MASTER OF SCIENCES
COMPUTERSCIENCES

SYLLABUS & REGULATIONS

WITH EFFECT FROM 2024-2025

M.Sc. <u>COMPUTER SCIENCES</u>
P.G. Degree Programme (CBCS) Regulations-2016
Amended as per NEP-2020

(with effect from the batch admitted in the academic year 2024-25)
CHOICE BASED CREDIT SYSTEM (CBCS)

CENTRE FOR DISTANCE AND ONLINE
EDUCATION (CDOE)
SRI VENKATESWARA UNIVERSITY
Accredited by "NAAC" with A+ Grade
Tirupati, Andhra Pradesh - 517502

DIRECTOR
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Online Education (CDOE)
Sri Venkateswara University
TIRUPATI - 517 502.

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CENTRE FOR DISTANCE AND ONLINE EDUCATION (CDOE)
SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF COMPUTER SCIENCESS

(Revised Scheme of Instruction and Examination, Syllabus etc., (with effect from the Academic Years 2024-2025)

M.Sc., - COMPUTER SCIENCES

Semester-I

Sl. no	Code	Title of the course	Hrs/ week	No. of Credits	Uni. Exams (Hour	IA	Semester end exam	Total Marks
1.	CS 101	**Data Structures & C++**	6	4	3	20	80	100
2.	CS 102	**Object Oriented Programming through JAVA**	6	4	3	20	80	100
3.	CS 103	**Computer Networks**	6	4	3	20	80	100
4.	CS 104	**Computer Organization & Operating Systems**	6	4	3	20	80	100
5.	CS 105	**Discrete Mathematics**	6	4	3	20	80	100
6.	CS 106	**Practical - I**	6	4	3	20	80	100
7.	CS 107	**Practical - II**	6	4	3	20	80	100
		TOTAL	42	28		140	560	700

Semester-II

Sl. no	Code	Title of the course	Hrs/ week	No. of Credits	Uni. Exams (Hour	IA	Seme-ster end exam	Total Marks
1.	CS 201	**Cryptography and Network Security**	6	4	3	20	80	100
2.	CS 202	**Advanced Database Management Systems**	6	4	3	20	80	100
3.	CS 203	**Software Engineering**	6	4	3	20	80	100
4.	CS 204	**Artificial Intelligence**	6	4	3	20	80	100
5.	CS 205	**Web Technologies**	6	4	3	20	80	100
6.	CS 206	**Practical - I**	6	4	3	20	80	100
7	CS 207	**Practical - II**	6	4	3	20	80	100
		TOTAL	42	28		140	560	700

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Semester-III

Sl. no	Code	Title of the course	Hrs/ week	No. of Credits	Uni. Exams (Hour	IA	Seme-ster end exam	Total Marks
1.	CS 201	Data Warehousing and Data Mining	6	4	3	20	80	100
2.	CS 202	Computer Graphics	6	4	3	20	80	100
3.	CS 203	1. Systems Programming 2. Computer Algorithms 3.UIDUsing.Net Technologies 4. Software Engineering 5. Software Testing	6	4	3	20	80	100
4.	CS 204	1. Cloud Computing 2. Big Data Analytics 3.Cyber Security 4.Mobile App Development	6	4	3	20	80	100
5.	CS 205	Soft Skills & Personality Development	6	4	3	20	80	100
6.	CS 206	Open Elective	6	4	3	20	80	100
7	CS 207	Practical I on Core	6	4	3	20	80	100
8	CS 208	Minor Project work	6	4	3	20	80	100
		TOTAL	**48**	**32**		**160**	**640**	**800**

Semester-IV

Sl. no	Code	Title of the course	Hrs/ week	No. of Credits	Uni. Exams (Hour	IA	Seme-ster end exam	Total Marks
1.	CS 201	MajorProjectWork	24	12	3	100	200	300
		TOTAL	**24**	**12**	**3**	**100**	**200**	**300**
AllSemesters - Total				**100**				**2500**

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M.Sc., - COMPUTER SCIENCES
Semester-I

CS 101: Data Structures & C++

UNIT-I

Introduction: The Abstract Data Type- A Model for an Abstract Data Type-Algorithm Efficiency.

