

VIDUSH SOMANY INSTITUTE OF TECHNOLOGY & RESEARCH, KADI

REMID SEM EXAM SYLLABUS - SEP 2026

Software Engineering (CT501-N)	
Unit	Detailed Syllabus
1	Software and Software Engineering Nature of software, Unique Nature of WebApps, Software Engineering and its importance, software process, Software Engineering practice, Software Myths.
2	Software Process Model A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Model: Waterfall Model, Incremental Process Models-Incremental Model, RAD Model, Evolutionary Process Models- Prototyping, Spiral Model, Concurrent Development Models, Component- Based Development Model Agile Development: What is Agility, What is an Agile Process, Agile methods Process Models- Extreme programming, Adaptive Software Development (ASD), Dynamic System Development Method (DSDM), Scrum. Computer Aided Software Engineering (CASE) : Overview of CASE approach, Classification of CASE tools
3	Software Requirement Analysis and Specification System and software requirements Types of software requirements: Functional and non-functional requirements, Domain requirements, User requirements Requirements Engineering Tasks, Initiating the Requirement engineering Process, Eliciting the requirements, Developing Use-cases, Negotiating Requirements, Validating Requirements.
4	Software Design Design concepts: Abstraction, Architecture, Patterns, Modularity, Cohesion, Coupling, Information hiding, Functional independence, Refinement, Refactoring, Design Classes. Design Model: Data design Elements, Architectural Design Elements, Interface Design Elements, Component Level Design elements, Deployment-Level Design Elements. Pattern-Based Software Design: Describing a Design Pattern, Using Patterns in Design, Frameworks.
5	Coding Programming languages and development tools, Selecting languages and tools,

	Good programming practices, Coding Standards
6	Software Testing Strategies A Strategic Approach to Software Testing, Techniques of testing: Black-box testing, and White-box testing Test Strategies: Unit testing, Integration Testing, Interface testing, System testing, Alpha and beta testing, Regression testing. Design of test cases.

Microprocessor Architecture and Programming (CE502-N)	
Unit	Detailed Syllabus
1	Introduction: Introduction to microprocessors and microcontrollers, system bus organization, 8085 architecture
2	Assembly Language Programming: Introduction to 8085 instructions, addressing modes, stacks and subroutines. Introduction to 16-bit and 32-bit microprocessors – 80x86 families. Assembly language programming for 8086/8088.
3	Interrupts and interrupt processing: Hardware and software Interrupts in 8085, 8086/8088.
4	Interfacing memory: DMA, SRAM/DRAM, cache memory. Memory layout for 8086/8088. Virtual mode operation.

Service Oriented Architecture (IT502-N)	
Unit	Detailed Syllabus
1	Introduction: Concepts of Distributed Computing, XML, Fundamental of SOA, evolution of SOA
2	Web Services Fundamental and Standard: Web Services: Definition, Architectures and Standards. Directory services, SOAP, REST WSDL,UDDI
3	Principles of Service-Oriented Architecture-Service-Oriented and object-orientation, SOA Standards Stack, SOA with Web Services, Key Principles of SOA

4	SOA and WS-* Extension: Message Exchange Pattern, Coordination, Atomic Transactions, Business Activities, Orchestration, Choreography, WS-Addressing, WS- Reliable Messaging, WS-Policy (including WS-Policy Attachments and WS-Policy Assertions), WS-Metadata Exchange, WS-Security (including XML-Encryption, XML- Signature, and SAML)
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Data Science Using Python Programming (CS501-N)	
Unit	Detailed Syllabus
1	Foundations of Data Science Introduction to Data Science Advantages, Disadvantages, and Applications Data Perspective libraries Popular tools used in data science
2	Introduction to Python Installation of Python Object-oriented programming concepts Conditions and loops in Python Basics of Python library files Advantages over other programming languages
3	Data manipulation and data visualization Data Manipulation with Pandas - o Data Indexing and Selections - o Operating data in Pandas - o Combining Datasets Data Visualization with Matplotlib - o General Matplotlib tips - o Line plots and scatter plots - o Visualizing Errors - o Histograms, Binning, and Density
4	Machine Learning Concepts What is machine learning? Introduction to Scikit-Learn Hyperparameters and Modal Validation Machine Learning with Scikit-Learn Machine learning application and advantages.
7	Advance Technology CGI Programming Lambda functions Maps Filtering

