

**Khandesh Education Society's,
Pratap College, Amalner (Autonomous)
Dist. Jalgaon.**



**'A+' Grade
NAAC Reaccredited
(CGPA 3.52)
DST-FIST Assisted College
UGC Honored "A College with Potential for Excellence"**

Choice Based Credit System (CBCS)

Syllabus For

T. Y. B. Sc.

Computer Science

(With effect from June 2021)

Khandesh Education Society's,
Pratap College, Amalner. (Autonomous)
Dist. Jalgaon
T. Y. B. Sc. (Computer Science)
(w. e. f. June-2021)

Semester – V

Structure

Discipline	Course Type	Course Code	Course Title	Credits	Hours (Clock Hrs)	Total Teaching hours	Marks (Total 100)	
							CA	UA
DSC	Core I	CS - 501	System Programming	3	3	45	40	60
	Core II	CS – 502	Database Management System	3	3	45	40	60
	Core III	CS – 503	Software Engineering	3	3	45	40	60
	Core IV	CS – 504	Computer Aided Graphics	3	3	45	40	60
DSC Skill Enhance Courses	Skill Based-I	CS – 505	Python Programming –I	3	3	45	40	60
	Skill Based-II	CS – 506 (A)	Elective –A Internet Programming using PHP	3	3	45	40	60
		CS – 506 (B)	Elective –B JAVA Programming-I					
DSC	Core (Practicals (s))	CS – Lab 507	Lab on Python Programming - I	2	4 (per batch)	60	40	60
		CS – Lab 508	Lab on C.G & System Prog.	2	4 (per batch)	60	40	60
		CS – Lab 509	Elective –A Lab on Internet Programming using PHP	2	4 (per batch)	60	40	60
Elective –B Lab on JAVA Programming -I								

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Semester – VI

Structure

Discipline	Course Type	Course Code	Course Title	Credits	Hours/Week (Clock Hours)	Total Teaching hours	Marks (Total 100)	
							CA	UA
DSC	Core I	CS - 601	Operating System	3	3	45	40	60
	Core II	CS – 602	R -DBMS	3	3	45	40	60
	Core III	CS – 603	Computer Network	3	3	45	40	60
	Core IV	CS – 604	Theoretical Computer Science	3	3	45	40	60
DSC Skill Enhance Courses (SEC)	Skill Based-I	CS – 605	Python Programming - II	3	3	45	40	60
	Skill Based-II	CS –606 (A)	Elective –A Web Programming using ASP.NET	3	3	45	40	60
		CS –606 (B)	Elective –B Java Programming - II					
DSC	Core (Practical (s))	CS – Lab 607	Lab on Python Programming II	2	4 (per batch)	60	40	60
		CS –Lab 608	Lab on RDBMS	2	4 (per batch)	60	40	60
		CS –Lab 609	Elective –A Lab on ASP.NET	2	4 (per batch)	60	40	60
Elective –B Lab on JAVA Programming -II								

Semester - V

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SEM-V**

CS-501 System Programming

**Total lectures: 45
Total Marks: 90**

Course Objectives:

- To understand use and development of software tools.
- To understand the design structure of Assembler and macro preprocessor
- To understand the design structure of compiler
- To understand the functions of linkers and loaders

Course Outcomes:

- Understand details about system software
- To do basic system program like development of editors lexical analyzers etc.
- Students are familiar with language processing activities- functions of translators, loader and linkers

Unit-1 Introduction

[L: 05, M: 10]

Types of program – System program and Application program
Difference between system programming and application programming.
Goal of system software
1.4 components of system software
1.5 View of system software

Unit-2 Software Tools

[L: 05, M: 10]

What is a Software Tools?
Software Tools for Program Developments
Editors
Debug Monitors
Programming Environments

Unit-3 Overview of Language Processors

[L: 5, M: 12]

Programming Languages and Language Processors
Language Processing Activities
Fundamentals of Language Processing

Unit-4. Assembler

[L: 10, M: 16]

Definition.
Features of assembly language, advantages
Statement format, types of statements
Constants and Literals.
Advanced assembler directives
Design of assembler – Analysis Phase and Synthesis Phase.