UNIT-II

Stack: Basic Stack Operation-Stack Linked List Implementation-Stack Applications –Stack ADT – Array Implementation.

UNIT-III

Introduction to Trees: Binary Trees –Binary Tree Traversal-Expression Trees-General Trees.

Heaps: Heaps Definition –Heap Structure-Basic Heap Algorithm-Heap Data Structure-Heap Algorithm-Heap Applications.

UNIT-IV

Multi way Trees: m-way Search Trees-B-Trees –Simplified B-Tress –B-Tree variation-Lexical Search Tree.

Advanced Sorting Concepts: General Sort Concepts-Insertion Sorts –Selection Sorts-Exchanges Sorts.

Graphs: Terminology –Operation –Graph Storage Structure-Graph Algorithms.

TEXT BOOKS

1. Data Structure a Pseudocode Approach with C++ by Richard F.Gilberf.Behrouza. Forouzan(Thomson Press).
2. Data Structures using C by Dr. P. Santosh Kumar Patra, S International Publisher, Hyd

CS 102:*OBJECT ORIENTED PROGRAMMING THROUGH JAVA*

UNIT-I

Fundamentals of Object Oriented Programming: Basic concepts, benefits OOPs, Applications of Oops, Java differs from C and C++ -Java and internet, Java and world wide web, web browsers, Overview of java language, Simple Java program, Java program structure , Java Tokens Statements, Java Virtual Machine, Constant, Variables and Data Types, Declaration of variables, Scope of Variables, Type casting, Operators and expressions, operator precedence and associatively, mathematical functions.

UNIT-II

DECISION MAKING AND BRANCHING: Simple if statement, If....Else statements, Switch statement , The While, do and for statements.

Classes OBJECTS AND METHODS: Defining a class and creating objects, constructors, static members , inheritance, overloading methods, Final classes and Finalizer methods, public, private and protected access, Array, Strings and Vectors, two dimensional arrays, wrapper classes, enumerated types.

UNIT- III

MULITPLE INHERITANCE: Defining Interfaces, extending interfaces, implementing interfaces Packages: Putting classes together — Java API Packages — Naming conventions – creating Packages— Using a Package.

MULTITHEREADED PROGRAMMING: Greeting Threads — Extending the Thread Class — Stopping and blocking a Thread — Life Cycle of a Thread — Thread Priority — Synchronization — Implementing a Runnable interface.

MANAGING ERRORS AND EXCEPTIOSN —Types of Errors — Exceptions— Multiple Catch statements — Throwing our own Exceptions.

UNIT- IV

APPLET PROGRAMMING: Local and Remote Applets — Applets and Applications —Applet Life Cycle — creating an Executable Applet — Designing a web page — Passing parameters to Applets.

GRAPHIC PROGRAMMING: The Graphic class — Line and Rectangles — Circles and ellipses — Line graphs — Bar Charts.

Managing Input/output FILES IN JAVA: Stream Classes — Byte Stream Classes —Character Stream Classes Using Streams — Creation of Files — Reading/Writing Characters and Bytes — handling primitive data types, concentrating and Buffering Files —Random access files — interactive input and output, Other Stream Classes.

TEXT BOOK

1. E. Balaguruswamy, Programming with Java, A primer, 3e, TATA Mc Grew —Hill Company (2008).
2. Complete Reference Java Programming with OOPs Concepts by Dr. P. Santosh Kumar Patra, Sumeni International Book Publishers, Hyd

UNIT – I

COMPUTER NETWORKS AND THE INTERNET: What is the Internet? What is a Protocol? The Network edge, The Network Core, Access Networks and Physical, Delay and Loss in Packet – Switched Networks, Protocol Layers and Their Service Models, Internet Back bones, NAPs and ISPs, A Brief History of Computer Networking and the Internet.

