



SARDAR PATEL UNIVERSITY, BALAGHAT

School of Engineering and Technology

Syllabus

Course: Diploma

Semester: IV

Branch: Computer Science and Engineering

w.e.f. Academic Session: 2024-25

DCSE401 Database Management System

Course Objectives:

1. Introduce students to the basic concepts of database systems, including data models, database design, and the importance of databases in software applications.
2. Teach students how to design and model databases using Entity-Relationship (ER) diagrams and normalization techniques.
3. Equip students with the skills to write complex SQL queries for data manipulation, retrieval, and management.
4. Explore advanced topics such as distributed databases, database security, and data warehousing.

Unit I: Database Concepts:

Introduction to Database and Database Management System, History of DBMS, Disadvantages of File System Data Management. Database System Applications, Advantages and Disadvantages of DBMS. Three level Architecture: Mapping between views, Data Independence. DBMS Users and Administrators, DBMS Architecture, DML, DDL & DCL

Unit II: Data Models:

Introduction to Data Models. Entities, Attributes and Association, Relationship among Entities. E-R Model, Generalization, Specialization and Aggregation. Relational Models. Codd's Relational Database Rules.

Unit III: Database Design Concepts and Normalization:

Relational algebra: Basic operation, Select, Join, Projection, Queries. Functional Dependency, Referential Integrity. Normalization: Introduction to Normalization. 1NF, 2NF, 3NF, Boyce - Codd Normal Form, Lossless or Lossy Decomposition.

Unit IV: Introduction to SQL:

Introduction to SQL, Structure of SQL Statements & SQL writing guidelines, Data Definition Commands, Structure of a Table. Data Manipulation Commands. Basic Structure of SQL Queries.

Unit V: Advance Database Concept:

Introduction to Transactions, Introduction to Concurrency Control, Data Mining & Data Warehousing, Distributed & Object based Database. Introduction to Cloud based Database.

Reference Books:

1. Desai Biplin C. (2001), "An Introduction to Database Management System", Galgotia Publication Pvt. Ltd. New Delhi.



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2. Ivan Byrose, “ SQL Programming”.
3. Peter Rob & Carlos Coronel, “ Database System Concepts”, Indian Edition, Cengage Learning India Pvt. Ltd.
4. Leon, “ SQL Complete Reference”, TMH.

Course Outcomes:

At the end of the course, students should be able to:

1. Describe fundamental concepts and architectures of database management systems, including relational, NoSQL, and distributed databases.
2. Create Entity-Relationship (ER) diagrams and apply normalization techniques to design efficient database schemas.
3. Construct complex SQL queries for Data Definition, Manipulation, and Retrieval, including joins, sub-queries and aggregate functions.
4. Analyze and discuss advanced topics such as database indexing, query optimization, and data warehousing techniques.



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DCSE402 Computer Network

Course Objectives:

1. To provide students with a comprehensive understanding of Computer Networking concepts, architectures and protocols.
2. To familiarize students with key networking protocols at different layers of the OSI and TCP/IP models.
3. To equip students with the skills to design, implement, and manage computer networks, including both wired and wireless technologies.

Unit I: Introduction to Network:

Basics of Networks: Definition, Need, Uses and Advantages. Types of Computer Networks: LAN, WAN, MAN. Network Architectures: Peer to Peer , Client-Server, Hybrid, Intranet, Internet and Extranet. Different Topologies: Bus, Ring, Star, Hybrid etc.

Unit II: Networking Models and Components:

Detailed Layered architecture of OSI and TCP/IP Reference Model. Comparison between OSI and TCP/IP Reference Model, Introduction to various LAN and WAN Protocols, Network Address: Overview, Type of Addresses, Need, advantages and disadvantages. IP Addresses: Class Full Addressing Network ID, Host ID Special Addressing. Overview Subnetting and Super-netting, VLAN. Networking Media – Coaxial, UTP, Shielded Twisted Pair, Fiber Optical Cable, and Wireless media, Networking Devices – NIC, Modem , Hub, Repeater, Switches, Bridge, Router, Gateway, Wi-Fi, VSAT. Structured cabling- Concept, advantages, racks, patch panel, crimping and punch tool, patch cords, RJ Connectors, Information Outlets (I/O Box) , Media Converter. Wi-Fi, CDMA, GSM.

Unit III: IP and Host to Host Protocols:

ARP/RARP: Resolution, Packet format mapping and encapsulation. Internet protocol: Virtual network, Connectionless, unreliable, Packet Delivery System. Datagram format: Datagram size, Network MTU and fragmentation, Time stamp option. IP Routing Algorithm. IP Checksum. ICMP and IGMP: Introduction and message format. Host-to-Host protocols: UDP and TCP.

