

UNIT-IV	6	Analysis of Variance and Co-variance ANOVA, One way ANOVA, Two Way ANOVA, ANOCOVA Assumptions in ANOCOVA, Multivariate Analysis Technique Classification of Multivariate Analysis, factor Analysis, R-type Q Type factor Analysis, Path Analysis	10	20
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Reference books:

1. “Research Methodology”, C.R. Kothari, Wiley Eastern.
2. “Formulation of Hypothesis”, Will kinson K. P, L Bhandarkar, Hymalaya Publication, Bombay.
3. “Research in Education”, John WBest andV. Kahn, PHI Publication.
4. “Research Methodology-A step by step guide for beginners”, Ranjit Kumar, Pearson
5. “Management Research Methodology-Integration of principles, methods and Techniques”,K.N.Krishna swami and others, Pearson Education

Semester-II

Branch: M.Sc.(C.S.)	Semester-II
Subject Code: PG2.1	Lecture:04 Credit:04
Subject Title	DATA WAREHOUSING AND DATAMINING

Modules	Sr. No.	Topic Details	No. of Lectures Assigned	Marks Weight age
UNIT-I	1	Data Warehousing: Overview And Concepts: Need for dataware housing, Basic elements of dataware housing, Trends in datawarehousing.	2	08
	2	Planning And Requirements: Project planning and management, Collecting the requirements.	2	
	3	Architecture And Infrastructure: Architectural Components, Infrastructure and metadata.	4	16
	4	Data Design And Data Representation: Principles of dimensional modeling, Dimensional modeling advanced topics, data extraction, transformation and loading, data Quality.	4	
UNIT-II	5	Information Access And Delivery: Matching information to classes of users, OLAP in data warehouse, Data warehousing and the web.	4	16
	6	Implementation And Maintenance: Physical design process, data warehouse deployment, growth and Maintenance.	4	
	7	Data Mining: Introduction: Basics of data mining, related concepts, Data mining techniques.	4	16
	8	Data Mining Algorithms: Classification, Clustering, Association rules.	4	
	9	Knowledge Discovery: KDD Process Web Mining: Web Content Mining, Web Structure Mining, Web Usage mining.	6	

UNIT-III	10	Advanced Topics: Spatial mining, Temporal mining. Visualisation : Data generalization and summarization-based characterization, Analytical characterization : analysis of attribute relevance, Mining class comparisons: Discriminating between different classes, Mining Descriptive statistical measure sing large databases	6	24
UNIT-IV	11	Data Mining Primitives, Languages, and System Architectures: Data mining primitives, Query language, Designing GUI based on a data mining query language, Architectures of data mining systems	6	20
	12	Application and Trends in Data Mining: Applications, Systems products and research prototypes, Additional themes in data mining, Trends in data mining	4	

REFERENCEBOOKS:

1. Paulraj Ponnian,. Data Warehousing Fundamentals., John Wiley.
2. M.H.Dunham,.DataMiningIntroductoryandAdvancedTopics.,PearsonEducation.
3. Han, Kamber,. Data Mining Concepts and Techniques., Morgan Kaufmann
4. Ralph Kimball,. The Data Warehouse Lifecycle toolkit., JohnWiley.
5. M Berry and G. Linoff,. Mastering Data Mining.,JohnWiley.
6. W. H. Inmon,. Building the Data Warehouses., Wiley Dreamtech.
7. E. G. Mallach,. Decision Support and Data Warehouse systems., TMH.

Branch: M.Sc.(C.S.)	Semester-II
Subject Code: PG2.2	Lecture:04 Credit:04
Subject Title	DATABASE MANAGEMENT SYSTEMS

Modules	Sr. No.	Topic and Detail	No. of Lectures assigned	Marks Weight age %
UNIT-I	1	Introduction : Database System Applications ,Database Systems versus File Systems, View of Data, Data Models, Database Languages, Database Users and Administrators, DBA Roles and activity, Database System Structure	2	20
	2	Entity–Relational Model: Basic Concepts, Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features, Design of E-R Database Schema, Reduction of an E-R Schema to Tables.	2	
	3	Relational Model: Structure of Relational Databases, Relational Algebra, Tuple Relational Calculus ,Domain Relational Calculus	4	
UNIT-II	4	SQL: SQL commands, Functions, Data Constraints, Grouping Data, Sub queries, Joins, Performance Tuning, Security Management, PL/SQL, Triggers.	8	15
	5	Integrity & Security: Domain Constraints, Referential Integrity, Assertions, Triggers, Privileges in SQL.	4	