APPLICATION LAYER: Principles of Application Layer Protocols, The World Wide Web: HTTP, File Transfer: FTP, Electronic Mail in the Internet, DNS – The Internet's Director Service.

Unit – II

TRANSPORT LAYER: Transport – Layer Services and Principles, Multiplexing and Demultiplexing Applications, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection – Oriented Transport: TCP, Principles of Congestion Control.

Unit – III

NETWORK LAYER AND ROUTING: Introduction and Network Service Models – Routing Principles – Hierarchical Routing – Routing in the Internet – What's Inside a Router?

Unit – IV

LINK LAYER AND LOCAL AREA NETWORKS: The Data Link Layer: Introduction, Services, Error Detection and Correction Techniques – Multiple Access Protocols and LAN's LAN Addresses and ARP – Ethernet, Hubs, Bridges and Switches – IEEE 802.11 LANs, PPP: The Point – to – Point Protocol – asynchronous Transfer Mode (ATM), X.25 and Frame Relay.

Text Book

1. Computer networking a top – down approach featuring the internet by – James F. Kurose and Keith w. ross (pearson)

Reference Books

1. Business data communication & networks by – Fitz Gerals (John wiley)

2. Data & computer communications – W Stallings (Pearson, phi)

3. Computer communications & networking topologies – Ma gallo, V.M.Hancock (Thomson)

4. Data communications & computer networks – R.Agarwal, BB Tiwari (vikas)

5. Computer networks – AS Tanenbaum (PHI)
6. Computer Networks by Dr. P. Santosh Kumar Patra, Spectrum Techno Press Hyderabad

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CS104:COMPUTER ORGANIZATION & OPERATING SYSTEMS

Unit-1

Logic Circuits: Basic Logic functions, Synthesis of logic functions using AND,OR, and NOT gates, Minimization of logic expressions, Synthesis with NAND and NOR gates, Practical Implementation of Logic gates, Flip-Flop, Registers and Shift Registers, Counters, Decoders, Multiplexers, Programmable Logic devices (PHD's), field programmable Gate Arrays, Sequential Circuits.

Basic Structure of Computer Hardware and Software: Functional Units, Basic Operational Concepts, Bus Structures, Software Performance.

Addressing Methods: Basic Concepts, Memory Locations, Main Memory Operations, Addressing modes, Assembly Language, Basic I/O Operations, Stacks and Queues Subroutines.

Unit-II

Processing Unit: Some fundamental concepts, Execution of a complete instruction, Hardwired Control, Performance Considerations, Macro Programmed Control, Signed Addition and Subtraction, Arithmetic and Branching Conditions, Multiplication of Positive Numbers, signed Operand Multiplication, Fast Multiplication.Integer Division, Floating Point Numbers and operations.

Unit-III

Operating Systems Functions: What is an Operating System?-Different services of the Operating System—Uses of System Calls- The Issue of portability –User's View of the Operating System – The Macro Facility –Graphical User Interface (GUI) –Virtual machine.

Information Management: Introduction –The File System-Device Driver (DD)

Process Management: Introduction –what is process –Evolution of multiprogramming – Content Switching –Process States – Process State transitions-Process Control Block a Process –Dispatch a Process –Time Up a process –Wake Up a process-Suspend/Resume Operation –Process –Scheduling.

Unit-IV

Memory Management: Introduction-Single Contiguous Memory Management-Fixed Partitioned Memory Management –Variable Partitions-Non Contiguous Allocation General Concepts –Paging-Segmentation-Combined Systems-Virtual Memory Management Systems.

UNIX -A Case Study: Introduction

The History of UNIX-Overview of UNIX-UNIX File System- Data Structures for Process/Memory Management –Process States and State Transitions –Executing and Terminating a Program in UNIX-Using the System (Booting and Login)-Process Scheduling –Memory Management.

