KONGUNADU ARTS AND SCIENCE COLLEGE

(AUTONOMOUS)

COIMBATORE – 641 029

DEPARTMENT OF COMPUTER SCIENCE (PG)

CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)

(2018 - 2019 onwards)

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

Coimbatore – 641029

Vision:

Developing the total personality of every student in a holistic way by adhering to the principles of Swami Vivekananda and Mahatma Gandhi.

Mission:

- Imparting holistic and man-making education with emphasis on character, culture and value - moral and ethical.
- Designing the curriculum and offering courses that transform its students into value added skilled human resources.
- Constantly updating academic and management practices towards total quality management and promotion of quality in all spheres.
- Extending the best student support services by making them comprehensive and by evolving a curriculum relevant to student community and society at large.
- Taking steps to make education affordable and accessible by extending scholarships to the meritorious and economically disadvantaged students.
- Moulding the teachers in such a way that they become the role models in promoting Higher Education.

DEPARTMENT OF COMPUTER SCIENCE (PG)

Vision:

- To achieve excellent standards of quality education by keeping pace with rapidly changing technologies.

Mission:

- To provide outstanding education and training to our graduate students for their productive careers in industry, academia, and government.

PROGRAMME OUTCOME (PO)

PO1 To enhance their skills in new computing technologies through practical and theoretical knowledge of computer science and software engineering

PO2 To think creatively, propose real ideas in explaining facts and figures or providing new solutions as computer professionals

PO3 To contribute to the economic development of the region, state and nation.

PO4 To analyze the impact of computing on individuals, organizations, and society.

PO5 To progress as developers providing software solutions for ethical, legal security, and global policy issues.

PO6 To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.

PO7 To apply knowledge of computing to create effective designs and solutions for complex problems.

PO8 To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1 Acquires adequate knowledge of fundamentals to enhance the skills in contemporary computing technology.

PSO2 Capable to establish and configure computer networks and resolve security conflicts.

PSO3 Profeciency in optimizing issues in data management with varying complexity.

PSO4 Construct and simulate computerized solution for defined objectives.

PSO5 Evolves with exposure in advanced computing favouring research.

KONGUNADU ARTS AND SCIENCE COLLEGE [AUTONOMOUS]

COIMBATORE - 641 029

MASTER OF SCIENCE IN COMPUTER SCIENCE

CURRICULUM & SCHEME OF EXAMINATION UNDER CBCS

[APPLICABLE TO THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2018-2019 & ONWARDS]

Semester	Subject code	Title of the Paper	Instruction Hours / Cycle	Exam. Marks			Duration of Exam.(hours)	Credits
				CIA	ESE	Total		
I	18PCS101	C.P.1 Data Structures using C++	5	25	75	100	3	4
	18PCS102	C.P.2 Data Communications and Networks	5	25	75	100	3	4
	18PCS103	C.P.3 Information Security	5	25	75	100	3	4
	18PCS104	C.P.4 Relational Database Management Systems	5	25	75	100	3	4
	18PCS1CL	C.Pr.1 Data Structures using C++ Lab	5	30	45	75	3	3
	18PCS1CM	C.Pr.2 RDBMS Lab	5	30	45	75	3	3
		Total	**30**					
II	18PCS205	C.P.5 Advanced Java Programming	4	25	75	100	3	4
	18PCS 206	C.P.6 Wireless Networks	4	25	75	100	3	4
	18PCS 207	C.P.7 .NET Framework	4	25	75	100	3	4
	18PCS 208	C.P.8 Software Project Management	4	25	75	100	3	4
	18PCS2E1	Elective Paper – I	4	25	75	100	3	4
	18PCS2CN	C.Pr.3 Advanced Java Lab	5	30	45	75	3	3
	18PCS2CO	C.Pr.4 .NET Lab	5	30	45	75	3	3
		Total	**30**					
III	18PCS 309	C.P.9 Open Source Systems	5	25	75	100	3	4
	18PCS 310	C.P.10 Unix and Linux Programming	5	25	75	100	3	4
	18PCS 311	C.P.11 Data Mining and Warehousing	5	25	75	100	3	4
	18PCS 3E2	Elective Paper - II	5	25	75	100	3	4
	18PCS 3Z1	Mini Project	---	15	60*	75	3	3
	18PCS3CP	C.Pr.5 Open Source Lab	5	30	45	75	3	3
	18PCS3CQ	C.Pr.6 Unix and Linux Programming Lab	5	30	45	75	3	3
		Total	**30**					

IV	18PCS412	C.P.12 Software Testing	5	25	75	100	3	4
	18PCS4E3	Elective Paper - III	5	25	75	100	3	4
	18PCS4CR	C.Pr.7 Software Testing Lab	5	30	45	75	3	3
	18PCS4Z2	Project and Viva-Voce	15	40	160**	200	3	6
		Total	**30**					
		GRAND TOTAL	**120**			2300		90

*Project Record – 45 and Viva-Voce – 15

**Project Record – 120 and Viva-Voce – 40

Major Elective Papers :

1. Big Data Analytics
2. Network Security And Cryptography
3. Bio Inspired Computing
4. Advanced Computing
5. Green Computing
6. Enterprise Web Services
7. Artificial Intelligence and Expert Systems.
8. Computational Intelligence
9. Distributed Systems

Tally Table:

S.No.	Part	Subject Groups	Marks	Credits
1.	III	Core Theory	1200	48
		Electives	300	12
		Practicals	525	21
		Mini Project	75	3
		Project	200	6
		Total	**2300**	**90**

Note :

CBCS – Choice Based Credit System

CIA - Continous Internal Assessment

ESE - End of Semester Examinations

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

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

1. Theory Examination - Part I, II & III

(i) CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K2 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K3 & K4 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

(ii) CIA I & II and ESE: 55 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	55
K2 Q11 to 15	B (Either or pattern)	5 x 3 = 15	Short Answers	
K3 & K4 Q16 to 20	C (Either or pattern)	5 x 6 = 30	Descriptive / Detailed	

2. Practical Examination:

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

3. Project Viva Voce:

Knowledge Level	Section	Marks	Total
K3	Project Report	60	80
K4	Viva voce	20	
K5			

Components of Continuous Internal Assessment

Components			Marks	Total
Theory	CIA 1	75	(75+75 = 150/10) 15	25
	CIA 2	75		
Assignment/Seminar			5	
Attendance			5	
Practical	CIA Practical		25	40
Observation Notebook			10	
Attendance			5	
Project	Review		15	20
Regularity			5	

QUESTION PAPER PATTERN for CIA and ESE

M.Sc Computer science (PG)

Theory

Max Marks: 75 **Time: 3Hrs**

Section A (10 x 1 = 10 marks)

Q.No. 1 to 10 : Multiple choice type alone with four distractors each.

Section B (5 x 5 = 25 marks)

Q.No. 11 to 15 : Either or / short notes type questions (one question 'a' or 'b' from each unit).

Section C (5 x 8 = 40 marks)

Q.No. 16 to 20 : Either or / essay type questions (one question 'a' or 'b' from each unit).

****

PCS 5

18PCS101

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS101		Core Paper 1: Data Structures using C++		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	I	5	75	4

Course Objectives

1. To inculcate the knowledge of various data structures and definitions.
2. To provide the use of data structure background for programming.
3. To develop the proficiency for planning & organizing the data structures.

Course Outcomes (CO)

K1	CO1	Students will get the knowledge of data structures and its usage
K2	CO2	Will be able to distinguish the various data structures
K3	CO3	Acquires skills to describe the data structures appropriately for programming
K4	CO4	Apply appropriate algorithms and data structures for various applications

UNIT I **[15 Hrs]**

Object Oriented Programming Using C++: Abstract data types-Encapsulation-Inheritance--Polymorphism-C++ and Object oriented programming.-constructors, destructor-overloading-Recursion-exceptional handling.

UNIT II **[15 Hrs]**

Linear lists-Array representation: Data objects and Structures-the linear list data structures-array representation. Linear list-Linked representation: Singly linked lists and Chains-Circular list and header nodes-Doubly linked list

PCS 6

18PCS101

UNIT III **[15 Hrs]**

Stacks: Definition and applications-the abstract data type-array representation-linked representation-applications.

Queues: Definition and applications-the abstract data type-**array representation***-linked representation-applications.

UNIT IV **[15 Hrs]**

Sorting: elementary sorting algorithm-decision trees- efficient sorting algorithms-sorting in the standard template library

Hashing-hash function-Collision resolution-deletion-perfect hash function-hash function for extendible Files

UNIT V **[15 Hrs]**

Binary and other trees: Trees – Binary tree-properties of binary trees-Representation of binary trees-Common binary tree operations

Binary search trees: Definitions-Abstract data types-Binary search tree operations and implementations.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment.

TEXT BOOKS:

1. E. Balagurusamy, Object Oriented Programming with C++ (Unit – I)
2. Sartaj Sahni, (2005) , Data structures, algorithms and applications in C++, University Press , second edition (Unit II,III,V)
3. Adam drozdek, (2006), Data structures and algorithms in C++" , third edition,.(Unit IV).

REFERENCE BOOKS:

1. D.S.Malik, (2003), Data structures using C++, India edition.
2. Clifford A. Shaffer, (2012), Data structures and algorithms in C++, Dover Publications.

PCS 7

18PCS101

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	S	L
CO2	S	M	S	H	H
CO3	S	M	S	H	H
CO4	S	S	S	S	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 8

18PCS102

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS102		Core Paper 2 : Data Communications and Networks		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	I	5	75	4

Course Objectives

1. To understand the basic concepts of networks.
2. To familiarize various networking and inter-networking devices and their functions.
3. To learn various technologies implemented in networking.

Course Outcomes (CO)

K1	CO1	Understanding the basic concepts of networks, protocols, standards and topologies.
K2	CO2	Recapitulate the signal conversion and various transmission mediums.
K3	CO3	Analyzing the optimal path for data transmission using various routing algorithms.
K4	CO4	Knowing various internet addressing and sub-netting the network

UNIT I **[15 Hrs]**

Data communications – Networks- Protocols and Standards - Line Configuration – Topology - Transmission Mode-Categories of Networks – Internetworks - OSI Model - TCP/IP Protocol suite. Signals: Analog and Digital – Analog Signals - Composite signals - Digital signals.

