

List of NPTEL Courses

S.No.	Title of the Course
1	The Joy of Computing using Python
2	Programming in Modern C++
3	Programming In Java
4	Software Engineering
5	Introduction to Internet of Things
6	Software Project Management
7	Data Structure and Algorithms using Java
8	Introduction to Machine Learning
9	Mathematical Foundations for Machine Learning
10	Artificial Intelligence: Search Methods for Problem Solving
11	Introduction to Industry 4.0 and Industrial Internet of Things
12	Data Structures and Algorithms Design

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

OPERATING SYSTEMS

SYLLABUS FOR MINOR DEGREE IN CSE V-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks:60	Course Code: U24MD510CS
Credits: 3	CIE Marks: 40	Duration of SEE: 3 Hours.

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1 To provide students with fundamental concepts of operating systems including process management 2 To enable students to analyze and apply synchronization	1 Explain the structure and services of operating systems and analyze process/thread management and CPU scheduling mechanisms. 2 Apply memory management and virtual memory concepts such as paging, segmentation, and page replacement to solve system-related problems. 3 Analyze synchronization problems and apply appropriate solutions using semaphores, monitors, and deadlock handling techniques. 4 Illustrate file system organization and implementation techniques including directory structures, allocation methods, disk scheduling, and device management. 5 Explain I/O system architecture and apply protection and security principles to ensure safe and controlled system access.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1	2	1			1						1	2	1
CO2	2	1	1	1			1					1		2	1
CO3	3	2	2				1						1	3	
CO4	2	1	2	1			1					1	1	1	
CO5	1	1	1		1							1		1	

UNIT-I:

Introduction to operating systems: Operating system services, User and Operating- system interface, System calls, Operating system structure.

Process: Process concept, Process Scheduling, Operations on process, Threads, Multithreading Models, Multicore programming.

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiprocessor scheduling.

UNIT-II:

Memory Management: Swapping, Contiguous memory allocation, Paging, Segmentation, Structure of the page table.

Virtual memory: Demand paging, Page replacement Algorithms, Thrashing, Allocating Kernel memory.

UNIT –III:

Process synchronization: The critical Section problem, Peterson's solution, Synchronization Hardware, Semaphores, Classic problems of Synchronization, Monitors.

Deadlocks: System model, deadlock characterization, Methods for handling deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from deadlock.

UNIT –IV:

File System Interface: File Concept, Access Methods, Directory and Disk Structure

File System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free Space management.

Device Management: Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap Space Management, RAID structure.

UNIT-V:

I/O System: I/O hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O request to hardware operation.

Protection: Goals of protection, Principles of protection, Domain of Protection, Access matrix, Implementation of Access matrix, Access Control, Revocation of Access Rights, Capability-based Systems

Security: The Security problem, Program threats

Learning Resources:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, 10th Edition (2018), Wiley India.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, 2nd Edition (2001), Pearson Education, Asia.
3. Dhananjay, Dhamdhare.M, *Operating System-concept based approach*, 3rd edition (2009), Tata McGraw Hill, Asia
4. Robert Love: *Linux Kernel Development*, (2004)Pearson Education
5. Richard Stevens, Stephen Rago, *Advanced Programming in the UNIX Environment*, 3rd Edition(2013), Pearson Education
6. <http://web.stanford.edu/~ouster/cgi-bin/cs140-spring19/index.php>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

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Department of Computer Science & Engineering

OPERATING SYSTEMS LAB

SYLLABUS FOR MINOR DEGREE IN CSE V-SEMESTER

L:T:P (Hrs./week):0:0:2	SEE Marks:50	Course Code: U24MD511CS
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1 Apply system calls for process management and file management 2 Implement techniques related to CPU Scheduling, Main memory management	1 Dual boot Operating system and partition the hard disk 2 Implement shell programs for a given task 3 Implement operations on Files and Process by using system calls 4 Implement CPU Scheduling algorithms 5 Implement Page Replacement techniques