Overview of assembly process
Pass Structure of Assembler – One pass, two pass assembler.
Problems of One-pass assembler
Design of Two-pass Assembler

Unit-5. Macro and Macro Preprocessor

[L: 05, M: 14]

Macro Definition and Call
Macro Expansion
Nested Macro Calls
Tables used in Macro
Advanced Macro Facilities
Design of Macro Preprocessor

Unit-6. Compiler

[L: 10, M: 14]

What is Compiler?
Scanning and Parsing
Programming Language Grammars
Scanning
Parsing
Language Processors Development Tools

Unit-7. Linkers and Loaders

[L: 05, M: 14]

Introduction
Relocation and Linking Concepts
Self Relocating Programs
Linking for Overlays
Dynamic Linking
Loaders

References:

1. D.M. Dhamdhare, “Systems Programming”, ISBN : 9780071333115, Tata McGraw-Hill Education, 2011
2. D.M. Dhamdhare, “Systems programming and operating system”. ISBN: 978-0074635797, Tata McGraw Hill Education Private Limited
3. John Donovan, “System programming.”, ISBN: 978-0-07-46
4. Srimanta Pal, “Systems Programming (Oxford Higher Education)” .
5. A A Puntambekar and I A Dhotre , “Systems Programming” . ISBN: 978-9350993347, Technical Publications.

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CS-502 Database Management System

**Total lectures: 45
Total Marks: 90**

Course Objectives:

- To understand the fundamental concepts of database.
- To understand user requirements and frame it in data model.
- To understand creations, manipulation and querying of data in databases.

Course Outcomes

On completion of the course, student will be able to–

- Solve real world problems using appropriate set, function, and relational models.
- Design E-R Model for given requirements and convert the same into database tables.
- Use SQL.

Content

1. Introduction of DBMS

L 12: M 16

Overview, Definition
Types of DBMS
Describing & storing data (Data models (relational, hierarchical, network)),
Levels of abstraction , data independence,
Queries in DBMS (SQL : DDL,DML,DCL,TCL), Users of DBMS, Advantages of DBMS

2. Conceptual Design (E-R model)

L 10: M 16

Overview of DB design,
ER data model (entities, attributes, entity sets, relations, relationship sets) ,
Conceptual design using ER (entities VS attributes, Entity Vs relationship, binary Vs ternary)

3. Relational data model

L 10: M 18

Relations (concepts, definition),
Conversion of ER to Relational model ,
Integrity constraints (key, referential integrity, general constraints)
3.4 Codd's Rules, Functional Dependency, Data
Normalization (1NF,2NF, 3NF, BCNF)

4. Relational algebra

L 08: M 15

Preliminaries

4.2 Relational algebra (selection, projection, set operations, renaming, joins, division)

5. Database Implementations

L-08 M:12

Database security

Database integrity

Transaction Concept

Transaction State

Transaction Properties (ACID)

6. Concurrency control, Backup & recovery: -

L-09 M-12

Lock-Based protocol,

Timestamp-Based protocol

Log base Recovery

Shadow Paging

Differed Updates.

Reference Books:-

1. Database System Concepts- Abraham Silberschatz, Henry F. Korth & S. Sudarshan, McGraw- Hill, 4th Edition / 5th Edition.
2. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
3. Database System Concepts – Alexis Leon & Mathews Leon, Vikas Publication House Ltd, New Delhi.
4. Raghu Ramkrishnan, "Database Management Systems". McGraw-Hill Education (ISE Editions); ISBN:978-0071168984
5. Bipin Desai, "An Introduction to Database Systems", ISBN: 978-8175157521

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CS-503 Software Engineering

Total lectures: 45

Total Marks: 90

Course Objectives:

This paper helps to understand

- What is software and the process in development of software.
- It gives detailed knowledge about various models and requirements needed in developing software.
- It also elaborates the concepts of designing, testing & quality about software.