UNIT II **[15 Hrs]**

Encoding and Modulating: Analog to Digital Conversion - Digital to Analog Conversion. Digital Data Transmission - DTE - DCE Interface – Modems - Cable Modems. Transmission Media: Guided Media-Unguided media

UNIT III **[15 Hrs]**

Data link control: Flow control - Error control. Switching: Circuit switching - Packet switching - Message switching.

Networking and Internetworking: Repeaters – Bridges – Routers – Gateways - Other devices. Routing Algorithm - Distance vector routing - Link state routing. Transport layer : Connection - OSI Transport Protocol – UDP – TCP.

PCS 9

18PCS102

UNIT IV **[15 Hrs]**

ISDN : Services – Subsriber Access to the ISDN – ISDN Layers. X.25: Layers - Other Protocols related to X.25.

Frame Relay: Introduction – Operations – Layers. ATM : Architecture – Switching – ATM Layers

UNIT V **[15 Hrs]**

TCP/IP :Overview –Network Layer – Addressing – Subnetting –Other protocols-BOOTP-DHCP - Telnet-Network Virtual network-SMTP-HTTP-

FTP- World Wide Web . Next Generation TCP/IP Protocol Suite *:IPv6 - ICMPv6.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOK:

1. Behrouz A. Forouzan (2007), "Data Communications and Networking", 4th Edition, TATA McGRAW Hill Publications.

REFERENCE BOOKS:

1. Achyut S Godbole (2002), "Data Communications and Networks", Tata McGraw Hill Publication.
2. Andrew S. Tanenbaum (2005), "Computer Networks" Pearson Publications, Fourth Edition.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	H	S
CO2	S	H	H	H	S
CO3	S	S	H	H	H
CO4	S	S	S	H	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 10

18PCS103

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS103		Core Paper 3: Information Security		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	I	5	75	4

Course Objectives

1. The course is intended to preach the common goals of security.
2. To educate the Legal issues of Information Security and its cons.
3. To inculcate the Security Technologies and its methods of implementation.

Course Outcomes (CO)

K1	CO1	Understanding the fundamental and history of Information Security, its legal and professional issues.
K2	CO2	Aware of Intrusion Detection tools and Biometric controls in market.
K3	CO3	Capable to handle sensitive real time security technologies and establishing VPNs
K4	CO4	Students are able to implement information security projects and its technical aspects.

UNIT I **[15 Hrs]**

Introduction to Information Security: Introduction-The history of information security- what is security? - Components of an information system-The security systems development life cycle. The need for security: Threats-Attacks.

UNIT II **[15 Hrs]**

Legal, Ethical and professional issues in Information Security: Introduction-Law and ethics in information security- International Laws and Legal Bodies- Ethics and information security. Risk Management: An overview of risk management-Risk identification-Risk assessment-**Risk Control strategies***.

UNIT III **[15 Hrs]**

Security Technology: Firewalls and VPNs: Introduction-Access control-Firewalls-Protecting remote connections.

PCS 11

18PCS103

UNIT IV **[15Hrs]**

Security Technology: Intrusion detection and prevention systems, Other security tools: Intrusion detection and prevention systems-Honeypots, Honeynets and padded cell systems-Scanning and analysis tools-Biometric access controls.

UNIT V **[15Hrs]**

Implementing Information Security: Introduction-Information Security project management-Technical aspects of implementation– **non Technical aspects of implementation. Information Security***. Maintenance: Security management maintenance models: The Security maintenance models-monitoring the external environment.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOK:

1. Michael E. Whitman, Herbert J. Mattord,(2014), **"**Principles of Information Security **"**, Fifth Edition, Cengage Learning Publications.

REFERENCE BOOKS:

1. Mark Rhodes-Ousley,(2013),"Information Security The Complete Reference", Second Edition McGraw Hill Professional.
2. John Vacca,(2013),"Managing Information Security", Second Edition, Syngress Imprint.
3. Nayak, Umesha, Rao, Umesh Hodeghatta,(2014)," The InfoSec Handbook an Introduction to Information Security", Apress Publisher, First Edition.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	L	M	H
CO2	M	S	M	H	H
CO3	L	S	S	H	H
CO4	M	H	H	S	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 12

18PCS104

Programme Code: 09		MSc. Computer Science		
Course Code:18PCS104		Core Paper 4 - Relational Database Management Systems		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	I	5	75	4

Course Objectives

1. To understand and apply the principles of data modelling using Entity Relationship and develop a good database design.
2. To understand the use of SQL and its syntax and apply Normalization.
3. To understand the concept of information retrieval.

Course Outcomes (CO)

K1	CO1	Student will master the basic concepts of Databases
K2	CO2	Student will have high level understanding of relational model and SQL.
K3	CO3	Student will be proficient in data Normalization
K4	CO4	Students will understand security concept and informational retrieval.

UNIT I **[15 Hrs]**

Overview of Database Systems: Managing data-File System versus a DBMS-Advantages of DBMS-Describing and storing data in a DBMS -Database design: Database design and ER diagrams-Entities, Attributes and Entity sets-Relationship and relationship sets-Additional features of the E-R model-Conceptual design with E-R model-Logical database design-Introduction to Views-Destroying altering tables and views.

UNIT II **[15 Hrs]**

Queries, Constraints and Triggers: Overview-the form of a basic SQL query-Union, Intersect and Expect-Nested queries-Aggregate operators-Null values-Complex integrity constraints in SQL-Triggers and active databases

UNIT III **[15 Hrs]**

Transaction Management: The ACID properties-Transaction and schedule-Concurrent execution of transactions-Lock based concurrency control - **Performance of locking*** - Transaction support in SQL-Concurrency control: 2PL, Serializability and Recoverability-Introduction to lock management-Lock conversion-Dealing with deadlocks.

UNIT IV **[15 Hrs]**

Schema refinement and normal forms: Introduction-Functional dependencies - Normal forms - Properties of decomposition-Normalization-Schema refinement in database design-Other kind of dependencies

Security and Authorization : Introduction-Access control-Discretionary access control -Mandatory access control.

UNIT V **[15 Hrs]**

Object-database system: New data types - Manipulating the new data - Structured data types - Operations on structured data – Encapsulation and ADT – Inheritance - Database design for ORDBMS - ORDBMS implementation challenges – OODBMS - Compare RDBMS, ORDBMS, OODBMS

Information Retrieval : Introduction to IR - DBMS versus Information Retrieval - Indexing for text search – Web search engines – Managing text in DBMS.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Power point presentation, Seminar, Brainstorming, Assignment

TEXT BOOK:

1. Ragu Ramakrishnan, Johannes Gehrke ,(2003) " Database Management Systems" , 3 rd Edition , Tata McGraw Hill Publication.

REFERENCE BOOKS

1. Elmarsri Navathe, Ranez Shankand, (2008) "Fundamentals of Database Systems", 5th Edition, Pearson Publication.
2. Silberschatz,Henry Korth, (2011)" Database System Concepts", 6th Edition, Tata McGraw Hill Publication.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	H	H
CO2	M	H	H	S	H
CO3	H	S	S	M	S
CO4	H	M	H	S	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 15

18PCS1CL

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS1CL		Core Practical 1: Data Structures using C++Lab		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	I	5	75	3

Course Objectives

1. To Inculcate the Knowledge of various data structures and definitions.
2. To provide the use of data structure background for programming.
3. To make a decision of appropriate data structure for programming.

Course Outcomes (CO)

K3	CO1	Distinguish the Various data structures
K3	CO2	Skills to describe the data structures appropriately for programming
K4	CO3	Apply appropriate algorithms and data structures for various applications
K5	CO4	Evaluate the Various Data Structures with various applications

LIST OF PRACTICAL PROGRAMS

1. Array Creation and Operations.
2. Stack and Queue Operations.
3. Recursion, Infix to Postfix Conversion.
4. Implementation of Linked List.
5. Tree Traversals.
6. Graph-Shortest Path.
7. Searching-Linear, binary, Fibonacci.
8. Sorting-Radix, shell, Quick, Heap, Merge.

PCS 16

18PCS1CL

Teaching Methods:

Demonstration ,simulation, assignment and Discussion.

Guidelines to the distribution of marks for Practical Examinations: (Total marks:75)

CIA : Total marks – 30 [Practical – 20, Observation- 5, Attendance – 5]

ESE: Two Questions will be given for each student (3 Hours / 45 Marks)

Record Work - 5 Marks

Algorithm, Coding and execution – 40 Marks

Particulars	Program 1 (Marks)	Program II (Marks)
Algorithm	5	5
Coding	10	10
Execution & viva voce	5	5

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	S	L
CO2	S	M	S	H	H
CO3	S	M	S	H	H
CO4	S	S	S	S	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 17

18PCS1CM

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS1CM		Core Practical 2 : RDBMS Lab		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	I	5	75	3

Course Objectives

1. To define schema and creation of Databases.
2. To write SQL Queries to retrieve information from Databases.
3. To use host language interface with Embedded SQL.

Course Outcomes (CO)

K3	CO1	Creation of Databases
K3	CO2	Retrieval of Information of Databases
K4	CO3	Use of Forms and Report writer packages
K5	CO4	Use of host language interface with Embedded SQL

LIST OF PRACTICAL PROGRAMS

1. Queries to perform SET operations, Views, Aggregate Operators and Triggers.

1. Online Reservation System.
2. Personal Information.
3. Student Mark Processing.
4. Hotel Management.
5. Stock Maintenance.
6. College Admission.

.

PCS 18

18PCS1CM

Teaching Methods:

Demonstration ,simulation, assignment and Discussion.