Theory of Computation (CE 503-N)	
Unit	Detailed Syllabus
1	Introduction: Set Theory, Logic, PMI, Proof methods, Strings, Alphabet, Languages, Production, derivation and Chomsky hierarchy of Languages.
2	Regular Languages: Regular Languages and Regular Expressions, Memory Required to Recognize A Language, Distinguishable and Indistinguishable Strings.
3	Finite Automata: Deterministic finite automata (DFA), Finding Regular Expression of a FA, Constructing Finite Automata for a given regular expressions, Union, Intersection, Difference and Complements of a FA, Nondeterministic finite automata (NFA), NFA- λ , Theorem and example of NFA- λ to NFA and NFA to DFA conversion, Kleene's Theorem Part 1 and Part 2, Minimization of DFA, Decision Problems.
4	Context Free Languages: Context Free Grammar and Context Free Languages with example, Derivation Tree and Ambiguity, Unambiguous CFG, An unambiguous CFG for Algebraic Expressions, Simplified forms and Normal Forms.

Formal Language and Automata Theory (IT 503-N)	
Unit	Detailed Syllabus
1	Introduction: Set Theory, Logic, PMI, Proof methods, Strings, Alphabet, Languages, Production, derivation and Chomsky hierarchy of Languages.
2	Regular Languages: Regular Languages and Regular Expressions, Distinguishable and Indistinguishable Strings.
3	Finite Automata: Deterministic finite automata (DFA), Finding Regular Expression of a FA, Constructing Finite Automata for a given regular expressions, Union, Intersection, Difference and Complements of a FA, Nondeterministic finite automata (NFA), NFA- λ , Theorem and example of NFA- λ to NFA and NFA to DFA conversion, Kleene's Theorem Part 1, Minimization of DFA, Moore and Melay machines.
4	Context Free Languages: Context Free Grammar and Context Free Languages with example, Regular Grammars, Derivation Tree and Ambiguity, Unambiguous CFG, Chomsky Normal Form.

Design & Analysis of Algorithms (CE504-N)	
Unit	Detailed Syllabus
1	Basics of Algorithms and mathematics • Algorithm definitions and examples • Mathematics for algorithmic sets • Functions and relations • Combinations • Vectors and matrices • Linear inequalities and linear equations
2	Analysis of Algorithms • Orders of Magnitude (Asymptotic notations) • Growth rates, some common bounds (constant, logarithmic, linear, polynomial, exponential) • Time and space complexity • Average and worst case analysis • Analysing control statements • Sorting Algorithms and analysis: Insertion sort, Radix sort
3	Divide and conquer algorithms • Introduction • Recurrence Relations and methods to solve recurrence(substitution, change of variables, master's method, Recurrence tree) • Sorting (Quick sort) • Matrix multiplication • Binary search
4	Greedy algorithms • General Characteristics of greedy algorithms • Problem solving using Greedy Algorithm- Graphs: Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), 0-1 Knapsack problem, Activity selection problem, Making Change Problem

Fundamentals of Algorithms (IT504-N)	
Unit	Detailed Syllabus
1	Fundamentals of Algorithms and mathematics • Algorithm definitions and examples • Mathematics for algorithmic sets • Functions and relations • Combinations • Vectors and matrices • Linear inequalities and linear equations
2	Analysis of Algorithms • Orders of Magnitude (Asymptotic notations) • Growth rates, some common bounds (constant, logarithmic, linear, polynomial, exponential) • Time and space complexity • Average and worst case analysis • Analysing control statements • Sorting Algorithms and analysis: Bubble sort, Selection sort
3	Divide and conquer algorithms • Introduction • Recurrence Relations and methods to solve recurrence(substitution, change of variables, master's method, Recurrence tree) • Sorting (Merge sort) • Matrix multiplication • Binary search tree
4	Greedy algorithms • General Characteristics of greedy algorithms • Problem solving using Greedy Algorithm- Graphs: : Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), Making Change Problem, 0-1 Knapsack problem