Text Books

1. Computer Organization by V.C. Hemacher-TMH, V Edition.
2. Operating systems by Achyut S Godbole, TMH.
3. Computer Organization by Dr. P. Santosh Kumar Patra, Amaravathi Publications

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CS 105: DISCRETE MATHEMATICS

Unit-I

FUNDAMENTALS: Sets, Relations and functions, Fundamentals of logic, Logical interferences, First order logic. Quantified proportions, Mathematical induction

ELEMENTARY COMBINATORICS: Combinations and Permutations, Enumeration-With repetitions, with constrained repetitions, the principle of Inclusion-Exclusion

Unit-II

RECURRENCE RELATIONS: Generating functions, Coefficients of generations functions, Recurrence relations, Inhomogeneous Recurrence Relations

Unit-III

RELATIONS AND DIAGRAMS: Relations and diagrams, Binary relations, Equivalence relations, Ordering relations , Lattices, Paths and Closures, Directed graphs, Adjacency matrices, Recurrence relations, Inhomogeneous Recurrence Relations

Unit-IV

GRAPHS: Graphs, Isomorphism, Trees, Spanning trees, Binary trees, Planar graphs, Eler Circuits, Hamilton graphs, Chromatic numbers, Four colour problem, Network flows.

Text Books

1. Discrete Mathematics for Computer Scientists by -JL. Moti, a Kandel and TP Baker
2. Discrete Mathematics by Dr. P. Santosh Kumar Patra, Spectrum University Press Hyderabad

M.Sc., - COMPUTER SCIENCES
Semester-II

CS 201: CRYPTOGRAPHY AND NETWORK SECURITY

UNIT – I

INTRODUCTION:- Attacks, Services, and Mechanisms, Security Services.
CONVENTIONAL ENCRYPTION: CLASSICAL TECHNIQUES: Steganography, Classical Encryption Techniques.
CONVENTIONAL ENCRYPTION: MODERN TECHNIQUES:- Simplified DES. The Data Encryption Standard, Differential and Linear Cryptanalysis, Block Cipher Modes of Operation.

UNIT – II

CONFIDENTIALITY USING CONVENTIONAL ENCRYPTION:- Traffic Confidentiality, Random Number Generation.
PUBLIC-KEY CRPTOGRAPHY:- Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography.
INTRODUCTION TO NUMBER THEORY:- Prime and Relatively Prime Numbers, Fermat's and Euler's Theorem, Euclid's Algorithm, The Chinese Remainder Theorem, Discrete Logarithms.

UNIT – III

MESSAGE AUTHENTICATION AND HASH FUNCTIONS:- Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs.
DIGITAL SIGNATURES AND AUTHENTICATION PROTOCOLS:- Digital Signatures, Authentication Protocols, Digital Signature Standard.

UNIT – IV

ELECTRONIC MAIL SECURITY:S/MIME
IP SECURITY: IP Security Overview, IP Security Architecture, Encapsulating Security Payload, Key Management. FIREWALLS: Firewall Design Principles, Trusted Systems.

TEXT BOOKS:
1. CRYPTOGRAPHY AND NETWORK SECURITY principles and Practice FOURTH

   Edition by William Stallings(Pearson Asia) –(Chapters1,2,4,5,6,7,8,10, 12,13 and 16).

2. Cryptography & Network Security by Dr. P. Santosh Kumar Patra, Sun Techno Publications,

UNIT – I

Database Application Development: SQL: QUERIES, CONSTRAINTS, TRIGGERS:Nested Queries – Complex Integrity Constraints in SQL – Triggers and Active Databases – Designing Active Database.

Database Application Development: Accessing Database from Applications – JDBC Classes and Interfaces – SQLJ.

UNIT – II

Object – Database Systems: Structures Data Types – Operations on Structured Data – Encapsulation and ADTs – Inheritance – Objects, OIDs, and Reference Types – Database Design for an ORDBMS – ORDBMS Implementation Challenges – OODBMS. (Chapter 23).

UNIT – III

Data Warehousing and Deductive Database: Data Warehousing and Decision Support: Introduction to Decision Support – OLAP: Multidimensional Data Model – Multidimensional aggregation Queries – Window queries in SQL: 1999 – Finding Answers Quickly – Implementation Techniques for OLAP – Data Warehousing – Views and Decision Support – View materialization – Maintaining Materialized Views.