	6	Relational Database Design : Functional Dependencies, Decomposition, Normalization–1NF–5NF, BCNF	4	
UNIT-III	7	Storage & File Structure : RAID , Improvement of Reliability & Performance Indexing & Hashing – Basic Concepts, Ordered Indices, B+ & B Tree Index Files, Static & Dynamic Hashing, Comparison of Ordered Indexing & Hashing.	8	15
	8	Transactions: Transaction Concept & State, Implementation of Atomicity& Durability, Serializability, Recoverability, Testing for Serializability.	4	20
UNIT-IV	9	Concurrency Control: Protocols- Lock Based, Timestamp-based, Validation Based, Deadlock Handling & Concurrency	4	15
	10	Recovery System: Failure Classification, Storage Structure, Recovery & Atomicity, Log based Recovery, Shadow Paging, Recovery with Concurrent Transactions, Buffer management, failure with loss of non volatile storage, advanced recovery techniques.	4	
	11	Object – Oriented Databases : New Database Applications, Object–Oriented Data Model, Object-Oriented Languages, Persistent Programming Languages, Persistent C++Systems	4	10
	12	Introduction, Overview of NoSQL Databases –Four Types of NoSQL (Document-oriented, Key Value Pairs, Column-oriented and Graph).	2	5

Reference Books:

1. Database System Concepts:Henry Korth,Silberschatz,Sudarshan5thEdition,McGraw-Hill
2. Fundamentals of Database Systems: Elmasri&Navathe3rd Edition , Pearson Education India, 01-Sep-2008-1168pages
3. Database Management Systems; Raghu Ramakrishnan, Johannes Gehrke; McGraw-HillInternationalEdition,2002edition
4. Modern Database Management (Seventh Edition); JeffreyA. Hoffer, Mary Prescott, Fred Mc Fadden;PrenticeHall, 2004
5. Database systems: Design, Implementation and Management; PeterRob, Carlos Coronel; Thomson Publication, 2004
6. Database Processing: Fundamentals, Design, Implementation(tenth Edition); D.M.Kroenke;Prentice-Hall,2005
7. Data Base Principles Programming Performance (Second Edition); Patrick O.Neil; Morgan Kaufmann Publishers, Inc., 2000
8. Oracle&iPL/SQL Programming: Scott Urman

Branch: M.Sc.(CS)	Semester-II
Subject Code: PG2.3	Lecture:02 Credit:02
Subject Title	Introduction to Microprocessors

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weight age
UNIT-I	1	History and overview: Growth of microprocessor technology from SSI, MSI, LSI Traps and interrupts to VLSI, Current global trends, RISC architecture Intel microprocessors 8085 to Pentium-II performance and features comparisons 8085 Microprocessor	15	15
	2	Internal architecture, Pinout, Memory addressing schemes, system bus structure, Data, address and control bus		
Unit-II	3	Multiplexing and demultiplexing Interrupts: Introduction, Purpose of interrupts, Interrupt vectors, 8259 – internal organisation, Pin out, Single and cascaded operation	15	15
	4	I/O Interface: Typical I/O interface, serial communication, 8251 A UART: Internal organisation and functioning, 8237 DMA: Internal organisation and functioning Memory: Type of memory ROM-PROM, EPROM, EEPROM (Flash ROM concept) RAM-SRAM, DRAM, EDO, ECC, SDRAM	15	

Unit-III	5	Packaging- DIP, SIMM, DIMM		10
Unit-IV	6	Addressing, memory map, address decoding Programming Addressing modes, data movement, arithmetic and logic instructions, control instructions. Overview of 8086 / 8088 Overview of 80286, 80386, 80486, Pentium, Pentium II, Pentium III	15	10

Reference Books:

1. “8085 Microprocessor” Gaonkar
2. “Inside the PC”: Peter Norton (Sixth Edition)
3. “Microprocessor System-The 8086/8088 Family”: Yu-Cheng Liu & Glen A. Gibson
4. “The Intel Microprocessors: 8086/8088, 80286, 80386, 80486, Pentium, Pentium Pro, Pentium-II & III “: Barry Brey (Fourth Edition)

Branch: M.Sc.(CS)	Semester-II
Subject Code: PG2.4	Practical:02 Credit:02
Subject Title	DATABASE MANAGEMENT SYSTEMS LAB