Unit IV: Application Layer Protocols:

Introduction to FTP, TELNET, NFS, SMTP, rlogin, SNMP, DNS Applications: Concept of DNS, Mapping DNS resource record, DNS Resolution, DHCP, VPN, IPv6, ICMPv6.

Unit V: Routing and Multicasting:

Vector Distance & Link State Routing Protocol, Routing Information Protocol, Open SPF Protocol. Gateway to Gateway Protocol, Hardware Broadcast, Hardware Multicast, IP Multicast



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and Address Mapping, IP Multicast to Ethernet Multicast.

Reference Books:

1. Computer Networks, Andrew S Tanenbaum, Publisher- PHI, New Delhi
2. B. A. Fourozan, TCP/IP Protocol Suite, Tata McGraw Hill
3. Internetworking with TCP/IP, Douglas E. Comer, Publisher- PHI, New Delhi
4. Hardware and networking by Vikas Gupta Publisher: Dreamtech press
5. Network Cabling Handbook by Chris Clerk Publisher Tata Mcgraw Hills Ltd.India.
6. Introduction to Networking by Richard McMohan Publisher Tata Mcgraw Hills Ltd.India.
7. TCP/IP Illustrated by Richard Stevens, Publisher- Addison – Wesley.

Course Outcomes:

At the end of the course, students should be able to:

1. Describe fundamental networking concepts, including the OSI and TCP/IP models, and their respective layers.
2. Analyze and explain the operation of various network protocols, such as IP, TCP, UDP, HTTP and DNS.
3. Design and implement basic network configurations using routers, switches and Wireless Access Points.



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DCSE403 Internet of Things

Course Objectives:

1. To provide a comprehensive understanding of the fundamental concepts, architecture, and components of the Internet of Things.
2. To explore the integration of various sensors and devices into IoT ecosystems and how they communicate with each other.
3. To address security and privacy challenges associated with IoT devices and networks.
4. To enable students to develop and deploy Real-world IoT applications using various platforms and tools.

Unit I: Introduction to IOT:

Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT

Unit II: IOT Communication:

Machine-to-machine (M2M), SDN (software defined networking) and NFV(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.

Unit III: IOT Protocols:

Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control.

Unit IV: Sensor Technology:

Sensor Technology , Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, Wireless Sensor Network Technology.

Unit V: Design Methodology:

IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions, Raspberry Pi & arduino devices. IOT Case studies: smart city streetlights control & monitoring.

Reference Books:

1. Rajkamal, "Internet of Things", Tata McGraw Hill publication.
2. Vijay Madiseti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)" 1st Edition, Universal Press



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3. Hakima Chaouchi “The Internet of Things: Connecting Objects”, Wiley publication.
4. Charless Bell “MySQL for the Internet of things”, Apress publications.
5. Francis dacosta “Rethinking the Internet of things:A scalable Approach to connecting everything”, 1st edition, Apress publications 2013.
6. Donald Norris “The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black”, McGraw Hill publication.

Course Outcome:

At the end of the course, students should be able to:

1. Demonstrate an understanding of IoT architecture, components, and key technologies.
2. Design and implement IoT systems, including hardware selection and software programming.
3. Apply appropriate networking protocols for communication between IoT devices and cloud services.
4. Identify potential security threats and implement basic security measures in IoT applications.



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DCSE404 Data Communication

Course Objectives:

1. Grasp the basic concepts and principles of data communication, including types of networks and communication models.
2. Explore different types of transmission media (wired and wireless) and their impact on data communication.
3. Analyze techniques for error detection and correction to ensure reliable data transmission.

Unit I: Data Communication Concepts and Technology:

Data Representation, Data Transmission. Modes of Data Transmission: Analog Data, Digital Data. Communication Channels, Synchronous & Asynchronous, Series & Parallel data Communication, Bit rate and Baud rate, Bandwidth & Channel Capacity, Nyquists and Shannon's theorems.

Unit II: Transmission Media:

Transmission Line Characteristic, Liner Distortions, Crosstalk, Twisted Pairs Cable, Coaxial Cable, UTP, STP. Optical Fiber: Multimode Fibers, Modal Dispersion, Mono Mode Fiber, Graded Index Fibers, Total Dispersion, Fiber Attenuation, Radio Media, UHF & Microwaves, Satellite Link, Equalization.

Unit III: Modulation and Data Modems:

Concept of Modulation and Demodulation, Digital modulation methods: PCM, Amplitude. Shift-keying, Frequency Shift-keying. Quadrature PSK (QPSK), Differential PSK (DPSK), Simplex, Half Duplex, Full Duplex .