Computer Networks (CE505-N)	
Unit	Detailed Syllabus
1	Overview of Networks and Data communication Introduction to Data Communications, Computer Networking, Protocols and Standards; Types of Network, Network Topology, Protocol hierarchies, and Design issues of layers, Interfaces and services; Reference Model: The OSI reference model, TCP/IP reference model, Comparison between OSI model and TCP/IP model; Network standards and policies, Uses of computer network, Network hardware, Network software.
2	Physical Layer Data and transmission techniques, Multiplexing, Transmission media, Asynchronous Communication, Wireless transmission, ISDN, ATM, Cellular Radio, Switching techniques issues
3	Data link Layer Data Link layer Design Issues, Link layer services, Framing, error control and Flow control, DLL protocols: Elementary Data Link Protocols, Sliding Window protocols: Protocols Verification models
4	Medium Access Control Sub layer The channel allocation problem, Multiple Access protocols: ALOHA, CSMA, Collision free protocols, Limited contention protocols, Wavelength Division Multiple Access Protocols; Wireless LAN protocols; Ethernet: Traditional Ethernet, Types of Ethernet, IEEE 802.2: LLC Data link layer switching Ethernet (CSMA/CD); Token Ring, DQDB, FDDI, Bridges and recent developments.

Data Communication and Networking (IT505-N)	
Unit	Detailed Syllabus
1	Introduction to Data communication Basics of Data Communications, Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission Impairments, Data rate limits, Performance, Signal Encoding Techniques: Digital to digital Conversion, Data transmission modes, Analog to analog transmission, Digital to analog transmission, OSI model and TCP/IP model.
2	Physical Layer Data and transmission techniques, Multiplexing, Transmission media, Asynchronous Communication, Wireless transmission, ISDN, ATM, Cellular Radio, Switching techniques issues
3	Data link Layer Data Link layer Design Issues, Link layer services, Framing, error control and Flow control, DLL protocols: Elementary Data Link Protocols, Sliding Window protocols: Protocols Verification models
4	Medium Access Control Sub layer The channel allocation problem, Multiple Access protocols: ALOHA, CSMA, Collision free protocols, Limited contention protocols, Wavelength Division Multiple Access Protocols; Wireless LAN protocols; Ethernet: Traditional Ethernet ,Types of Ethernet , IEEE 802.2: LLC Data link layer switching Ethernet(CSMA/CD); Token Ring, DQDB, FDDI, Bridges and recent developments.

Python Programming (IT506F-N)	
Unit	Detailed Syllabus
1	Introduction to Python Programming Language: Introduction to Python Language, • Strengths and Weaknesses, • IDLE, Dynamic Types, • Naming Conventions, • String Values, • String Operations, • String Slices, • Storing Operators, • Numeric Data Types, • Conversions, • Built In Functions
2	Data Collections and Language Component: • Introduction, • Control Flow and Syntax, • Indenting, • The if Statement, • Relational Operators, • Logical, • Operators, • True or False, • Bit Wise Operators, • The while Loop, break and continue, • The for Loop, Lists, • Tuples, • Sets, • Dictionaries, • Sorting Dictionaries, • Copying Collections.
3	Object and Classes : • Classes in Python • Principles of Object Orientation • Creating Classes • Instance Methods • File Organization • Special Methods • Class Variables • Inheritance • Polymorphism • Custom Exception Classes • Type Identification

Optimization Techniques (CT506D-N)	
Unit	Detailed Syllabus
1	Mathematical preliminaries: Vector space and matrices, Transformations, Concept of Geometry, Elements of calculus.
2	Linear programming: Introduction to Linear Programming, Simplex Method (The Simplex Algorithm, Two Phase Method, Revised Simplex Method), Duality, Karmarkar's Method.