Course Outcomes:

After completion of the course:

- Students are able to perform the E-R Diagram, DFD, Data dictionary, Decision tree about software.
- They can also design the software in learned language using the course content.
- Get the knowledge of types of testing & how testing is performed in industry.

1. Introduction to Software Engineering

L-8 M-12

Software and Software Engineering
Evolution of Software
Software Characteristics
Software Applications
Software Myths
Software Process
Software Development Life Cycle (SDLC)

2. Software Development Model

L-8 M-14

Waterfall Model
Prototyping Model
Incremental Development Model
RAD model
Spiral Model

3. Requirement Analysis and Specification

L-8 M-12

Requirements Engineering
Fact finding Techniques
Introduction to Types of Requirement Modeling
Data Modeling Concepts- Data Objects, Data Attributes & Relationship.

4. Design Engineering

L-7 M-14

Characteristics of good Software Design
Design Concepts- Architecture, Modularity, Information Hiding
Cohesion & Coupling
Decision Table & Decision Tree
Data flow Diagram
Data Dictionary

5. Software Coding & Testing

L-7 M-12

Coding standards & Guidelines
What is testing?
Testing Activities
Black box testing
White box testing
Introduction to Debugging Approaches – Brute force Method, Backtracking,
Case Elimination Method, Programming Slicing

6. Software Quality

L-7 M-12

What is Quality?
Software Quality - Garvin's quality dimensions, Mc Calls quality factors,
ISO 9125 quality factors
Elements of Software Quality Assurance
ISO 9000 & Certification

References –

1. Roger S. Pressman, "Software Engineering a Practitioners Approach", ISBN 13: 9780071267823, 7 th edition, McGraw Hill International Edition.
2. Rajib Mall, "Fundamental of Software Engineering", ISBN- 978-81-203- 3819-7 3 RD Edition,, PHI Learning Private Limited.
3. Gaurav Gupta and Deepika Gupta, "Software Engineering", ISBN:978-3843310130, Lambert Publishing pvt. Ltd
4. Udit Agrawal, "Software Engineering", ISBN: 978-9350142363
5. Carlo Ghezzi, "Fundamentals of Software Engineering", ISBN: 978-8120322424, Prentice Hall India Learning Private Limited; 2nd edition

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CS-504 Computer Aided Graphics

Course Objectives

**Total lectures: 45
Total Marks: 90**

- Understanding Graphics Concept.
- Study the various graphics techniques
- Study the various graphics algorithms

Course Outcome:

- Differentiate between interactive and non-interactive graphics.
- Study line Drawing and Circle Drawing techniques and algorithms.
- Perform 2D and 3D transformation on different images.
- Know about detail working of 2D and 3D clipping and windowing.
- Understand raster graphics and hidden surface elimination.

Unit-1: Introduction to Graphics

[L:08 M:16]

The origin of computer graphics
Application of Computer Graphics
Definitions: Pixel, Resolution, Aspect Ratio, Interactive, Non interactive graphics, Active graphics, Passive graphics
How the interactive graphics display works.
Display types: Random Scan and Raster Scan

Unit-2: Line Drawing Technique

[L: 07 M: 14]

Co-ordinate Systems
The Simple DDA
The Symmetrical DDA
Bresenham's line drawing Algorithm
Bresenham's circle drawing Algorithm

Unit-3: Two Dimensional and Three Dimensional Transformations

[L: 08 M: 20]

Transformation principles
Concatenations
2D Transformations, 2D Matrix Representation
3D Transformations, 3D Matrix Representation
Transformation in Viewing
The Perspective Transformation

Unit-4: Clipping and Windowing

[L: 09 M: 16]