Unit IV: Multiplexing, Spreading and Switching:

Multiplexing: Frequency-Division Multiplexing, Wavelength: Division Multiplexing, Synchronous Time-Division Multiplexing, Statistical Time- Division Multiplexing. Spread Spectrum: Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum. Channelization: Frequency-Division Multiple Access (FDMA), Time- Division Multiple Access (TDMA), Code-Division Multiple Access (CDMA).Circuit Switched Networks: Three Phases, Efficiency, Delay, Circuit- Switched Technology. Virtual Circuit Networks: Addressing, Three Phases, Efficiency, Delay in Virtual-Circuit Networks, Circuit-Switched Technology, Structure of a Switch: Circuit Switches, Packet Switches.

Unit V: Error Detection and Correction:

Introduction: Types of Errors, Redundancy, Detection VS Correction, Forward Error Correction, Reverse Error Correction. Block Coding: Error Detection, Error Correction, Hamming Distance



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and Minimum Hamming Distance. Liner Block Code, CRC, Checksum. Telephone Network: Major Components, Topology, Signaling, Services Provided by Telephone Networks. Dial-Up Modems: Modem Standards, types of Modems. Digital Subscriber Line: DSL, ADSL Lite, HDSL, SDSL, VDSL.

Reference Books:

1. Tomasi Wayne, Introduction to Data Communications and Networking, Pearson Education, 2007.
2. Rajneesh Agrawal and Bharat Bhushan Tiwari, Data Communication and Computer Networks, Vikas Publishing house Ltd., 2005.
3. S. Tanenbaum, Computer Networks, Fourth Edition, Pearson Education.
4. Leon-Gracia and I. Widjaja, Communication Networks, Tata McGraw Hill, 2004.
5. K. Pahlavan and P. Krishnamurthy, Principles of Wireless Networks, PHI Learning

Course Outcome:

At the end of the course, students should be able to:

1. Describe the fundamental concepts of data communication and the roles of various networking components.
2. Evaluate and select appropriate transmission media for different communication scenarios.
3. Implement error detection and correction techniques in data communication systems.
4. Develop strategies to enhance the security of data transmission in networks.



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DCSE406P Core Python Programming

Course Objectives:

1. Learn the basic syntax, data types, and control structures of Python.
2. Enhance algorithmic thinking and problem-solving through Python programming.
3. Understand and apply OOP principles using Python.
4. Create simple applications and scripts that solve real-world problems.

Unit I: An Introduction to Python

Python Syntax compared to other programming languages, Python Installation, Beginning Python Basics: The print statement, Comments, Python Data Structures & Data Types, String Operations in Python, Simple Input & Output, Simple Output Formatting, Operators in python, Python Program Flow: Indentation, The If statement and its' related statement, An example with if and it's related statement, The while loop, The for loop, The range statement, Break &Continue, Examples for looping.

Unit II: Functions & Modules

Create your own functions, Functions Parameters, Variable Arguments, Scope of a Function, Function Documentations, Lambda Functions & map, N Exercise with functions, Create a Module, Standard Modules

Unit III: Exceptions Handling and File Handling

Errors, Exception handling with try, Handling Multiple Exceptions, Writing your own Exception, File handling Modes, Reading Files, Writing & Appending to Files, Handling File Exceptions, The with statement

Unit IV: Classes in Python

New Style Classes, Creating Classes, Instance, Methods, Inheritance, Polymorphism, Exception Classes & Custom Exceptions, Data Structures: List Comprehensions, Nested List Comprehensions, Dictionary Comprehensions, Functions , Default Parameters, Variable Arguments, Specialized Sorts

Unit V: Writing GUIs in Python (Tkinter)

Introduction, Components and Events, An Example GUI, The root component, Adding a Button, Entry Widgets, Text Widgets, Check buttons, Capstone Project in Python.

Reference Books:

1. "Python Crash Course" by Eric Matthes, A hands-on introduction to programming with



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Python, covering the basics and practical projects.

2. "Automate the Boring Stuff with Python" by Al Sweigart, Focuses on practical programming tasks and automation.
3. "Fluent Python" by Luciano Ramalho, Delves into Python's features and libraries, with a focus on writing idiomatic and efficient code.

Course Outcome:

At the end of the course, students should be able to:

1. Demonstrate proficiency in writing and executing Python scripts for various tasks.
2. Effectively use Python libraries for tasks such as data manipulation, web scraping, or automation.
3. Create classes and objects, and apply inheritance and polymorphism in Python.
4. Build and deploy small-scale applications, demonstrating an understanding of software development practices.