Deductive Databases: Introduction to Recursive Queries – Theoretical Foundations – Recursive Queries with Negation.

UNIT – IV

Data Mining and Distributed Databases: Data Mining: Introduction to Data Mining – Counting Co-occurrences – Mining for Rules – Tree-Structured Rules – Tree-Structured Rules – Clustering – similarity Search over Sequences – Incremental Mining and Data Streams – Additional Data Mining Tasks.

Parallel and Distributed Databases: Introduction – Architectures for Parallel Databases – Introduction to Distributed Databases – Distributed DBMS Architectures – Storing Data in a Distributed DBMS – Distributed Catalog Management – Updating Distributed Data.

<u>TEXT BOOK</u>

1. Database Management Systems by – Raghu Ramarishnan. Gehrike Third edition (TMH).

CS 203: SOFTWARE ENGINEERING

UNIT – I

Introduction To Software Engineering: The Evolving Role of Software – Software – The Changing Nature of Software – Software myths.

A Generic View of Process: Software Engineering – A Layered technology – A Process frame work – The capability Maturity Model Integration (CMMI) – Process Patterns – Process Assessment – Personal and Team Process Models – process Technology – Produce and Process.

Process Models: Prescriptive Models – T he waterfall Model – Incremental Process Models – Evolutionary Process Models – Specialized Process Models – The Unified Process.

UNIT – II

Software Engineering Practice: Software engineering Practice – Communication Practice – Planning Practices – Modeling Practices – Construction Practice – deployment.

System Engineering: Computer –Based systems – The System Engineering Hierarchy – business Process Engineering: An Overview – Product Engineering: An Overview – System Modeling.

Requirement Engineering: A Bridge to Design and Construction – Requirements Engineering Tasks Initiating the Requirements Engineering Process – Eliciting Requirements – Developing Use – Cases – Building the analysis Model – Negotiating Requirements – Validating Requirements.

Building The Analysis Model: Requirements Analysis – Analysis Modeling Approaches – Data Modeling Concepts – Object-oriented Analysis – Scenario-Based Modeling – Flow-Oriented Modeling – Class-Based Modeling – Creating a behaviour Model.

UNIT – III

Design Engineering: Design within the Context of Software Engineering – design Process and Design Quality – Design Concepts – The Design Model – Pattern-Based Software Design.

Creating an Architectural Design: Software Architecture – Data Design – Architectural Styles and Patterns – Architectural Design – Assessing Alternative Architectural Design – Mapping Data Flow into Software Architecture.

Modeling Component – Level Design: What is a Component? – Designing Class-Based Component –Level Design – Object Constraint Language – designing Conventional Components.

UNIT – IV

Performance User Interface Desing: The Golden Rules – User Interface Analysis and Design – Interface Analysis – Interface Design Steps – Design Evaluation.

Risk Management: Reactive Vs. Proactive Risk Strategies – Software Risks – Risk Identification – Risk Projection – risk Refinement – Risk Mitigation, Monitoring, and Management – The RMMM Plan.

Quality Managmeent: Quality Concepts – Software Quality Assurance – Software Reviews – formal Technical Reviews – formal Approaches to SQA – Statistical Software Quality Assurance – Software Reliability – The ISO 9000 Quality Standards – The SQA Plan.

TEXT BOOKS

1. SOFTWARE ENGINEERING BY R.S. PRESSMAN (McGraw Hill Sixth Edition).
2. Software Engineering by Dr. P. Santosh Kumar Patra, Amaravathi Publishers - Hyd

CS 204 : ARTIFICIAL INTELLIGENCE

UNIT – I

Overview of Artificial Intelligence: What is AI? – The Importance of AI – Early work in AI – AI and related Fields.

UNIT – II

Dealing With Inconsistencies and Uncertainties: Introduction – Truth Maintenance Systems – Default Reasoning and the Closed World Assumption – Predicate Completion and Circumscription – Modal and Temporal Logics – fuzzy Logic and Natural Language Computations.