Definitions: Window, View port, Clipping
Cohen-Sutherland line clipping algorithm
Mid-point Subdivision line clipping algorithm
Polygon Clipping

The Windowing Transformation
3-D Clipping

Unit-5: Raster Graphics and Solid Area Scan-Conversion

[L: 07 M: 12]

Introduction
Scan Converting Line and Polygon drawing
Coherence
(YX) Algorithm
Priority: Painter's Algorithm

Unit-6: Hidden Surface Elimination

[L: 06 M: 12]

Object Space and Image Space Algorithms
The Depth Buffer Algorithm
Warnock's Algorithm

Reference:

1. William M. Newman and Robert F. Sproull, "Principles of Interactive Computer Graphics", ISBN : 9780074632932 (Second Edition), Tata-McGraw Hill Publication
2. Rogers," Procedural Interactive Computer Graphics", ISBN- 978-070486775, McGraw Hill Book Company Ltd.
3. Mathematical Elements of Interactive C.
4. Rogers & Adams. "Mathematical Elements of Computer Graphics", ISBN: 978-0070486775
5. James D. Foley, "Computer Graphics: Principles and Practice". ISBN:978-0201121100, Addison Wesley; 2nd edition

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CS-505 Python Programming-I

**Total lectures: 45
Total Marks: 90**

Course Objectives:

- The course is designed to provide Basic knowledge of Python.
- Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.
- To learn how to design and program Python applications.
- To develop problem solving skills and their implementation through Python.
- Master the fundamentals of writing Python scripts

Course Outcome:

- Explain basic principles of Python programming language
- Construct and apply various filters for a specific task.
- Apply the best features of mathematics, engineering and natural sciences to program real life problems.

Unit – 1 Introduction to Python Programming

L: 5 M: 10

Introduction to Python
History of Python
Version of Python
Need, Features of Python
Applications of Python
Installing Python on Linux and Windows
Installing Python IDE

Unit – 2 Basics of Python Programming

L: 10 M: 20

Python Identifiers, Variables and Keywords
Putting Comments
Expressions and Statements
Standard Data Types – Basic, None, Boolean, Numbers.
Type Conversion Function
Operators in Python
Operator Precedence
Accepting Input and Displaying Output
Flow Control Statements
Conditional Statements
Looping Statements

break, continue, pass Statements

Unit – 3 Python Strings

L: 10 M: 20

Introduction to String

String Literals

Assign String to a Variable

Multiline Strings

Operations on Strings, Index Operator: Working with the Characters of a String, String Length, the Slice Operator, String Comparison,

Concepts of Python Lists: Creating, Initializing and Accessing elements in lists, Traversing, Updating and deleting elements from Lists.

List Operations: Concatenation, List Indexing, Slices

Built- in List functions and methods

Aliasing, Cloning Lists

Unit – 4 Python Tuples and Dictionary

L: 10 M: 20

Introduction to Tuples

Creating Tuples.

Deleting Tuples.

Accessing elements in a Tuple.

Tuples Operations: Concatenation, Repetition, Membership, Iteration.

Built- in Tuples functions and methods

Introduction to Dictionary

Dictionaries: Concept of key-value pair.

Creating, Initializing and Accessing elements in a Dictionary.

Traversing, Updating and Deleting elements in a Dictionary

Built- in Dictionary functions and methods

Unit – 5 Python Functions and Modules

L: 10 M: 20

Introduction to Functions

Defining a Function (def)

Calling a Function

Function Arguments - Required arguments, Keyword arguments, Default arguments, Variable-length arguments

Scope of Variables

Void functions and function returning values

Recursion

Advance Function Topics: Anonymous Function Lambda, Mapping Functions, and

Functional Programming Tools: filter and reduce

Introduction to Modules

Creating Modules and Packages

Importing Modules

Using the dir() Function

Built-in Modules

References:

1. John V Guttag (2013), Introduction to Computation and Programming Using Python, Prentice Hall of India, 2013, ISBN: 9780262525008
2. Peter C. Norton, Alex Samuel and others, –Beginning Python||, Wrox Publication,2005 ISBN 10: 0764596543 ISBN 13: 9780764596544
3. R. NageswaraRao(2016), Core Python Programming, Dreamtech Press, 2016, ISBN-13: 9789351199427
4. Wesley J. Chun(2006), Core Python Programming - Second Edition, Prentice Hall, ISBN-13: 978-0132269933, ISBN-10: 0132269937
5. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser(2013), Data Structures and Algorithms in Pyhon”, Wiley, 2013, ISBN : 978-1-118-54958-2, ISBN : 978-1-118-29027-9(HardCover)
6. Kenneth A. Lambert(2011), Fundamentals of Python – First Programs, CENGAGE Publication, 2011, ISBN 1111822700, ISBN 9781111822705
7. Luke Sneeringer(2015), Professional Python, Wiley Inc.,2015, ISBN: 1119070856

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CS-506: JAVA Programming- I

Total lectures: 45

Total Marks: 90

Course Objectives:

- To learn Object Oriented Design with JAVA
- Ability to write computer program to solve specific program
- To handle abnormal termination of a program using exception handling

Course Outcomes:

- Get knowledge of JDK environment
- Explore polymorphism using method overloading and method overriding
- Understand the different aspects of hierarchy of classes and their extensibility
- Understands the concept of streams and files
- Write programs for handling run time errors using exceptions

Unit-1 Introduction to JAVA

[L-04M-08]

History of Java

Comparison of Java and C++

Features - Simple, Object Oriented Distributed, Robust, Secure, Architecture neutral, Portable, Interpreted, High Performance, Multithreading, dynamic.

Java and Internet

JDK Environment (Java, Javac, Applet Viewer, Javadoc)

Unit-2 Basics of JAVA

[L-04M-10]

Variables, Data Types, Casting, Operators

Compiling and running java program,

Command line arguments.

Accepting input from console (Using BufferedReaderclass, Scanner)

Arrays

Unit-3 Objects and Classes

[L-08M-14]

Introduction – Classes and Objects

Data members, methods

Types of Constructors

Overloading

Packages

Access modifier

Inner classes

Unit-4 Functions in JAVA**[L-07M-16]**

String functions - Concatenation, Substring, String editing, Testing for Equality,
Character extraction functions – CharAt, getChars, getByte
Formatting functions
Date and Time functions using Gregorian Calendar Class.

Unit-5 Inheritance**[L-10 M-20]**

Inheritance- Inheritance Hierarchy, Super class, Overriding, Polymorphism
Use of final keyword related to method and class
Interfaces
Wrapper classes
Reflection - 'Class' class
Use of abstract class and abstract methods

Unit-6 Exception Handling**[L-06M-10]**

Dealing with errors - Types of exceptions
Exception Handling Mechanism
Catching Exceptions.
Creating user defined exception

Unit-7 Streams and Files**[L-06M-12]**

String class and String Buffer Class
Using the File class
Stream classes-Byte Stream classes , Character Stream Classes
Creation of files
Reading/Writing characters and bytes
Handling primitive data types
Random Access files

References:

1. Cay's Horstmann and Gary Cornell, "Core Java Volume -1 Fundamentals", ISBN: 81-7808-277-2
2. E. Balaguruswamy, "Programming with Java – A primer", ISBN: 978-0-07-061713-1
3. Herbert Schildt, "The complete reference JAVA-2", ISBN:978-0-07-049543-2, Fifth Edition,(TMH)
4. Java 6 Programming Black Book.
5. Horstmann, C. S/ Cornell, "Core Java 2: Volume II – Advanced Features", 7th ed Pearson.