Modules	Sr. No:	Topics and Details	No. of lectures assigned	Marks Weight age%
UNIT-I	1	Database, Table Creation	2	05
	2	Defining Schema, Constraints, Normalization	3	15
UNIT-II	3	SQL Basic Queries	2	10
	4	Joining, and Clauses implementation	2	
UNIT-III	5	Procedure, Function execution	4	20
	6	PLSQL Script Execution	4	
UNIT-IV	7	Stored Procedure, Function, Packages Execution	4	
	8	Cursor, Trigger Writing	4	

References:

1. Oracle8iTheCompleteReference:Loney, Koch

Branch: M.Sc.(CS)	Semester-II
Subject Code: PG2.5	Practical:02 Credit:02
Subject Title	WEB TECHNOLOGY LAB

Modules	Sr. No:	Topics and Details	No. of Lectures/ Practical assigned	Marks Weight age
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UNIT-I	1	Introduction to Web Technology, HTML, Basic Tags, CSS, Table and Forms	1	02
	2	Introduction to JavaScript, Variables, Operators, Data Type Conversions, functions, Control Structure, Date Time functions and Form Manipulation	2	08
	3	MYSQL – Introduction about Database, Data Types, DML, DDL, Aggregate functions, Data Time functions, Stored Procedure, Sub query and join	2	
	4	PHP-Introduction to PHP, History, Web Brower, Web Server, Xampp, Installation and Configuration files.	2	08
	5	Syntax, Operators, Variables, Constants, Control, Structure, Language construct and functions	2	
UNIT-II	6	Function–Syntax, Arguments, Variables, References, Returns and Variable Scope	2	12
	7	Arrays-Enumerated Arrays, Associative array, array iteration, Multi-dimensional array, Array function and SPL Date and Time functions.	2	
	8	OOP’s–Instantiation, Modifiers, Inheritance, Interfaces, Exceptions, Static Methods and Properties, Autoload, Reflection, Type Hinting and Class Constance.	2	
UNIT-III	9	String and Patterns-Quoting, Matching, Extracting, Searching, Replacing and Formatting	2	4
	10	Web Features-Sessions, Forms, GET and POST data, Cookies, HTTP Headers. Database Programming.	2	4
	11	Streams and Network Programming- Files, Reading, Writing, File System functions, Streams File Uploading and File Downloading.	2	4
UNIT-IV	12	Ajax Basics, Sending data to PHP with Ajax, Prototype-Utility functions, Ajax object and Form Object. Smarty variables, Variable Modifiers, Built-in Functions, custom functions, Config files.	2	4
	13	Introduction to Joomla	2	4
		CakePHP - MVC Overview, Naming Conversions, Model, V\view, Controller, Helpers, Scaffolding an Data Validation, Security, Web Services	1	2

Elective-II

Branch: M.Sc.(C.S.)	Semester-II
Subject Code: PG2.6.1	Lecture:04 Credit: 04
Subject Title	Elective-II Ethical Hacking

Prerequisite:

1. Computer Programming, Web Programming, Computer Networks.

COURSEOBJECTIVES:

1. Introduces the concepts of Ethical Hacking and gives the students the opportunity to learn about different tools and techniques in Ethical hacking and security and practically apply some of the tools.

COURSEOUTCOMES:

After completion of course, students would be able to:

1. Understand the core concepts related to malware, hardware and software vulnerabilities and their causes.
2. Understand ethics behind hacking and vulnerability disclosure.
3. Appreciate the Cyber Laws and impact of hacking.
4. Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies.

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weight age%
UNIT-I	1	Introduction to Ethical Disclosure: Ethics of Ethical Hacking, Ethical Hacking And the legal system, Proper and Ethical Disclosure	05	10
UNIT-II	2	Penetration Testing and Tools: Using Metasploit, Using BackTrack Live CD Linux Distribution.	10	15
UNIT-III	3	Vulnerability Analysis: Passive Analysis, Advanced Static Analysis with IDA Pro, Advanced Reverse Engineering.	10	15
	4	Client-side browser exploits: Exploiting Windows Access Control Model for Local Elevation Privilege, Intelligent Fuzzing with Sulley, From Vulnerability to Exploit.	05	15
UNIT-IV	5	Malware Analysis: Collecting Malware and Initial Analysis, Hacking Malware.	05	10
	6	Case study of vulnerability of cloud platforms and mobile platforms & devices.	05	10

Reference Books:

1. Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Gray Hat Hacking: The Ethical Hackers' Handbook, TMH Edition.
2. Jon Erickson, Hacking: The Art of Exploitation, SPD.