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1				1				2			1	1	
CO2	3	2		1						2				2	
CO3	3	2	2	1	1								1	2	
CO4	3	2				1				2			1	1	

Programming Exercise:

1. Building & Booting of Operating system, Disk partitioning and Dual boot of OS
2. Write shell programs by using simple shell commands
3. Write shell programs by using conditional statements
4. Write shell programs to showcase the usage of control loops

5. Write a C program to create a file
6. Write a C program to manipulate the contents of a file
7. Write a C program to create a child process
8. Write a C program to illustrate wait() system call
9. Write a C program to implement CPU scheduling algorithms
10. Write a C program to implement page replacement algorithms

Learning Resources:

1. Kernighan and Pike, UNIX Programming Environment, PHI/ Pearson Education
2. U. Vahalia, UNIX Internals: The New Frontiers, Pearson Education Inc.2003.
3. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, 10th Edition (2018), Wiley India.
4. Richard Stevens, Stephen Rago, *Advanced Programming in the UNIX Environment*, 3rd Edition(2013), Pearson Education
5. <http://web.stanford.edu/~ouster/cgi-bin/cs140-spring19/index.php>
6. <https://nptel.ac.in/courses/106106144/>

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

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Department of Computer Science & Engineering

DATABASE MANAGEMENT SYSTEMS

SYLLABUS FOR MINOR DEGREE IN CSE VI-SEMESTER

L:T:P(Hrs./week):3:0:0	SEE Marks:60	Course Code: U24MD610CS
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

Course objective	Course outcomes
Students should be able to	At the end of the course, students will be able to
1. Identify different issues involved in the design and implementation of a database system. 2. Understand transaction processing, concurrency control and recovery techniques.	1. Identify the functional components of database management system. Create conceptual data model using Entity Relationship Diagram. 2. Transform a conceptual data model into a relational model. 3. Apply normalization techniques in database design. 4. Apply No-SQL concepts in the data base design. 5. Apply concurrency control techniques for efficient transaction management

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		2									1	1		2
CO2	2	1	2										1		2
CO3	3	1	2		3							2	2		3
CO4	3	1	2		3							1	2		3
CO5	3	1	1									1	2		3

UNIT-I

Introduction: Database System Application, Purpose of Database Systems, View of Data, Database Languages, Relational Database, Database Design, Specialty Databases, Data Storage and Querying, Database Users and Administrators.

Database Design and E-R Model: Overview of the Design Process, The E-R Model, Constraints, E-R Diagrams, E-R Design Issues, Extended E-R features, Reduction to Relational Schemas, Other aspects of Database Design.

UNIT-II

Relational Model: Structure of Relation Database, Fundamental Relational Algebra Operations, Additional Relational Algebra Operations, Extended Relational Algebra Operations, Modification of the Database, Relational Calculus

Structured Query Language: Introduction, Basic Structure of SQL Queries, Set Operations, Additional Basic Operations, Aggregate Functions, Null Values, Nested Sub queries, Views, Join Expression.

UNIT-III

Advanced SQL: SQL Data Types, Integrity constraints Authorization, Functions and Procedural Constructs, Recursive Queries, Triggers, JDBC, ODBC and Embedded SQL.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and first Normal form, Decomposition Using Functional Dependencies, functional Dependency Theory.

UNIT-IV

No-SQL: Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, The Value of Relational Databases

Transaction Management: Transaction concept, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation and Atomicity, Serializability, Recoverability.

UNIT-V

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, B-Tree Files, Multiple – Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing

Concurrency Control: Lock Based Protocols, Timestamp – Based Protocols Validation Based Protocols, Deadlock Handling.

Learning Resources

1. Abraham Silberschatz, Henry F Korth, Sudharshan S, Database System Concepts, 6th Edition(2011), McGraw-Hill International Edition.
2. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications,1st Edition ,2019.

3. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System , 8th Edition(2006) Pearson Education.
4. Raghu Ramakrishna, and Johannes Gehrke, Database Management Systems, 3rd Edition(2003), McGraw Hill.
5. RamezElmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, 4th Edition(2006), Pearson Education.
6. Peter rob, Carlos coronel, Database Systems, (2007), Thomoson.
7. <http://nptel.ac.in/courses/106106093/>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	1 Hour 30 Minutes			

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Department of Computer Science & Engineering

DATABASE MANAGEMENT SYSTEMS LAB

SYLLABUS FOR MINOR DEGREE IN CSE VI-SEMESTER

L:T:P (Hrs./week):0:0:2	SEE Marks:50	Course Code: U24MD611CS
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1 Apply SQL commands on a database. 2 Develop an application using forms, reports and PL/SQL.	1 Design and implement a database schema. 2 Apply DDL, DML, DCL and TCL commands on a database. 3 Apply sub queries to get data from given database. 4 Implement PL/SQL programs for creating stored procedures.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1		1	1								1	2	
CO2	3	2	2	2	3								1	2	
CO3	3	2	2	3	2	1							2	3	
CO4	3	2	2	1	3	1							2	3	
CO5	3	3	2	3	3	1							2	3	

Programming Exercise:

1. Creation of database tables without constraints.
2. Creating tables using combination of constraints.
3. Usage of Stored Functions.
4. Exercising all types of Joins.
5. Exercising complex Queries.
6. Exercising sub Queries.
7. Exercising sample PL/SQL programs

8. Demonstration of PL/SQL functions
9. Demonstration of PL/SQL Procedures

Learning Resources:

1. Ivan Bayross, SQL, PL/SQL, The Programming Language of Oracle, 4th Edition, PBP Publications.
2. Nilesh Shah, Database Systems Using Oracle, 2nd Edition(2007), PHI.
3. Rick F Van der Lans, Introduction to SQL, 4thEdition(2007), Pearson Education.
4. Benjamin Rosenzweig Elena Silvestrova, Oracle PL/SQL by Example, 3rdEdition(2004), Person Education.
5. Albert Lulushi, Oracle Forms Developer's Handbook, 1st Edition(2006), Pearson Education.
6. <https://www.lynda.com/Access-tutorials/Welcome/195854/373426-4.html>

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

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Department of Computer Science & Engineering

FULL STACK WEB DEVELOPMENT

SYLLABUS FOR MINOR DEGREE IN CSE VII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: U23MD710CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	<i>On completion of the course, students will be able to</i>
1 Develop applications using web technologies.	1 Apply HTML and CSS to design web pages.
2 Develop and publish REST API.	2 Develop dynamic web front end using JavaScript.
	3 Design a component driven user interface using React.
	4 Develop back-end application using Node.js and MongoDB.
	5 Develop and deploy web services to integrate web applications.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1	2	1	3				1				2		
CO2	1	2	2	2	3				1				3		
CO3	1	3	2	2	3				1				3	1	
CO4	1	2	2	2	3				1				3	1	1
CO5	1	2	2	2	3				1				3	1	1

UNIT-I:

Web Basics and Overview: Evolution of the Internet and World Wide Web, HTTP, Introduction to HTML5, Linking, Tables, Forms, Form input Types, HTML5 Structural Elements.

Cascading Style Sheets: Selectors, Properties and Values, External Style Sheets, Positioning of Elements, Box Model and Media Queries.

UNIT-II:

JavaScript: Introduction to JavaScript ES6, Variables, Objects, Document and Window Objects, Arrays, String Manipulation, Scripting Functions, Event Handling.

UNIT-III:

React: React Module, Code Sandbox, Templating with JSX, Babel, ES6 Literals, Expressions in JSX, JSX attributes and Styling React Elements, React Components, States and Props, Life Cycle of Components, Stateless Component,

Event Handling, Rendering List, Error Handling, Routers, Single Page Application.