Guidelines to the distribution of marks for Practical Examinations: (Total marks:75)

CIA : Total marks – 30 [Practical – 20, Observation- 5, Attendance – 5]

ESE: Two Questions will be given for each student (3 Hours / 45 Marks)

Record Work - 5 Marks

Algorithm, Coding and execution – 40 Marks

Particulars	Program 1 (Marks)	Program II (Marks)
Algorithm	5	5
Coding	10	10
Execution & viva voce	5	5

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	S	L
CO2	S	M	S	H	H
CO3	S	M	S	H	H
CO4	S	S	S	S	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 19

SEMESTER II **18PCS205**

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS205		Core Paper 5 : Advanced Java		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	II	4	60	4

Course Objectives

1. To understand the basic concepts of Object oriented programming.
2. To inculcate the concepts of networking and graphics offering a GUI environment.
3. To educate the concepts of database management and essentials of Servlets

Course Outcomes (CO)

K1	CO1	Ability to understand the applications in OOPS paradigm.
K2	CO2	Student can establish Client-Server network and enable Multithreaded applications
K3	CO3	Will Effectively use Applets , Event and Construction of Bean API , providing a GUI environment,
K4	CO4	Capable of better Backend Management, Can compose complex Applications with Swings and Servlet.

UNIT I **[12 Hrs]**

Introduction: Inheritance: basics-Using super keyword- Multilevel inheritance – overriding – Dynamic method dispatch – Abstract – Using final with inheritance.

Packages and Interfaces: Packages- Access protection-Importing Packages. Interface –Defining interface- Variables in interface-Implementing an interface.

UNIT II **[12 Hrs]**

Exception handling: Fundamentals – Using try and catch – Nested try statements - Throw – Throws – Finally – Using built in exceptions – Creating own exceptions.

Multithreading: Thread model – Creating a thread- Using isAlive() and join() Thread priorities – Synchronization – Deadlock- Suspending ,resuming and stopping threads.

File Input Stream-File Output Stream. Networking: Inet address TCP/IP client/ server sockets.-Datagrams.

Applet Class: Applet basics-Applet Skeleton-A simple Applet-HTML Applet tag

UNIT III **[12 Hrs]**

Event handling: Event model - Event classes - Event Listener interface- Adapter classes.

Graphics: Window Fundamentals - Working with graphics, color and font. AWT Controls Fundamentals – Labels-Buttons- Checkboxes-Lists – Text field – Layout managers - Menu bars and menus.

UNIT IV **[12 Hrs]**

JDBC: Connecting java with Oracle-Java Beans: advantages – using BDK – JAR files – Introspection- **Developing simple bean using the BDK** *.

UNIT V **[12 Hrs]**

Swing – Japplet – Icons and JLabel, JTextField, JPasswordField, JButton, JCheckBox, JRadioButton, JComboBox, JScroll panes - JTabbed panes – Trees - Tables

Servlets – simple servlet – life cycle – Servlet API – Servlet Package .

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOKS:

1. Herbert Schildt,(2011), “Java, The Complete Reference“, Eighth edition, Tata McGraw HillPublication.
2. Paul Deitel and Harvey Deitel,(2014), “Java How to Program, Late Objects”, Tenth Edition, Pearson Education Asia.

REFERENCE BOOKS:

1. Cay S. Horstmann, Gary Cornell, (2013), **"**Core Java®, Volume II—Advanced Features, Ninth Edition" Prentice Hall.

2. Hariom Choudhary, (2015),"Introduction to Java Programming, Comprehensive Version 2014-2015".

MAPPING

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	L
CO2	S	S	H	H	M
CO3	H	M	H	S	L
CO4	M	H	S	H	H

S – Strong H – High M – Medium L – Low

PCS 22

18PCS206

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS206		Core Paper 6:Wireless Networks		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	II	4	60	4

Course Objectives

1. To impart adequate knowledge of wireless communication.
2. To provide exposure of various kinds of wireless communications with its architecture and different types of wireless networks.
3. To Familiarize IEEE wireless standards, Wi-max and Video coding.

Course Outcomes (CO)

K1	CO1	Students will get the knowledge of wireless communication
K2	CO2	Knows the structures and standards of wireless communication
K3	CO3	Describe the components & operations of various wireless networks
K4	CO4	Access the standards and types of wireless networks

UNIT I **[12 Hrs]**

WIRELESS NETWORK ARCHITECTURE AND OPERATION: Cellular concept-cell fundamentals-mobility management-introduction to GSM –GSM network and system architecture. CDMA network and system architecture. **Generation of cellular systems*.**

UNIT II **[12 Hrs]**

WIRELESS LANS and PANS Introduction to wireless LANs –evolution-design issues-mac layer operations-security.IEEE802.15x technologies-PAN application and architecture- Physical layer detail-bluetooth link controller –operational states

UNIT III **[12 Hrs]**

WIRELESS MAN: Wireless MAN-IEEE802.16x wireless MANS-mac layer details-IEEE802.16 physical layer detail-common system operations. WIRELESS WANS: wireless in local loop: Generic WLL Architecture- WLL Technologies.-wireless ATM

18PCS206

UNIT IV **[12 Hrs]**

WIRELESS INTERNET: Introduction-mobile IP-bindings-route optimization-handoffs-security in mobile IP. -Traditional TCP- TCP over wireless –mobile TCP.WAP-Model-Protocol stack. ADHOC SENSOR NETWORKS: Introduction - Ad hoc wireless internet. **WiMax / IEEE 802.16 699**: Introduction – System Overview .

UNIT V **[12 Hrs]**

RECENT ADVANCES IN WIRELESS NETWORKS: Wireless Fidelity Systems: Service provider model. Optical wireless networks: Short range infrared communication - optical wireless WDM. **Video Coding:** Introduction - Video Coding Standards.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOKS:

1. Gary J.Mullet (2006), Introduction to Wireless Telecommunication and networks , India edition (Unit I,II,III)

2. C.Siva Ram Murthy,B.S.Manoj (2007), Adhoc Wireless networks-Architecture and protocols. Pearson / Prentice Hall (Unit IV, V)

3. T.L Singal (2017), “Wireless communications”, TMH.. (Unit V)

REFERENCE BOOKS:

1. William Stallings (2007), Wireless Communications and networks, Pearson / Prentice Hall of India, 2nd Edition..

2. Vijay K.Garg (2008), Wireless communications and networking,.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	M	H
CO2	S	S	M	H	M
CO3	S	S	H	H	M
CO4	S	S	H	H	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 24

18PCS207

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS207		Core Paper 7 - .Net Framework		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	II	4	60	4

Course Objectives

1. To understand .Net framework features like portability and language interoperability concepts.
2. To understand the vb.Net and ASP.Net controls.
3. To understand how to work with database with the help of ADO.Net.

Course Outcomes (CO)

K1	CO1	Student will be able to understand .Net framework concepts.
K2	CO2	Student will be able to remember VB.Net controls windows application.
K3	CO3	Student will be able to analyse how to use a ASP.Net controls and web application.
K4	CO4	Student will be able to create or apply database driven Windows application and ASP.Net web applications.

UNIT I **[12 Hrs]**

Understanding .Net-The .Net strategy-The origins of .Net technology-The.Net framework-The CLR-Framework base classes-Visual studio .net-.Net languages-Benefits of .Net approach-VB.NET-new in vb.net-operators-conditionals & loops-Procedures, scope & exception handling.

UNIT II **[12 Hrs]**

Windows forms and controls-General controls: Label, textbox, button, rich textbox, Link labels,check boxes, radiobutton, combobox, listbox, timer, progress bar.

Container controls: Groupbox, panel, tab control-tooltip-splitters- menus-menu items-context menus-builtindialogbox

18PCS207

UNIT III **[12 Hrs]**

ASP.NET:Webforms:Buttons,textboxes,labels,Literals,placeholders,checkboxes,radiobuttons, tables,panels- images-image lists-tree and list view-toolbars-status bar and progress bars.

UNIT IV **[12 Hrs]**

Image button, list boxes, drop downlist, hyperlink & link button-Validation controls: required field, regular expression, compare, **range validators***-calendars-adrotators-html controls.

UNIT V **[12 Hrs]**

Data access with ADO.Net - **Binding controls to database***-database access with web applications-creating window services, web services-deploying applications.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOKS:

1. E.Balagurusamy (2008), “Programming in C# A Premier”, TMH Publisher co Ltd. (UNIT I)
2. Steven Holzner (2008),“Visual Basic.Net Programming Black Book”, Dream Tech. (UNIT II.III.IV,V)

REFERENCE BOOKS:

1. Evangelos Petroustes,(2002) “Mastering Visual Basic.Net”, BPB Publications, First Edition.
2. KoGENT Solutions Inc(2010)., ASP.NET 3.5 (Covers C# and VB 2008 codes) Black Book, Platinum Edition, Dreamtech press.

PCS 26

18PCS207

MAPPING

CO \ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	H	S	H
CO2	M	H	H	S	H
CO3	H	S	H	S	H
CO4	H	H	H	S	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 27

18PCS208

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS108		Core Paper 8 : Software Project Management		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	II	4	60	4

Course Objectives

1. To understand the concepts of software project and product life cycle.
2. To analyze software requirements, design and development of the project.
3. To equip testing and ensuring the software quality.

Course Outcomes (CO)

K1	CO1	Students will be aware of project and product life cycle and its requirements.
K2	CO2	Thorough understanding in various key aspects which are involved in the process of project development.
K3	CO3	Gathering requirements enable the students to analyze them in order to achieve goal.
K4	CO4	Applying all the techniques and methods learned to minimize variability and develop the software.

UNIT I **[12 Hrs]**

Product life cycle-Project life cycle models-metrics-introduction-The metrics Roadmap-A typical metrics strategy-what should you measure-set targets and track them-Understanding and trying to minimize variability-Act on data.

UNIT II **[12 Hrs]**

Software Configuration management-some basic definitions and terminology-The processes and activities of Software configuration management-Configuration status accounting-Configuration Audit.

Software Quality Assurance-How do you define Quality?-Why is quality important in software?-Quality control and Quality Assurance-Cost and benefits of quality-Software Quality assurance tools.

PCS 28

18PCS208

Risk management-What is Risk management and why it is important?-Risk management cycle-Risk Identification: Common tools and techniques-Risk Quantification-Risk monitoring-Risk mitigation.