Subject Code: PG2.6.2	Lecture: 04 Credit: 04
Subject Title	PROJECT MANAGEMENT

Modules	Sr. No.	Topic Details	No. of Lectures Assigned
UNIT-I	1	Project Management Framework Overview of project Management, Project Organization, Planning a s/w project, Project management life cycle, Risk management, Identification of Risks, Risk Analysis, Risk Planning & Monitoring	15
	2	S/w Project Estimation: Project Estimation , Different methods of estimation (COCOMO model, Delphi cost estimation etc.), Function point analysis	
UNIT-II	3	Project Management Tools & Techniques PERT & Gantt Charts, Introduction to Microsoft Project	15
	4	Software Quality Management & Testing Quality Assurance & Standards, Quality Planning, Quality control Role of testing in Software development , Testing Procedure, Defect Management	
UNIT-III	5	Configuration Management(CM): CM planning, Change Management, Version and Release Management, Configuration Management	15
UNIT-IV	6	S/W Team Management: Characteristics of Performance management, High performance Directive and collaborative styles, Team Structure, Team Communication, Managing customer expectations, Group Behavior Role of User in Projects, User role in project management, User role in various stages of, S/W Development User role in System ,implementation.	15

Reference:

1. Software Project management By Edwin Bennatan
2. Software Engineering by Roger S. Pressman
3. Software Engineering concepts by Richard Fairley
4. Software Project Management by S.A. Kelkar
5. Software Engineering by IAN Sommerville
6. System Analysis and Design Methods By J.L Whitten , L.D. Bentley and K.C. Dittman

Branch: M.Sc.(CS)	Semester-II
Subject Code: PG2.6.3	Lecture: 04 Credit: 04
Subject Title	Fuzzy Logic and Neural Network

Modules	Sr. No.	Topic Details	No. of Lectures Assigned
UNIT-I	1	FUNDAMENTALS OF FUZZY LOGIC Basic concepts: fuzzy set theory- basic concept of crisp sets and fuzzy sets- complements- union intersection-combination of operation- general aggregation operations-fuzzy relations-compatibility relations-orderings-morphisms- fuzzy relational equations-fuzzy set and systems	15
UNIT-II	2	ARCHITECTURE OF NEURAL NETWORKS Architectures: motivation for the development of natural networks-artificial neural networks-biological neural networks-area of applications-typical Architecture-setting weights-common activations functions Basic learning rules- Mcculloch -Pitts neuron- Architecture, algorithm, applications-single layer net for pattern classification-Biases and thresholds, linear separability - Hebb’s rule-algorithm -perceptron - Convergence theorem-Delta rule	15
UNIT-III	3	BASIC NEURAL NETWORK TECHNIQUES Back propagation neural net: standard back propagation-architecture algorithm- derivation of learning rules number of hidden layers--associative and other neural networks- hetro associative memory neural net, auto associative net- Bidirectional associative memory-applications-Hopfield nets-Boltzman machine	15
UNIT-IV	4	COMPETITIVE NEURAL NETWORKS Neural network based on competition: fixed weight competitive nets- Kohonen self organizing maps and applications-learning vector quantization-counter propagation nets and applications adaptive resonance theory: basic architecture and operation-architecture, algorithm, application and analysis of ART1 & ART2 Neocognitron - Architecture, training algorithm and application-fuzzy associate memories, fuzzy system architecture- comparison of fuzzy and neural system	15

Reference Books:

Branch: M.Sc.(CS)	Semester-II
Subject Code: PG2.6.4	Lecture: 04 Credit: 04
Subject Title	ELCTIVE II: IoT (INTERNET of THINGS)

Modules	Sr. No.	Topic Details	No. of Lectures Assigned	Marks Weight age
UNIT-I	1	Introduction to IoT Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs	6	10
	2	IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network	6	10
UNIT-II	3	Network & Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination	16	30
	4	Challenges in IoT Design challenges, Development challenges, Security challenges, Other challenges	10	15
UNIT-III	5	Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT applications	6	10
UNIT-IV	6	Developing IoTs Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python	16	25

Reference Books:

1. Vijay Madiseti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”
2. Walteneus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

Branch: M.Sc.(CS)	Semester-II
Subject Code: PG2.7	Lecture: 04 Credit: 04
Subject Title	RP/OJT