforming with XSLT -Threading - Java Architecture for XML Binding (JAXB) - Data Binding Generation - Marshalling XML - Unmarshalling Java - Other Callback Methods - Sample Code for XML Binding

UNIT V – Security in Web Services

Challenges of Securing Web Services : Technologies behind Securing Web Services - Rapid-Fire Cryptography , XML Encryption: Implementations of XML Encryption - XML Encryption - Encrypting XML Element - Decrypting the XML Element - Programming Steps for Encryption and Decryption, XML Signature : Types of XML Signatures - XML Signature Syntax -Canonicalization - Implementations of XML Signature - XML Signature: An Example, Security Assertions Markup Language (SAML): SAML Implementations- SAML Architecture- Authentication Assertion - Attribute Assertion -Authorization (Decision) Assertion- SAML Bindings and Protocols - Model of Producers and Consumers of SAML Assertions- Single Sign-On Using SAML

TEXT BOOKS

1. Developing Java™ Web Services, Ramesh Nagappan Robert Skoczylas Rima Patel Sriganesh, Wiley Publishing Inc., Indianapolis, Indiana. 2003

REFERENCE BOOKS

1. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.
2. Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.
3. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.

Digital Open Educational Resources (DOER)

1. https://www.tutorialspoint.com/webservices/what_are_web_services.htm
2. https://docs.oracle.com/cd/E40938_01/doc.74/e40142/dev_secure_web_srvcs.htm

EVALUATION PATTERN

INTERNAL	EXTERNAL
Assignment – 20 Marks **Test – 20Marks**	**Objective – 20 Marks** **Essay Type Qns. – 40 Marks**
Total – 40Marks	**Total – 60Marks**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOME	KNOWLEDGE LEVEL(ACCORDING TO BLOOM'S TAXONOMY)	PSOS ADDRESSED	POS ADDRESSED
CO 1	Analyse the challenges in web services and understand the architectures behind the web services.	K1,K2	PSO1& PSO4	PO2
CO 2	Understanding the SOAP architecture in developing web services.	K1,K2	PSO3	PO1
CO 3	Efficiently use market leading environment tools to create and consume web services	K3,K4	PSO4 &PSO5	PO2
CO 4	Identify and select the appropriate framework components in creation of webservice solution	K1,K2	PSO6	PO3
CO 5	Analyse the challenges of security in web services.	K2,K3	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO1	3	3	1	2	1	2	2
CO2	1	2	3	1	1	2	2
CO3	1	2	1	3	3	2	2
CO4	2	2	2	2	1	3	1
CO5	2	2	2	2	1	3	3

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	1	3	2	2
CO2	3	1	2	2
CO3	1	3	2	2
CO4	1	2	3	1
CO5	1	2	1	3

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

M.Sc. Computer Science

SELF STUDY

For those who joined in 2021 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	CREDITS
PSCS	21PGBSL3	**EVOLUTIONARY COMPUTING**	TUTORIAL	5

COURSE DESCRIPTION

Provide evolutionary Computation and global optimization techniques.

COURSE OBJECTIVES

- To solve various search and optimization problems
- To handle multi-objective optimization problems in their totality
- To Describe the Evolutionary algorithms and solve complex problem using evolutionary algorithms

UNITS

UNIT I – EVOLUTIONARY COMPUTING

Biological foundation of Evolutionary computing, Introduces evolutionary algorithms, a class of stochastic, population-based algorithms inspired by natural evolution theory, capable of solving complex problems for which other techniques fail

UNIT II – GENETIC ALGORITHMS (GA)

Biological foundation of GA, General steps in GA, Genetic Operations: cloning, crossover and mutation, Encoding and Selection techniques, Mathematical foundation and Schemata, Holland Schemata theorem, design and implementation of GA, issues in implementation of GA, applications of GA, Classifier systems, Genetic programming, new trends in GA. Applications of GA

UNIT III: SWARM INTELLIGENCE (SI)

Biological foundation of SI, SI Techniques: Ant Colony Optimization (ACO) and Particle Swarm optimization (PSO). General steps in ACO, the "Invisible Manager" (Stigmergy), the Pheromone, Ant Colonies and Optimization, Ant Colonies and Clustering, Applications of Ant Colony Optimization. Applications of ACO

UNIT IV: PARTICLE SWARM OPTIMIZATION (PSO)

Social Network Structure: The Neighborhood Principle, PSO Algorithm, Fitness Calculation, Convergence, PSO System Parameters, Particle Swarm Optimization versus Evolutionary Computing and Applications of PSO

UNIT V: FEW ALGORITHMS

Mimetic algorithm, Firefly Algorithm, multi objective algorithms

REFERENCE BOOKS

1. ***An introduction to Genetic Algorithms***, M. Mitchell, Prentice-Hall, 1998.
2. ***Genetic Algorithms in Search, Optimization, and Machine Learning***, D. E. Goldberg,Addison Wesley,1989.
3. ***Computational Intelligence -PC Tools***, P.Simpson and R.Dobbins, R.Eberhart,AP Professional, 1996.
4. ***Evolutionary Computation – A Unified Approach*** , Kenneth A.De.Jong, The MIT Press, 2016

Digital Open Educational Resources (DOER)

1. https://youtu.be/-WKZglCAQwE
2. https://youtu.be/L--IxUH4fac
3. https://youtu.be/qY6AO68cSrc

EVALUATION PATTERN

INTERNAL	EXTERNAL
Assignment – 20 Marks **Test – 20Marks**	**Objective – 20 Marks** **Essay Type Qns. – 40 Marks**
Total – 40Marks	**Total – 60Marks**

COURSE OUTCOMES (CO)

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED	POs ADDRESSED
CO 1	Formulate a problem as an evolutionary computation search/optimization by specifying representations, selection and variation operators.	K1 &K2	PSO1& PSO2	PO1 & PO3
CO 2	Write a program or use a package to implement an evolutionary algorithm.	K3 &K4	PSO3 & PSO4	PO2
CO 3	Conduct evolutionary optimization experiments and properly report and discuss the results	K1&K3	PSO4	PO3
CO 4	Apply various evolutionary computation methods and algorithms for particular classes of problems	K2 &K3	PSO5 & PSO6	PO2 & PO3
CO 5	Develop evolutionary algorithms for real-world applications.	K3 &K4	PSO7	PO4

Mapping COs Consistency with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO1	3	3	1	1	1	2	2
CO2	1	1	2	2	2	2	2
CO3	2	2	2	3	1	2	2
CO4	2	2	2	1	3	3	1
CO5	2	2	2	3	1	1	2

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	3	1
CO2	2	2	3	2
CO3	2	3	1	2
CO4	2	3	2	2
CO5	2	1	1	2

Note: Strongly Correlated – **3** Moderately Correlated – **2**
 Weakly Correlated -**1**