UNIT III **[12 Hrs]**

Project initiation: Introduction- Activities-output, quality records and completion criteria-interfaces to the process database.

Software Requirements gathering-inputs and start criteria for requirements gathering-dimensions of requirements gathering-steps to be followed during requirements gathering-outputs and quality records from the requirements phase-skill sets required during the requirement phase

Estimation-what is estimation?-when and why is estimation done?-three phases of Estimation-estimation methodology-formal models for size estimation-translating size estimate into effort estimate-translating effort estimate into schedule estimate.

UNIT IV **[12 Hrs]**

Design and development phases-some differences in our chosen approach-salient features of design-evolving an architecture for blueprint-design for reusability-technology choices/constraints-Design for standards-Design for portability-Design for testability-Design for diagnosability -Design for maintainability-Design for installability-interoperability design.

Project management in testing phase-Introduction-what is testing?-what are the activities that make up testing?-**Test scheduling and types of tests***.

UNIT V **[12 Hrs]**

Project management in maintenance phase-introduction-activities during the maintenance phase-management issues during the maintenance phase-configuration management during the maintenance phase-skill sets for people in the maintenance phase - estimating size, effort and people resources for the maintenance phase- - Impact of the Internet on Project Management. People Focused process models : Growing emphasis on people centric models- people capability maturity model (P-CMM).

* Self study – Questions for examination may be taken from the self study portions also.

PCS 29

18PCS208

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOK:

1. Gopalaswamy Ramesh (2003), "Managing Global Software Projects", Tata McGraw Hill publishing company.

REFERENCE BOOK:

1. Bob Hughes and Mike Cotterell (2006), "Software Project Management", 4th Edition, TMH.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	H	S
CO2	S	M	S	S	S
CO3	S	M	H	S	S
CO4	S	M	S	H	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 30

18PCS2CN

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS2CN		Core Practical 3 : Advanced Java Lab		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	II	5	75	3

Course Objectives

1. The course inculcates the fundamentals and dynamics of OOPs paradigm.
2. To demonstrate the the GUI and advanced functionalities enriching the development skill.
3. To simulate the industrial demands and expertise in the specified domain.

Course Outcomes (CO)

K3	CO1	Students will be capable to understand and apply the better usage of OOPs concept.
K3	CO2	Proficient in developing GUI environment and event handling
K4	CO3	Establishing networks with socket programming and Sessions
K5	CO4	Simulates applications with Swings and Servlets.

LIST OF PRACTICAL PROGRAMS

1. Develop applications using package, polymorphism, inheritance and inner class.
2. Applications with applets and sockets.
3. Application with Swing and JDBC concepts.
4. Create applications with multithreading and file concepts.

PCS 31

18PCS2CN

Teaching Methods:

Demonstration ,simulation, assignment and Discussion

Guidelines to the distribution of marks for Practical Examinations: (Total marks:75)

CIA : Total marks – 30 [Practical – 20, Observation- 5, Attendance – 5]

ESE: Two Questions will be given for each student (3 Hours / 45 Marks)

Record Work - 5 Marks

Algorithm, Coding and execution – 40 Marks

Particulars	Program 1 (Marks)	Program II (Marks)
Algorithm	5	5
Coding	10	10
Execution & viva voce	5	5

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	H	M
CO2	H	M	S	S	H
CO3	H	S	S	H	M
CO4	H	S	S	H	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 32

18PCS2CO

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS2CO		Core Practical 4 : .Net Framework Lab		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	II	5	75	3

Course Objectives

1. To educate the usage of .Net framework Environment.
2. To understand the usage of controls in .Net.
3. To create database application with ADO.Net.

Course Outcomes (CO)

K3	CO1	Effective use of .Net framework concepts.
K3	CO2	Develop a working knowledge of VB.Net controls
K4	CO3	Student will be able to build well formed web controls with validation
K5	CO4	Student will be able to create or apply database driven Windows application and ASP.Net web applications.

List of Practical Problems

1. Develop applications with windows controls.
2. Develop ADO.Net application to insert, delete, update records in database.
3. Develop a web site using Web controls.
4. Develop a web site with database connection.

PCS 33

18PCS2CO

Teaching Methods:

Demonstration ,simulation, assignment and Discussion

Guidelines to the distribution of marks for Practical Examinations : (Total marks:75)

CIA : Total marks – 30 [Practical – 20, Observation- 5, Attendance – 5]

ESE : Two Questions will be given for each student(3 Hours / 45 Marks)

Record Work - 5 Marks

Algorithm, Coding and execution – 40 Marks

Particulars	Program 1 (Marks)	Program II (Marks)
Algorithm	5	5
Coding	10	10
Execution & viva voce	5	5

MAPPING

CO \ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	H	S	H
CO2	M	S	H	S	S
CO3	H	S	H	H	H
CO4	H	S	H	**S**	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 34

SEMESTER III **18PCS309**

Programme Code: 09		MSc.Computer Science		
Course Code: 18PCS309		Core Paper 9: Open Source Systems.		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	III	5	75	4

Course Objectives

1. To educate the benefits of proprietary and non proprietary softwares.
2. To inculcate the significance of freeware Web Technologies
3. To promote the web designing skills and data handling with Server side scripts.

Course Outcomes (CO)

K1	CO1	Will enhance their presentation skills in designing, recollecting Html tags , pruning it to perfection with style sheets
K2	CO2	Students can escalate their web design to data manipulation at client end with JavaScript
K3	CO3	Will have sound knowledge in data validation and handling dynamic data with DHTML
K4	CO4	Handling challenges at backend, performing validation at Server end with PHP-MySQL suite

UNIT I **[15 Hrs]**

Introduction: HTML, XML, and the World Wide Web. HTML**:** Basic Html –The Document Body-Text-Hyperlinks-Adding More Formatting – Lists –Tables--Images.

UNIT II **[15 Hrs]**

More HTML**:** Multimedia Objects – Frames –Forms –Toward Interactivity —XHTML –An Evolutionary Markup .

Cascading Style Sheets**:** Introduction –using styles-Defining own

Styles- Properties and Values in Styles- Style Sheets - A worked example-Formatting Blocks of Information.

PCS 35

18PCS309

UNIT III **[15 Hrs]**

An Introduction to Java Script**:** JavaScript- JavaScript –The Basics –Variables –String Manipulation –Statements **-Regular Expression*–** Array –Function-Window objects.

UNIT IV **[15 Hrs]**

Dynamic HTML With JavaScript**:** Data Validation – Opening New Window –Messages and Confirmations –The Status Bar –Writing to Different Frame –Rollover Buttons-Moving Images –Floating Logos.

UNIT V **[15 Hrs]**

An Introduction To PHP**:** PHP –Using PHP – Variables –Program Control –Built in Functions-File Manipulation –Validation.

Mysql**:** Establishing connection-Accessing Mysql with PHP-Starting, terminating and writing your own SQL programs

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment.

TEXT BOOK:

1.Charis Bates,(2011)" Web Programming Building Internet Applications", Wiley India Pvt.Ltd.,II Edition.

REFERENCE BOOKS:

1. Adam Rizvi,(2011), Click Start Internet Basics: The Internet Basics, Written for Beginners, Click start publishing, UK.

2. Jon Duckett, (2008)"Beginning Web Programming with HTML, XHTML, and CSS", Wiley publishers.

3. Ivan Bayross and Sharanam Shah, (2005),"MySQL 5 for Professionals", Shroff Publishers and Distributors, Third Edition.

PCS 36

18PCS309

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	M	S	L
CO2	H	S	S	H	M
CO3	M	S	S	S	H
CO4	M	H	H	S	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 37

18PCS310

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS310		Core Paper 10:Unix &Linux Programming		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	III	5	75	4

Course Objectives

1. To understand the basic set of commands and utilities in Linux/UNIX systems.
2. To provide a comprehensive introduction to Shell Programming.
3. To develop an essential skills required to write simple and complex Shell scripts to automate the applications

Course Outcomes (CO)

K1	CO1	Obtain a foundation for unix /linux operating systems
K2	CO2	Manifestation of various unix /linux command and its usage
K3	CO3	Make effective use of Unix / Linux utilities, and scripting languages
K4	CO4	Exposure to develop a software using Unix/Linux systems

UNIT I **[15 Hrs]**

Introduction, Brief history. Unix Components/Architecture. Features of Unix. The UNIX Environment and UNIX Structure, Posix and Single Unix specification. The login prompt. General features of Unix commands/ command structure. Command arguments and options. Understanding of some basic commands such as echo, printf, ls, who, date, passwd, cal, Combining commands. Meaning of Internal and external commands. The type command: knowing the type of a command and locating it. The man command knowing more about Unix commands and using Unix online manual pages. The man with keyword option and whatis. The more command and using it with other commands. Knowing the user terminal, displaying its characteristics and setting characteristics. Managing the nonuniform behaviour of terminals and keyboards. The root login. Becoming the super user: su command. The /etc/passwd and /etc/shadow files. Commands to add, modify and delete users.

UNIT II **[15 Hrs]**

Unix files. Naming files. Basic file types/categories. Organization of files. Hidden files. Standard directories. Parent child relationship. The home directory and the HOME

variable. Reaching required files- the PATH variable, manipulating the PATH, Relative and absolute pathnames. Directory commands – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names. File related commands – cat, mv, rm, cp, wc and od commands. File attributes and permissions and knowing them. The ls command with options. Changing file permissions: the relative and absolute permissions changing methods. Recursively changing file permissions. Directory permissions.

UNIT III **[15 Hrs]**

The vi editor. Basics. The .exrc file. Different ways of invoking and quitting vi. Different modes of vi. Input mode commands. Command mode commands. The ex mode commands. Illustrative examples Navigation commands. Repeat command. Pattern searching. The search and replace command. The set, map and abbr commands. Simple examples using these commands. The shells interpretive cycle. Wild cards and file name generation. Removing the special meanings of wild cards. Three standard files and redirection. Connecting commands: Pipe. Splitting the output: tee. Command substitution. Basic and Extended regular expressions. The grep, egrep. Typical examples involving different regular expressions.