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CS-507 LAB on Python Programming – I

Instruction:

- At the time of Practical you can use any Python IDEs and Code Editors (PyCharm, Spyder, Thonny, etc.).
1. Installing python and setting up environment. Simple statements like printing the names (“Hello World”), numbers, mathematical calculations, etc.
 2. Write a program to find all prime numbers within a given range.
 3. Write a program to print "n" terms of Fibonacci Series using Iteration
 4. Write a program to demonstrate the use of slicing in string.
 5. Programs related to string manipulation
 6. Write a Programs related to functions & modules
 7. Write a program that demonstrate concept of functional programming.
 8. Write a program to demonstrate the use of list & related functions
 9. Write a program to demonstrate the use of Dictionary& related functions
 10. Write a program to demonstrate the use of tuple.

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CS-508 LAB on Computer Aided Graphics & System Programming

Program on Computer Aided Graphics:

1. Draw the following pattern using standard graphics library:
 - a. Block Diagram of Computer
 - b. Display Flag of India
 - c. Flow Chart Symbols, DFD Symbols, ER-Diagram Symbols
2. Implement Bresenham's Line Drawing Algorithm.
3. Implement Bresenham's Circle Drawing Algorithm.
4. Implement DDA line Drawing Algorithm.
5. Implementing Translation transformation on polygon.
6. Implementing Scaling transformation on polygons.
7. Implementing Rotation transformation on polygons.
8. Implement Cohen-Sutherland line clipping algorithm.

Program on System Programming:

1. Program to delete comment in a file.
2. Program to delete Blanks & tabs from a file.
3. Program to implement Interrupt Handler.
4. Program for SMAC-0
 - a) SMAC 0 Code for Addition
 - b) SMAC 0 Code for Subtraction
 - c) SMAC 0 Code for Multiplication
 - d) SMAC 0 Code for Square
 - e) SMAC 0 Code for GCD
 - f) SMAC 0 Code for LCM
5. Program to implement Line Editor:
 - a) New file
 - b) Append line
 - c) Display File
 - d) Delete Line
 - e) Display Block
 - f) Insert Line
 - g) Copy & Paste
 - h) Move the line

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Elective A

DSC (UG-CS-509 A): Internet programming using PHP

1. Design web pages using HTML that will contain online admission forms.
2. Write PHP scripts that demonstrate fundamentals PHP.
3. Write PHP script that will display grade based on criteria given below using the marks obtained in T.Y.Bsc.Examination.
 - a. Distinction (70 and above)
 - b. First Class (60 -69)
 - c. Pass (40 - 59)
 - d. Fail (below 40)
4. Write a PHP script to demonstrate different String functions.
5. Write a PHP script to demonstrate array.
6. Write a PHP script to use Functions (Call by Value, Call by reference).
7. Write a PHP script to Demonstrate OOPS Concept in PHP.
8. Write a PHP script to demonstrate Exception Handling.
9. Write a PHP script to demonstrate Form Data Handling using Get and Post methods.
10. Design a database in MYSQL using PHP. Create table in database. Store, Update, Delete and Retrieve data from the table. Display the data from the table.
11. Write a PHP script to store, retrieve and delete cookies on your local machine.
12. Write a PHP script to store, retrieve and delete data using session variables.

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**Elective B
CS-509 Lab on JAVA Programming-I**

1. Write a simple program in Java to print first fifty prime number.
2. Write a program in Java to print factorial of given number using recursion
3. Write a program in Java to print Fibonacci series in given series
4. Write a program in Java to demonstrate command line arguments.
5. Write a program in Java to create student information using array
6. Write a program in Java to implement user defined package.
7. Write a program in Java to implement default & parameterized constructor.
8. Write a program in Java to demonstrate various operations on string functions.
9. Write a program in Java to demonstrate wrapper classes
10. Write a program in Java to demonstrate class.
11. Write a program in Java to implement inheritance.
12. Write a program in Java to demonstrate inner class.
13. Write a program in Java to demonstrate reflection.
14. Write a program in Java to demonstrate exception handling.
15. Write a program in Java to demonstrate text stream object that take input from user & write it into text file.