UNIT-IV:

Node.js: Setup, Node Life cycle, REPL, Node Modules- FS, HTTP, URL, NPM, Redirecting Requests, Call backs, Events, Blocking and Non-Blocking Code, Node.js with Express, Express -Handling Requests and Responses.

MongoDB

SQL and NoSQL Concepts, Create and Manage MongoDB, CRUD operations on MongoDB, MongoDB with Node.js, Services offered by MongoDB, Valkey for Caching.

UNIT-V:

Web Services: Web Services Architecture, Web Services Technologies - SOAP, REST, Node.js REST API, JSON Web Tokens for Authentication, Microservices Architecture.

Serverless Computing: AWS services, AWS Lambda, Use-Cases, Web application Deployment in Cloud.

Learning Resources:

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, Internet & World Wide Web How to Program, 5th Edition, Pearson Education.
2. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasanth Subramanian, Apress, 2019
3. Modern Full-Stack Development, Frank Zammetti, Apress, 2022
4. The Node Craftsman Book, Manuel Kiessling, Packt Publishers, 2017
5. Robert W. Sebesta, Programming the World Wide Web, 8th Edition (2020), Pearson Education.
6. <https://www.w3schools.com/html/>
7. <https://react.dev/learn>
8. <https://nodejs.dev/learn>
9. <https://aws.amazon.com/lambda/>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

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Department of Computer Science & Engineering

FULL STACK WEB DEVELOPMENT LAB

SYLLABUS FOR MINOR DEGREE IN CSE VII-SEMESTER

L:T:P (Hrs./week):0:0:2	SEE Marks:50	Course Code: U23MD711CS
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1. Develop web applications. 2. Publish web services.	1. Design a website using HTML. 2. Design webpages by applying CSS. 3. Design dynamic websites using JavaScript. 4. Develop dynamic web applications using server side code

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	2	3	1			2				2		
CO2	2	2	2	2	3	1			2				3		
CO3	2	2	2	2	3	1			2				3	1	
CO4	2	2	2	2	3	1			2				3	1	1
CO5	2	2	2	2	3	1			2				3	1	1

Programming Exercise:

1. Creation of static website using HTML.
2. Creation of Web Site using HTML Forms.
3. Apply CSS to the Web Site.
4. Apply CSS box model to the Web Site.
5. Create a dynamic website using JavaScript.
6. Demonstrate event handling using JavaScript.
7. Validation of website using JavaScript.
8. Creation of dynamic content in a web Application using Node.
9. Program to perform CRUD operations on Mongo DB.
10. Creation of dynamic content in a web Application using Node and Mongo DB.

Learning Resources:

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, Internet & World Wide Web How to Program, 5th Edition, Pearson Education.
2. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasana Subramaniam, Apress, 2019
3. Robert W. Sebesta, "Programming the World Wide Web", Pearson Education.(3rd)
4. Uttam K.Roy, "Web Technologies", Oxford publishers.
5. <http://www.w3schools.com>

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

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Department of Computer Science & Engineering

COURSE PROJECT

SYLLABUS FOR MINOR DEGREE IN CSE VII-SEMESTER

L:T:P (Hrs./week): 0:0:6	SEE Marks:50	Course Code: U23MD719CS
Credits : 3	CIE Marks:50	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
	<i>On completion of the course, students will be able to</i>
1 Develop an application in the relevant area of Computer Science.	1 Review the literature survey to identify the problem.
2 Learn contemporary technologies.	2 Design a model to address the proposed problem.
	3 Develop and test the solution.
	4 Demonstrate the work done in the project through presentation and documentation.
	5 Adapt to contemporary technologies.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2						2				2	3	1		2
CO2		3				2	2				2		2		2
CO3			3			2	2	3			2		1	3	3
CO4			2	3	3		2	3			2		3	3	3
CO5							1	3	3	3	2		1	1	2

The students are required to carry out a mini project in areas such as Data Structures, Database Management Systems, Operating Systems or any other area relevant to Computer Science and Engineering.

Students are required to submit a report on the mini project at the end of the semester.