UNIT IV **[15 Hrs]**

Shell programming. Ordinary and environment variables. The .profile. Read and readonly commands. Command line arguments. exit and exit status of a command. Logical operators for conditional execution. The test command and its shortcut. The if, while, for and case control statements. The set and shift commands and handling positional parameters. The here (<<) document and trap command. Simple shell program examples. File inodes and the inode structure. File links – hard and soft links. Filters. Head and tail commands. Cut and paste commands. The sort command and its usage with different options. The umask and default file permissions. Two special files /dev/null and /dev/tty.

UNIT V **[15 Hrs]**

Meaning of a process. Mechanism of process creation. Parent and child process. The ps command with its options. Executing a command at a specified point of time: at command. Executing a command periodically: cron command and the crontab file.. Signals. The nice and nohup commands. Background processes. The bg and fg command. The kill command.-The find command- Structure of a perl script. Running a perl script. Variables and operators. String handling functions. Default variables – $_ and $. – representing the current line and current line number. The range operator. Chop() and chomp() functions. Lists and arrays. The @- variable. The splice operator, push(), pop(), split() and join(). File handles and handling file – using open(), close() and die () functions.. Associative arrays – keys and value functions. Overview of decision making loop control structures – the foreach. Regular expressions – simple and multiple search patterns. The match and substitute operators-Defining and using subroutines

PCS 38

TEXT BOOKS:

1.Sumitabha Das, (1993), Unix Concepts and Applications., 4th Edition, Tata McGraw Hill (Unit I,II,III,IV, V).

2.Behrouz A. Forouzan, Richard F. Gilberg (2009): UNIX and Shell Programming- Cengage Learning – India Edition, (Unit- I,IV,III).

3.M.G. Venkatesh Murthy: UNIX & Shell Programming, (2009), Pearson Education. (Unit -V).

REFERENCE BOOKS:

1. Graham Glass, King Ables, (2009), Unix for programmers and users, , Pearson Education, 3rd Edition.

2. .N.B Venkateswarlu, (2010), Advanced Unix programming, BS Publications, 2nd Edition..
3. Yashwanth Kanitkar, (2010), Unix Shell programming , BPB Publisher, 1st Edition .

4. . Richard Blum, (2014), Linux Command Line and Shell Scripting – Bible, Wiley

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	H	M
CO2	S	S	H	H	H
CO3	S	S	H	H	H
CO4	S	S	S	S	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 40

18PCS311

Programme Code: 09		MSc.Computer Science		
Course Code: 18PCS311		Core Paper 11: Data Mining and Warehousing		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	III	5	75	4

Course Objectives

1. To inculcate the basics of Data Mining and Data Warehousing.
2. To recognize the various data mining and warehousing tools in the business environment/ state of the market.
3. To develop the proficiency for planning & applying the DM techniques.

Course Outcomes (CO)

K1	CO1	Understand the basics of DataMining & DataWarehousing.
K2	CO2	Identify the appropriate Data Mining techniques for problem solving
K3	CO3	Demonstration of various data mining techniques and ware housing tool
K4	CO4	Implement the methods and techniques to develop a small Project

UNIT I **[15 Hrs]**

Data Mining: Introduction - what is Decision tree? – Where to use Decision Trees – How the Decision Tree Works – Case Study – Strengths and Weaknesses.

Neural Networks: What is Neural Network? – Where to use Neural Networks – How the Neural Networks – Case Study - Strengths and Weaknesses.

UNIT II **[15 Hrs]**

Nearest Neighbor and Clustering: Where to use Clustering and Nearest-Neighbor Prediction – How Clustering and Nearest-Neighbor Prediction Work – Case Study - Strengths and Weaknesses.

PCS 41

18PCS311

Genetic Algorithms: What are Genetic Algorithms – Where to use Genetic Algorithms – How the Genetic Algorithm works – Case Study - Strengths and Weaknesses.

UNIT III **[15 Hrs]**

Rule Induction: Where to use Rule Induction – How Rule Induction Works – Case Study - Strengths and Weaknesses.

Data Visualization: Data Visualization Principles- Parallel Coordinates – Visualizing Neural Networks – **Visualization of Trees** *– State of the Industry.

UNIT IV **[15 Hrs]**

Business Analysis: Reporting and Query Tools and Applications: Tool Categories – The Need for Applications - Cognos Impromptu – Applications.

On-Line Analytical Processing (OLAP): Need for OLAP – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – **Categorization of OLAP Tools** *– State of the Market – OLAP Tools and the Internet.

UNIT V **[15 Hrs]**

Data warehousing: Introduction – Data Warehousing Components – Overall Architecture – Data Warehouse Database – Sourcing, Acquisition, Cleanup, and Transformation Tools – Metadata – Access Tools – Data Marts – Data Warehouse Administration and Management – Information Delivery System.

Building a Data Warehouse: Business Considerations: Return of Investment – Design Considerations – Technical Considerations – Implementation Considerations – Integrated Solutions – Benefits of Data Warehousing.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOK:

1. Alex Berson ,Stephen J.Smith, (2004), Data Warehousing (2004), Data Mining & OLAP Tata McGraw Hill.

REFERENCE BOOKS:

1. Jiawei Han and Micheline Kamber (2008), Data Mining Concepts and Techniques, Morgn Kaufman Publishers, Second Edition.
2. Reema Thareja (2009), Data Warehousing, Oxford University Press, First Edition..

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	S	S
CO2	S	M	S	H	S
CO3	S	H	S	H	S
CO4	S	H	S	H	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 43

18PCS3Z1

Programme Code: 09		MSc.Computer Science		
Course Code: 18PCS3Z1		Mini Project		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	III			3

MARK DISTRIBUTION:

	Marks
CIA	**15**
VIVA-VOCE *	**15**
PROJECT RECORD *	**45**

*** Both Internal and External Examiner shall evaluate Project and Viva-Voce Jointly**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	H	M	H	M
CO2	H	M	S	S	H
CO3	H	S	S	H	M
CO4	H	S	S	H	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 44

18PCS3CP

Programme Code: 09		MSc.Computer Science		
Course Code: 18PCS3CP		Core Practical 5 : Open Source Lab		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	III	5	75	3

Course Objectives

1. The course educates the advanced concepts in web designing with Open Source tools.
2. To demonstrate the development of web application and its validation.
3. To inculcate the significance of Server Scripts and simulating applications with backends.

Course Outcomes (CO)

K3	CO1	Posses better presentation and manipulating skills for developing a dynamic web page
K3	CO2	Validating the essentials in an application using JavaScript and DHTML.
K4	CO3	Capable to develop Web application with Server script
K5	CO4	Performs better Data manipulation for web application using PHP-Mysql suite.

LIST OF PRACTICAL PROGRAMS

1. Designing Websites with HTML and CSS.
2. Developing applications with JavaScript.
3. Validations with PHP.
4. File Handling in PHP.
5. Develop applications with PHP and MySQL

PCS 45

18PCS3CP

Teaching Methods:

Demonstration ,simulation, assignment and Discussion.

Guidelines to the distribution of marks for Practical Examinations: (Total marks:75)

CIA : Total marks – 30 [Practical – 20, Observation- 5, Attendance – 5]

ESE: Two Questions will be given for each student (3 Hours / 45 Marks)

1. Record Work - 5 Marks
2. Algorithm, Coding and execution – 40 Marks

Particulars	Program 1 (Marks)	Program II (Marks)
Algorithm	5	5
Coding	10	10
Execution & viva voce	5	5

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	H	M
CO2	H	M	S	S	H
CO3	H	S	S	H	M
CO4	H	S	S	H	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 46

18PCS3CQ

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS3CQ		Core Practical 6 : Unix & Linux Programming Lab		
Batch 2018-2019	Semester III	Hours / Week 5	Total Hours 75	Credits 3

Course Objectives

1. Execute the basic set of commands and utilities in Linux/UNIX systems.
2. To write shell scripts to solve regular exercises.
3. To implement some standard Linux/Unix utilities and can able to develop some software applications

Course Outcomes (CO)

K3	CO1	Make effective use of Unix utilities, and scripting languages
K3	CO2	Apply shell scripts to develop a small types of applications
K4	CO3	Exposure to develop a software using Unix/Linux systems
K5	CO4	Execution of simple programs and shell script with various applications

LIST OF PRACTICAL PROGRAMS

1. Implementation of basic commands, File commands and Directory commands.
2. Develop various application programs with vi editor.
3. Develop applications using shell scripts.

Teaching Methods:

Demonstration ,simulation, assignment and Discussion.

Guidelines to the distribution of marks for Practical Examinations : (Total marks:75)

CIA : Total marks – 30 [Practical – 20, Observation- 5, Attendance – 5]

ESE : Two Questions will be given for each student(3 Hours / 45 Marks)

Record Work - 5 Marks

Algorithm, Coding and execution – 40 Marks

PCS 47

18PCS412

Particulars	Program 1 (Marks)	Program II (Marks)
Algorithm	5	5
Coding	10	10
Execution & viva voce	5	5

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	H	M
CO2	S	H	S	H	H
CO3	S	H	S	H	H
CO4	S	S	S	H	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 48

18PCS412

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS412		Core Paper 12 : Software testing		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	IV	5	75	4

Course Objectives

1. To understand software life-cycle model (SDLC Model).
2. To introduce software testing techniques.
3. To understand softer planning, test reporting and software tools.

Course Outcomes (CO)

K1	CO1	Understand the software life-cycle model and software quality, quality assurance and quality control
K2	CO2	Ability to remember Black box testing and Integration testing concept.
K3	CO3	Student can able to analyse system and acceptance testing, performance testing.
K4	CO4	Student can able to apply regression testing , object oriented system testing, test planning execution.

UNIT I **[15 Hrs]**

Introduction – Software Life Cycle Models : Phases of Software Development – Quality, Quality Assurance and Quality Control – Testing, Verification & Validation – Process Model to represent different phases – **Life Cycle Models*.**

Types of testing – White Box Testing: What is White Box Testing? – Static Testing – Structural Testing – Challenges in White Box Testing.

18PCS412

UNIT II **[15 Hrs]**

Black box testing : What is Black Box Testing ? – Why Black Box Testing? – When to do Black Box Testing – How to do Black Box Testing?