Probabilistic Reasoning: Introduction – Bayesian Probabilistic Inference – Possible World Representations – Dempster – Shafer Theory – Ad – hoc Methods – Heuristic Reasoning Methods.

UNIT – III

Structured Knowledge: Graphs, Frames, And Related Structures: Introduction – Associative Networks – Frame Structures – Conceptual Dependencies and Scripts.

Search and Control Strategies: Introduction – Preliminary Concepts – Examples of Search Problems – Uniformed or Blind Search – Informed Search – Searching And – or Graphs.

Matching Techniques: Introduction – Structures Used in Matching – Measures for Matching – Matching Like Patterns – Partial Matching – Fuzzy Matching Algorithms – The RETE Matching Algorithms.

UNIT – IV

Knowledge Organization and Management: Introduction – Indexing and Retrieval Techniques Integrating Knowledge in Memory – Memory Organization Systems.

Natural Language Processing: Introduction – Overview of Linguistic – Grammars and Languages – Basic Parsing Techniques – Semantic Analysis and Representation Structures – Natural Language Generation – Natural Language Systems.

Exprt Systems Architecture: Introduction – Rule – Based System Architectures – Nonproduction System Architectures – Dealing With Uncertainty – Knowledge Acquisition – and Validation – Knowledge System Building Tools.

TEXT BOOKS

1. Introduction to Artificial Intelligence and Expert Systems by Patterson PHI.
2. Introduction to Artificial Intelligence byDr. P. Santosh Kumar Patra,Amaravathi Publishers

CS-205 : WEB TECHNOLOGIES

UNIT – I

MULTITHREADING: Introduction, Class Thread: An Overview of the Thread Methods, Thread States: Life Cycle of a Thread Priorities and Thread Scheduling, Thread Synchronization, Producer/Consumer Relationship without Thread Synchronization, Producer/Consumer Relationship with Thread Synchronization, Producer/Consumer Relationship: The Circular Buffer, Daemon Threads, Runnable interface, Thread Groups. **JAVA DATABASE CONNECTIVITY (JDBC):** Introduction, Database Systems, Relational Database Model, Relational Database Overview: The Books. Mdb Database, Strctured Query Language, A First Example, Reading, Inserting and Updating a Microsoft Access Database, Transaction Processing.

UNIT – II

SERVLETS: Introduction, Overview of Servlet Technology, Downloading the Java Servlet Developmetn Kit, Handling HTTP GET Requests, Handling HTTP POST Requests, Session Tracking, Multitier Applications: Using JDBC from a Servlet, Electronic Commerce, Servlet Internet and World Wide Web Resources.

REMOTE METHOD INVOCATION (RMI): Introduction, Case Study: Creating a Distributed System with RMI. Defining the Remote Interface, Implementing the Remote Interface, define the Client, Compile and Execute the Server and the Client.

UNIT -III

NETWORKING: Introduction, Manipulating URLs, Reading a File on a Web Server, Establishing a Simple Server (Using Stream Sockets), Establishing a Simple Client (Using Stream Sockets), Client/Server Interaction with Stream Socket Connections, Connectionless Client/Server Interaction with Datagrams, Client/Server Tic-Tac-Toe Using a Multithreaded Server, Security and the Network.

UNIT –IV

JAVABEANS: Introduction, Bean Box Overview, Preparing a Class to Be a Java Bean, Creating a Java Bean: Java Archive Files and the Jar Utility, Adding Beans to the Bean Box, Connecting Beans with Events in the Bean Box, Adding Properties to a Java Bean, Creating a Java Bean with a Bound Property, Specifying the Bean Info Class for a Java Bean, Java Beans World Wide Web Resources.

TEXT BOOKS

1. JAVA how to Programming BY DEITEL & DEITEL (PEARSON Education – Third Edition – 2001).

2. Web Technologies by Dr. P. Santosh Kumar Patra, Amaravathi Publishers - Hyd