Advanced Java Programming (CT506A-N)	
Unit	Detailed Syllabus
1	Swing : JFC, MVC Architecture; difference between AWT and Swing, Components from javax.swing package – Jcomponent, JFrame, JWindow, JLabel, JButton, JTextComponent, JToggleButton, JRadioButton, JCheckbox ; Pluggable Look and Feel
2	JDBC: Components of JDBC; JDBC Architecture; JDBC Drivers, CURD operation Using JDBC and java.sql package, DriverManager Class, Driver, Connection, Statement and Resultset Interfaces, difference between java.sql and javax.sql
3	Java Networking and J2EE : Network Programming in Java using the java.net package; Establishing two-way communication between Server and Client using TCP and UDP; Features of Java Enterprise Edition; Architecture of Java EE; Working with EJB
4	Servlets : Exploring javax. servlet and javax.servlet.http packages; Servlet Life cycle; Creating a servlet; ServletConfig and Servlet Context objects; HttpServletRequest and HttpServletResponse Interfaces; Session Tracking Mechanisms; Event Handling; Creating and Configuring filters; Parameter initialization in Filters; Manipulating Responses using Filter

Dot Net Technology (CT506C-N)	
Unit	Detailed Syllabus
1	Introduction Fundamental terms in .NET - Detailed .NET Framework architecture, Name spaces - Assemblies, Exploring Assemblies and Namespaces - Common Language Implementation , Metadata and Intermediate Language - Garbage Collection, Versioning and Side-by-Side Execution, The Data Types and Base Class Libraries - Understanding .NET Data Types - Stream and String Manipulation, Files and I/O, Collections - The Microsoft Visual Basic Namespace End to DLL Hell, Managed Execution
2	Basic concepts of VB.NET and C# Introduction to VB.NET and C#, Namespaces - Creating Classes, Classes and Inheritance, Overloading, Constructors and Destructors, Inheritance, Controlling scope and visibility, Dispose and Finalization, Modifiers, Properties and Indexers, Attributes, Reflection API ,Unsafe Code, Events and Delegates Windows Application: - Language Features Creating .NET Projects, Namespaces, Threads, Debugging and Error Handling, Structured Error Handling - Windows Forms: Benefits, Windows Form Controls, Properties and Events, .NET Events, MDI Form, Visual Inheritance, Apply Inheritance techniques to Forms - Dialogs, ToolTips, Resizing , Menus, Custom control creation, Using ActiveX Controls, Printing, Handling Multiple Events, GDI+ Console Applications - When to use Console Applications - Generating Console o utput, p rocessing Console Input
3	ADO.NET - Benefits of ADO.NET, ADO.NET compared to classic ADO, ADO .NET Objects Working with Data Sets, Managed Providers, Data Binding - Data Sets and XML, Typed Data Sets, Working with Data Reader, Reading and Write Data Using the SqlDataSource Control

4	ASP.Net and Web Development - Introduction to ASP.NET, Difference between ASP and ASP .Net, Controls, Rich Server Controls, Web Site Administration Tool, Configuration Overview, Programming Configuration Files, Encrypting Configuration Sections, Database accessing, ListBound Controls- Repeater Control, DataList Control - Server side: Cache, session, Application, Request, Response - State Management: Preserving State in Web Applications, Page-Level State, Using Cookies, ASP.NET Session State, Storing Objects in Session State, Configuring Session State, Using Cookieless Session IDs, Application State - Themes and Master Pages: Consistent Web Site, CSS and Scene files, Master Pages: Content place holder and Nested Master page. - Web Services: XML Web Services, Creating and Designing an XML Web Service, Creating Web Service Consumers - ASP.net security
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