Integration Testing : What is Integration Testing? – Integration Testing as a Type of testing – Integration Testing as a Phase of Testing – Scenario Testing – Defect Bash.

UNIT III **[15 Hrs]**

System & Acceptance Testing : System Testing overview – Why is System Testing done? – Functional Vs Non-Functional Testing – Functional System Testing – Non functional System Testing – Acceptance Testing – Summary of Testing Phases.

Performance Testing: Introduction – Factors governing Performance Testing – Methodology for Performance Testing - Tools for Performance Testing – Process for Performance Testing.

UNIT IV **[15 Hrs]**

Regression Testing : What is Regression Testing? –Types of Regression Testing- When to do Regression Testing? –How to do Regression Testing? –Best practices in Regression Testing.

Testing of Object Oriented Systems : Introduction –**Primer on Object oriented software*** – Differences in OO Testing .

UNIT V **[15 Hrs]**

Test planning, Management and Execution : Introduction – Test Planning – Test Management – Test Process – Test Reporting – Best Practices.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

PCS 50

18PCS412

TEXT BOOK:

1. Srinivasan Desikan, (2008) Gopalaswamy Ramesh, "Software Testing Principles and Practices" , Pearson Education.

REFERENCE BOOKS:

1. Boris Beizer, (2004) "Software Testing Techniques", Dream Tech Press, Second Edition.
2. Renu Rajanai ,(2004) Pradeep Oak, "Software Testing", Tata Mc Graw Hill.
3. William Perry,(2007) "Effective Methods for Software Testing ", John Wiley & Sons, Third Edition.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	H	H	M
CO2	H	M	H	H	M
CO3	H	M	H	H	M
CO4	H	M	H	H	M

S – Strong **H** – High **M** – Medium **L** – Low

PCS 51

18PCS412

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS4CR		Core Practical 7 : Software testing Lab		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	IV	5	75	3

Course Objectives

1. To understand software testing techniques.
2. To introduce software testing tools like selenium, win runner etc.
3. To know how to write test cases and apply.

Course Outcomes (CO)

K3	CO1	Effective use of software life-cycle model and software quality, quality assurance and quality control
K3	CO2	Ability to use different testing tools.
K4	CO3	Student can able to write test planning and execution. Student can able to write and apply test cases to different software products.
K5	CO4	Student can able to write and apply test cases to different software products.

LIST OF PRACTICAL PROGRAMS

- Project representation with UML tools
- Cost Estimation of Developed Applications
- Validation of Applications using Selenium.

PCS 52

18PCS412

Teaching Methods:

Demonstration ,simulation, assignment and Discussion.

Guidelines to the distribution of marks for Practical Examinations : (Total marks:75)

CIA : Total marks – 30 [Practical – 20, Observation- 5, Attendance – 5]

ESE : Two Questions will be given for each student(3 Hours / 45 Marks)

Record Work - 5 Marks

Algorithm, Coding and execution – 40 Marks

Particulars	Program 1 (Marks)	Program II (Marks)
Algorithm	5	5
Coding	10	10
Execution & viva voce	5	5

MAPPING

CO \ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	H	H	M
CO2	H	M	H	H	M
CO3	M	M	M	H	H
CO4	H	M	H	H	M

S – Strong **H** – High **M** – Medium **L** – Low

PCS 53

18PCS4Z2

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS4Z2		Project Work and Viva-Voce		
Batch	Semester	Hours / Week	Total Hours	Credits
2018-2019	IV	15	225	6

MARK DISTRIBUTION:

	Marks
CIA	**40**
VIVA-VOCE *	**40**
PROJECT RECORD *	**120**

*** Both Internal and External Examiner shall evaluate Project and Viva-Voce jointly**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	H	M	H	M
CO2	H	M	S	S	H
CO3	H	S	S	H	M
CO4	H	S	S	H	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 54

QUESTION PAPER PATTERN for CIA and ESE

M.Sc Computer science (PG)

Theory

Max Marks: 75 **Time: 3Hrs**

Section A (10 x 1 = 10 marks)

Q.No. 1 to 10 : Multiple choice type alone with four distractors each.

Section B (5 x 5 = 25 marks)

Q.No. 11 to 15 : Either or / short notes type questions (one question 'a' or 'b' from each unit).

Section C (5 x 8 = 40 marks)

Q.No. 16 to 20 : Either or / essay type questions (one question 'a' or 'b' from each unit).

****

PCS 55

ELECTIVE PAPERS

Programme Code: 09		MSc. Computer Science		
Course Code:		Elective Paper : Big Data Analytics		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To introduce the basic concepts of big data.
2. To face the challenges of big data.
3. To teach students in applying skills and tools to manage and analyse big data

Course Outcomes (CO)

K1	CO1	Understand the concept and challenges of big data.
K2	CO2	Collect, manage, store, store, query and analyse various forms of big data.
K3	CO3	Gain hands-on experience on large-scale analytics tools to solve some open big data problems.
K4	CO4	Understand the big data tools like Hadoop,Hbase,NoSQL and Neo4J

UNIT - I

What is big data – why big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies - open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics.

PCS 56

UNIT – II

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.

UNIT - III

Hbase – data model and implementations – Hbase clients – Hbase examples – praxis. Cassandra – cassandra data model – cassandra examples – cassandra clients – Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.

UNIT – IV

Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships– schemaless databases – materialized views – distribution models -peer- peer replication –consistency – relaxing consistency – version stamps – partitioning and combining – composing map-reduce calculations -**Document based Database** *– MongoDB- Introduction- Data Model- Working with data- Replication & Sharding- Development.

UNIT – V

Graph databases Neo4J- Key concept and characteristics-Modelling data for neo4j-Importing data into neo4j-Visualizations neo4j-Cypher Query Language-Data visualization-Creating Visual analytics with Tableau-Connecting your data-Creating Calculation-Using maps-Dashboard-Stories.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOK:

1. Tom White, (2012) “Hadoop: The Definitive Guide”, Third Edition ,O’Reilly Media Inc.,.

REFERENCE BOOKS:

1. Rik Van Bruggen, (2014) "Learning Neo4j" Packt Publishing.
2. Daniel G. Murray, (2016)"Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software" 2nd Edition,Wiley Publications.
3. Eelco Plugge, David Hows, Peter Membrey, Tim Hawkins (2015) "The Defininetive Guide to Mongodb",Apress.
4. Pramod J. Sadalage, Martin Fowler, (2014)"NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence" Pearsons Education.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	H	S	H	S
CO2	M	H	S	M	S
CO3	M	S	S	M	S
CO4	M	M	S	M	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 58

Programme Code: 09		MSc. Computer Science		
Course Code:		Elective Paper : Network Security and Cryptography		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To familiarize basic concepts of cryptography and algorithms.
2. To know about various security issues.
3. To understand the process of implementing the cryptographic algorithms.

Course Outcomes (CO)

K1	CO1	Understanding fundamental concepts of network security.
K2	CO2	Knowing how the encryption and decryption are done.
K3	CO3	Familiarize various kinds of viruses and related threats.
K4	CO4	Implementing various cryptography algorithms.

UNIT I

Introduction: The OSI Security Architecture-Security Attacks-Security Services-Security Mechanisms-A model for network security. Classical Encryption Techniques: Symmetric Cipher Model-Substitution technique-Transposition Technique-Rotor Machines-Steganography.

UNIT II

Block Ciphers and the data Encryption Standard: Block Cipher Principles-The Data Encryption Standard-Block Cipher Design Principles. Advanced Encryption Standard: Evaluation Criteria for AES-The AES Cipher.

Public Key Encryption and Hash Functions: Introduction to Number theory-Public Key Cryptography and RSA-Key Management.

PCS 59

UNIT III

Message Authentication and Hash Functions: Authentication Registration-Authentication Functions-Authentication Codes-Hash Functions-Security of Hash Functions and MACs.

Hash and MAC Algorithms: Secure Hash algorithm-Whirlpool-HMAC-CMAC.Digital Signatures-Authentication protocols-Digital Signature Standard.

UNIT IV

Network Security Applications: Authentication Applications-**Electronic Mail Security***-IP Security-Web Security.

UNIT V

Intruders-Intrusion Detection-Password Management-Viruses and Related Threats-Virus Counter measures-Firewall Design Principles-Trusted Systems.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOK:

1. William Stallings (2011) "Cryptography and Network Security Principles and Practices", Fourth Edition, PHI Publications.

REFERENCE BOOKS:

1. Atul Kahate (2005), "Cryptography and Network Security", Third Edition, TMH.
2. Haribhaskar (2008), "Cryptography and Network Security", Sam Publishers, First Edition.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	H	S
CO2	H	S	H	H	H
CO3	H	S	H	H	H
CO4	H	S	H	M	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 60

Programme Code: 09		MSc. Computer Science		
Course Code:		Elective Paper : Bio Inspired Computing		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To Inculcate the basics of Bio-Inspired algorithms
2. To provide exposure of various kinds of Heuristic and Meta-heuristics algorithms
3. To develop the proficiency for planning & implementing the various Bio-Inspired algorithms.

Course Outcomes (CO)

K1	CO1	Obtain a foundation for Bio-Inspired algorithms
K2	CO2	Distinguish nature based algorithms and bio inspired algorithms
K3	CO3	Most real-world optimization problems can be recognized
K4	CO4	Apply relevant Bio-Inspired problem solving methodologies for optimization

UNIT - I

Natural to Artificial Systems – Biological Inspirations in problem solving – Behavior of Social Insects: Foraging - Division of Labor - Task Allocation – Cemetery Organization and Brood Sorting – Nest Building - Cooperative transport.

UNIT - II

Ant Colony Optimization [ACO]: Ant Behavior - Towards Artificial Ants - Combinatorial Optimization - Ant Colony Optimization Meta heuristic – Problem solving using ACO - Extensions of Ant Systems – ACO and Local search methods -
ACO theoretical considerations and Convergence.

PCS 61

UNIT - III

Ant Colony Optimization algorithms for NP - hard problems - Routing problems - Assignment problems - Scheduling problems – Subset problems - Machine Learning Problems – ACO for Travelling Salesman problem*.

UNIT -IV

Swarm Intelligence: Biological foundations of Swarm Intelligence – Swarm Intelligence in Optimization – Particle Swarms for dynamic optimization problems.

UNIT - V

Biological Inspired computing to Natural Computing – Integration of Evolutionary Computation Components in Ant Colony Optimization – Particle Swarm ptimization based on Socio-cognition.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOKS:

1. Eric Bonabeau, Marco Dorigo, Guy Theraulaz, (2000) ” Swarm Intelligence: From Natural to Artificial Systems” , Oxford University press. (Unit I)

2. Marco Dorigo, Thomas Stutzle, (2004), Ant Colony Optimization , MIT Press. (Unit –II,III)

3. Christ ian Blum, Daniel Merkle (Eds.), (2008) Swarm Intelligence: Introduction and Applications , Springer Verlag,. (Unit – IV)

4. Leandro N De Castro, Fernando J Von Zuben, (2005), Recent Developments in Biologically In spired Computing , Idea Group Inc, (Unit –V)

REFERENCE BOOKS:

1. Anna Ursyn, Biologically-Inspired Computing for the Arts – Scientific Data through graphics, Information Science Reference

2. De-Shuang Huang, Yong Gan, Prashan Premaratne, Kyungsook Han(Eds.) (2014), Bio-Inspired Computing and Applications, LNBI 6840, Springer

PCS 62

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	H	S
CO2	S	H	S	H	S
CO3	S	S	S	H	S
CO4	S	S	S	S	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 63

Programme Code: 09		MSc. Computer Science		
Course Code:		Elective Paper : Advanced Computing		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To Inculcate the basics of Grid Computing Architecture and Framework
2. To provide exposure to Cluster Computing Middlewares
3. To understand the concepts of Cloud Computing and its Applications

Course Outcomes (CO)

K1	CO1	Obtain a foundation for Grid Computing Concepts and Architecture
K2	CO2	Exposure to various toolkits used in Grid
K3	CO3	Proficient in single system image
K4	CO4	Apply Cloud in various Real-time Applications

UNIT I

GRID COMPUTING **:** Grid Computing -The data Centre, the Grid and the distributed/High performance computing –Cluster computing and Grid computing – Meta computing–Scientific, business and E-Governance Grids, web services and Grid computing. Technologies and architecture for Grid computing. World wide Grid Computing Activities, Organizations and projects. Web services and the Service oriented Architecture (SOA).

UNIT II

GRID COMPUTING ARCHITECTURE : OGSA for Resource distribution – Stateful web services in OGSA –Web services Resource Framework(WSRF) – Resource approach to

stateful services-WSRF specification – Globus Toolkit. Grid Resource Management system - Grid Security Requirements – ***Data management challenges.**

UNIT III

CLUSTER COMPUTING : Approaches to parallel computing –How to achieve low cost parallel computing through clusters – Definition and architecture of a cluster – Cluster Middleware : An Introduction –Levels and layers of single system Image(SSI) –Cluster middleware design objectives –Resource Management and scheduling –Cluster programming environment and tools. Process Scheduling - Load sharing and Load balancing.

UNIT IV

UNDERSTANDING CLOUD COMPUTING: Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

UNIT V

DEVELOPING CLOUD SERVICES: Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service –Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

Cloud Computing for the family - Cloud Computing for the Community - Cloud Computing for the Corporation.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOKS:

1. C.S.R Prabhu,(2008) Grid and Cluster computing, Prentice Hall of India, (Units I, II & III)
2. Michael Miller, (2008)"Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que,. (Units IV & V)

REFERENCE BOOK:

1. Ian Foster, Carl Kesselman,(2004) The Grid 2: Blueprint for a New Computing Infrastructure, Elsevier Series,.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	H	S
CO2	S	H	S	H	S
CO3	S	S	S	H	S
CO4	S	S	S	S	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 66

Programme Code: 09		MSc. Computer Science		
Course Code:		Elective Paper : Green Computing		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To introduce students the concepts of Green computing
2. To understand the concept of green Enterprise architecture and how to minimize e-waste.
3. To teach students in applying skills to manage the Environmentally Responsible Business Strategies (ERBS).

Course Outcomes (CO)

K1	CO1	Understand how to build environmentally responsible business policies, practices and metrics.
K2	CO2	Understand the concepts of green assets and modelling, green enterprise architecture, green information system.
K3	CO3	Understand the concepts of Grid framework and green data centre.
K4	CO4	Apply Green IT strategies and applications to a home, Hospital, packaging industry and telecom sector.

UNIT I

Fundamentals of Green IT : Business, IT, and the Environment –Green computing: carbon foot print, scoop on power –Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics -Approaches to green computing -Middleware Support -Compiler Optimization -Product longevity -Software induced energy consumption -its measurement and rating.

PCS 67

UNIT II

Green Assets and Modeling: Green Assets: Buildings, Data Centers, Networks, and Devices –Green Business Process Management: Modeling, Optimization, and Collaboration –Green Enterprise Architecture –Environmental Intelligence –Green Supply Chains –Green Information Systems: Design and Development Models.

UNIT III

Grid Framework: Virtualizing of IT systems –Role of electric utilities, Telecommuting, teleconferencing and teleporting –Materials recycling –Best ways for Green PC –***Green Data center** –Green Grid framework.

UNIT IV

Green Compliance and Green Mobile : Socio-cultural aspects of Green IT –Green Enterprise Transformation Roadmap –Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future -Green mobile -optimizing for minimizing battery consumption -Web, Temporal and Spatial Data Mining Materials recycling.

UNIT V

Case Studies: The Environmentally Responsible Business Strategies (ERBS) –Case Study Scenarios for Trial Runs –Case Studies –Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOK:

1. Bhuvan Unhelkar,(2011) “Green IT Strategies and Applications -Using Environmental Intelligence”, CRC Press.

REFERENCE BOOKS:

1. Alin Gales, Michael Schaefer, Mike Ebbers, (2011)"Green Data Center: steps for the Journey", Shoff/IBM rebook.
2. John Lamb,(2009)"The Greening of IT", Pearson Education.
3. Jason Harris,(2012) " Green Computing and Green IT Best Practices on Regulations and Industry Initiatives, Virtualization, Power Management, Materials Recycling and Telecommuting", Emereo Publishing.

MAPPING

CO \ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M	M	L	S
CO2	M	M	M	L	S
CO3	M	M	M	L	S
CO4	M	M	M	L	S

S – Strong **H** – High **M** – Medium **L** – Low

PCS 69

Programme Code: 09		MSc. Computer Science		
Course Code: 18PCS4E3		Elective Paper : Enterprise Web Services		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To educate the concepts of webservice development and mobile portals.
2. To offer a broader study on XML manipulation and WSDL usage.
3. To enhance business analysis skills and excel in real world Web service Application development.

Course Outcomes (CO)

K1	CO1	Understanding the usage of basic Web service technologies and structure better XML schema and SOAP Models for web applications
K2	CO2	Acquires Knowledge to develop registry for web service and experimenting various WSCL components
K3	CO3	Developing better Workflow Management and aware of various Web security issues
K4	CO4	Handling challenges in mobile web services and real world web applications

UNIT I

Introduction-Why is it important-Web services and Enterprises-Xml Documents-Namespaces-Xml schema-Implementing schema Types-“any” element-Inheritance-Type declaration Managing Schema-SAX-DOM-XSL-XPath

UNIT II

SOAP &WSDL: SOAP Model-SOAP messages-SOAP Encoding-SOAP RPC-Document-RPC-Literal-Encoded-WSDL-Structure-Binding-Types-Element-Services-ManagingWSDL Description-Using SOAP and WSDL –Implementation &Deployment.

PCS 70

UNIT III

UDDI Business registry-UDDI Specification & Data Structures-Accessing UDDI-Lifecycle Management-Dynamic access point Management. Web services Conversation language-WSCL Interface Components.

UNIT IV

Security: Security is an end-end process-Web Services security issues-Type of security attacks and threats-WS security roadmap-WS security.

Quality of Service – QOS metrics- What are holes?-Design Pattern and practices-Building Qos intoWebservices.

UNIT V

Mobile Web Service-Direct Mobile Web service Access-J2ME Web services – Portals:WSRP and WSIA Specifications-Building portals with WSRP-Deploying services.

Casestudy: RealWorld webservice application development: Enterprise Procurement-System functionality and architecture.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment

TEXT BOOK:

1. Sandeep Chaterjee and James Webber(2009)-"Developing Enterprise Web services-An architect's guide ",Pearson Education .

REFERENCE BOOKS:

1. Ron Schmalzer, Travis Vandersypen, Jason Bloomberg, et al,(2008), "XML and Web Services Unleashed", Pearson Education.

2. Atul Kahate,(2009), "XML and Related Technologies", Pearson Education.

3.Eric New Comer,(2002) "Understanding Web Services: XML, WSDL, SOAP and UDDI", Addison- Wesley, USA.

PCS 71

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	M
CO2	M	M	S	H	L
CO3	M	H	H	S	M
CO4	L	H	H	S	M

S – Strong **H** – High **M** – Medium **L** – Low

PCS 72

Programme Code: 09		MSc. Computer Science		
Course Code:		Elective paper : Artificial Intelligence and Expert Systems		
Batch 2018-19	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To familiarize AI problems and AI techniques.
2. To learn various search techniques and knowledge representations.
3. To inculcate expert system concepts and applying them to solve the problems.

Course Outcomes (CO)

K1	CO1	Understanding basic concepts Artificial Intelligence, AI problems and its techniques.
K2	CO2	Analyze state space search, problem characteristics and knowledge representations.
K3	CO3	Students can able to differentiate between conventional program and expert system.
K4	CO4	Students can build and apply expert system to the problem by acquiring knowledge from experts.

UNIT I

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

UNIT II

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

UNIT III

Using Predicate logic: Representing simple facts in logic - Representing Instance and Isa relationships - Computable functions and predicates - Resolution - Natural deduction.

PCS 73

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

UNIT IV

Introduction to expert systems: what are expert systems? – How are expert systems organized? – Expert system vs. Conventional program – what have expert systems been used for? – PROSPECTOR.

UNIT V

Building an expert system: will expert systems work for my problem? – Task and Stages in Expert system development – Choosing a tool for building expert system – Acquiring knowledge from the experts – example.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment **.**

TEXT BOOKS :

1. Elaine Rich and Kevin Knight (2002), "Artificial Intelligence", Tata McGraw Hill Publishers Company Pvt Ltd, Second Edition. (Unit 1, 2, 3)
2. Donald. A. Waterman (2009), "A Guide to Expert Systems", Pearson Publication, Third Edition. (Unit 4, 5)

REFERENCE BOOK :

1. George F Luger (2002), "Artificial Intelligence", 4th Edition, Pearson Publication.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	H	H	S
CO2	H	M	S	M	S
CO3	H	M	M	M	H
CO4	M	M	M	M	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 74

Programme Code: 09		MSc .Computer Science		
Course Code:		Elective Paper : Computational Intelligence		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To understand the fundamental of neural networks.
2. To understand the concepts of machine intelligence applications of fuzzy logic.
3. To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Course Outcomes (CO)

K1	CO1	Student will be able to understand concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
K2	CO2	Student will be able to remember fuzzy sets, knowledge representation using fuzzy rules.
K3	CO3	Student will be able study approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic
K4	CO4	Student will be able know genetic algorithms and its application to engineering optimization problems

UNIT I

INTRODUCTION – ARTIFICIAL INTELLIGENCE : Artificial Intelligence: History and Applications – Production Systems – Structures and Strategies for state space search – Data driven and goal driven search – Depth First and Breadth First Search – DFS with Iterative Deepening – Heuristic Search – Best First Search – A* Algorithm – AO* Algorithm – Constraint Satisfaction – Using heuristics in games – Minimax Search – Alpha Beta Procedure planning.

UNIT II

ARTIFICIAL INTELLIGENCE – REPRESENTATION SCHEMES : Knowledge representation – Propositional calculus – Predicate Calculus – Theorem proving by Resolution –

Answer Extraction – AI Representational Schemes – Semantic Nets – Conceptual Dependency – Scripts – Frames – Introduction to Agent based problem solving.

UNIT III

NEURAL NETWORKS : Neural networks (NNs) for machine learning – models of neuron – perceptrons and perceptron learning rule – limitations of perceptrons – Multilayer perceptrons (MLPs) – back propagation learning algorithm – MLPs as classifiers – local minima and ovefitting – applications of MLPs – Radial basis functions (RBFs) – interpolation and approximation with RBFs – RBFs *vs.* MLPS – related classical optimization.

UNIT IV

GENETIC ALGORITHM AND EVOLUTIONARY PROGRAMMING : Genetic algorithms: Introduction – genetic Operators – chromosomes – mutations and cross – over – Fitness functions – Evolutionary programing – learning classification systems Multi – agent systems – PCA and SOM with evolutionary computations – Modeling uncertainty – distributions– intervals– fuzzy sets– rough sets– Fuzzy Vs Crisp– membership pas– Fuzzy systems.

UNIT V

EXPERT SYSTEM AND LANGUAGE PROCESSING : Overview of Expert System Technology – Rule based Expert Systems– Introduction to Natural Language Processing – Languages and Programming Techniques for AI – **Introduction to PROLOG and LISP*** – Search strategies and Logic Programming in LISP– Production System examples in PROLOG.

* Self Study - questions for examinations may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment.

TEXT BOOKS:

1. George.F.Luger, (2002) "Artificial Intelligence –Structures and Strategies for Complex Problem Solving", 4th edition, Pearson Education,.
2. E. Rich, K.Knight, (1991)"Artificial Intelligence", 2nd edition, Tata McGraw Hill, Winston. P. H, "LISP", Addison Wesley

REFERENCE BOOKS:

1. Ivan Bratko, (2000)"Prolog Programming for Artificial Intelligence", 3rd edition, Addison Wesley,
2. A.P. Engelbrecht, "Computational Intelligence", John Wiley &Sons, 2002.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	H	S	S
CO2	M	H	H	S	H
CO3	H	S	S	M	S
CO4	H	M	H	S	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 77

Programme Code: 09		MSc. Computer Science		
Course Code:		Elective Paper : Distributed Systems		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. Students will identify the core concepts of distributed systems.
2. To examine state-of-the-art distributed systems, such as Google File System.
3. To design and implement sample distributed systems

Course Outcomes (CO)

K1	CO1	Student will learn the principles, architectures, algorithms and programming models used in distributed systems
K2	CO2	Demonstrate knowledge of the core architectural aspects of distributed systems
K3	CO3	Student will able to demonstrate underlying components of distributed systems such as RPC, file systems.
K4	CO4	Students will examine how existing systems have applied the concepts of distributed systems in designing large systems, and will additionally apply these concepts to develop sample systems.

UNIT I

Introduction: Definition – Goals - Hardware concepts - Software concepts - The Client /Server model.

UNIT II

Communication: Layered Protocols - Remote Procedure Call - Message Oriented Communication - Stream Oriented Communication.

UNIT III

Naming: Naming Entities – Locating Mobile Entities. Synchronization: Clock Synchronization - Logical Clock - Global State.

UNIT IV

Consistency and Replication: Introduction - Data Centric Consistency model - Client Centric Consistency model - Consistency Protocols.

UNIT V

Fault Tolerance: Introduction - Process Resilience - Reliable client/Server Communication-Recovery.

PCS 78

Security: Threats - Policies and Mechanism – **Authentication*** – Firewall.

* Self study – Questions for examination may be taken from the self study portions also.

Teaching Methods:

Chalk and Talk, Powerpoint presentation, Seminar, Brainstorming, Assignment.

TEXT BOOK:

1. Tanenbaum,A.S & Van Steen M, (2002) "Distributed System", Prentice Hall.

REFERENCE BOOKS:

1. Coulouris G.F,Dollimore J.B & Kind Berg,T, (2005)"Distributed System:Concepts and Design", 4th Edition, Addison Wesley.
2. William Buchanan, (2000) "Distributed System and Networks", McGraw Hill.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	H	S	S
CO2	M	H	H	S	H
CO3	H	S	S	M	S
CO4	H	M	H	S	H

S – Strong **H** – High **M** – Medium **L** – Low

PCS 79

ADVANCED LEARNERS COURSE (ALC)

18PCS0D1

ALC 1 : PROGRAMMING IN C #

Programme Code: 09		MSc. Computer Science		
Course Code: 1**8**PCS0D1		ALC 1 : PROGRAMMING IN C #		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To understand the basic elements of C#.
2. To provide exposure to Program Structure and Inheritance.
3. To understand File systems and its operations.

UNIT I

Basic Elements of C #: .Net frame work – C # language – Features – Character set – Lexical elements - Escape sequence – Identifiers – Keywords – Concepts of data – Operators – Punctuators – Primitive data types – Preprocessing Directives.

UNIT II

C# Program Structure: Program Structure – Methods – Instance – new operator – Member access – Invoking a method – Parameter Types - Constructor – Destructor – Default Constructor – this reference – Access Modifiers – Static members – Formatted method – Header of main method – Enumeration operators types – type conversion – Merging of String - is operator – Checked & unchecked operator.

UNIT III

Statements: Classification – Expression – Control Flow – Block – Declaration – Empty – Exception – Lock – Labeled – Checked & unchecked. Arrays: Regular & Jagged Arrays – Two & Three dimensional arrays – Local Arrays - Features of arrays – System Arrays – Passing array as a parameter – Application of arrays – Recursive methods – Structure – Nested Structures.

PCS 80

UNIT IV

Inheritance: Introduction – Types - .Net building blocks – Name Hiding – Virtual and override methods – Dynamic binding – Abstract method & class –

Advantages. Interface and Operator overloading: Interface – Declaration of Interface – Polymorphism of Interface – Operator overloading – method overloading – Collection Interfaces – Variable method Interfaces list.

UNIT V

File Operations and Multithreading: Stream – File management – File operations – Multitasking – Multi threading – Operation of threads - Secondary threads – Synchronization.

TEXT BOOK:

1. S.Thamarai Selvi, R.Murugesan, (2003)"A Text Book on C# A systematic approach to Object Oriented Programming", Pearson Education.

REFERENCE BOOK:

1. E Balagurusamy (2017) "Programming in C#", Fourth Edition, McGraw Hill Education.

PCS 81

18PCS0D2

ALC 2: J2EE

Programme Code: 09		MSc. Computer Science		
Course Code: 1**8**PCS0D2		ALC 2 : J2EE		
Batch 2018-2019	Semester	Hours / Week	Total Hours	Credits 4

Course Objectives

1. To understand the basics of J2EE.
2. To provide exposure to Java Servlets, Beans and Remote Method Invocation.
3. To learn the concepts of Web Services.

UNIT-I

J2EE and J2SE - The Birth of J2EE - Databases - The Maturing of Java - Java Beans and Java Message Service - Why J2EE? J2EE Multi-Tier Architecture - J2EE Best Practices - J2EE Design Patterns and Frameworks.

UNIT-II

J2EE FOUNDATION - Java servlets - Java Server Pages

UNIT-III

Enterprise JavaBeans - JavaMail API - Java Interface Definition Language and CORBA.

UNIT-IV

Java Remote Method Invocation - Java Message Service – Security - Java Naming and Directory Interface API

UNIT-V

WEB SERVICES - SOAP - Universal Description, Discovery, and Integration (UDDI) - Electronic Business XML - The Java API for XML Registries (JAXR) - Web Services Description Language (WSDL)

PCS 82

TEXT BOOK:

1.James Keogh, “J2EE - The complete Reference”, Mc-Graw Hill, 2002.

REFERENCE BOOK:

1. Stephanie Bodoff, Eric Armstrong, Jennifer Ball, Debbie Bode Carson, Ian Evans, Dale Green Kim, Haase Eric Jendrock, “ The J2EE Tutorial”, Second Edition, Pearson Education, 2004.