Semester –VI

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CS-601 Operating System

**Total lectures: 45
Total Marks: 90**

Objectives:

- To understand Operating system concepts and services.
- To understand the concept of a CPU scheduling, memory management, Disk Drum Scheduling and deadlock.

Outcomes:

- Students should familiar with Operating System Services.
- Understand CPU scheduling algorithms, memory Management Techniques, Disk Drum Scheduling algorithms, Deadlock preventions and avoidance.
- Introduction to android operating systems – its architecture, applications and uses.

Unit 1.Introduction

L: 04 M: 08

What is an operating system?
Types of Operating System
Services of Operating System
Functions of operating system.

Unit 2.CPU scheduling

L: 10 M: 16

Multiprogramming Concepts
Basic Concept of CPU scheduling: CPU-I/O burst cycle, CPU scheduler, Preemptive scheduling, Dispatcher
Performance criteria's
Scheduling Algorithms: FCFS, SJF, Priority scheduling, Round-robin scheduling
Multilevel queues, multilevel feedback queue

Unit 3.Memory Management

L: 10 M: 20

Logical versus Physical Address space
Swapping
Multiple partition allocation MFT , MVT
Paging
Segmentation
Virtual Memory Management – Background, Demand paging

Unit 4. Disk and Drum Scheduling

L: 06 M: 18

First Come first serve scheduling
Shortest Seek Time First Scheduling
SCAN Scheduling
C-SCAN Scheduling

Unit 5 Deadlocks**L: 10 M: 18**

Concept of Deadlock
Deadlock Characterization
Deadlock Prevention
Deadlock Avoidance
Deadlock Detection
Recovery from Deadlock

Unit 6 Overview of Android Operating system**L: 05 M: 10**

What is android operating system.
Android Architecture
Features of Android operating system
Applications of android operating system
What is Google play store

Reference books:

1. Peterson Silberschatz, "Operating system concepts", ISBN: 0-201-35251-6, Addison Wesley, 1st Edition
2. Andrew S. Tanenbaum, "Modem operating system", ISBN: 81-203-0974-X, P .H.I. New Delhi 3.
3. Achyut S. Godbole, "Operating Systems" ISBN: 9780070702035, McGraw Hill Education, 2010, Third Edition
4. .Marko Garaenta, "Learning Android ,Oreilly ", ISBN: 978-1449319236, O' Reilly, second edition
5. Mike Wolfson, "Android developers tools, Essential,Oreilly" ISBN:978-1

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CS-602 Relational Database Management Systems

**Total lectures: 45
Total Marks: 90**

Prerequisites

- Basic Knowledge of DBMS
- Knowledge of SQL Queries
- Basics of relational design
- Basics of ER model

Course Objectives

- To teach fundamental concepts of RDBMS (PL/PgSQL)
- To teach database management operations
- Be familiar with the basic issues of transaction processing and concurrency control
- To teach data security and its importance

Course Outcomes

On completion of the course, student will be able to–

- Design E-R Model for given requirements and convert the same into database tables.
- Use database techniques such as SQL & PL/SQL.
- Explain transaction Management in relational database System.
- Use advanced database Programming concepts

Unit 1 INTRODUCTION TO RDBMS

[L: 5 M: 10]

Introduction to RDBMS,
Introduction to Open Source software PostgreSQL,
Installation of open source software PostgreSQL on Windows and Linux,
Data types of Postgre SQL

Unit 2 DATABASE AND TABLE OPERATIONS

[L: 05 M: 10]

Database Operations - 1.Creating a Database 2.Dropping the Database
Table Operations – 1. Create 2. Alter3. Drop

Unit 3 SQL – STATEMENTS, OPERATORS, FUNCTIONS

[L: 10 M: 20]

Statements - SELECT, INSERT, UPDATE, DELETE
Null value and Default value
Operators - Arithmetic, Logical, Comparison, Bitwise, Relational

Functions - Aggregate functions, Date and Time functions, String functions

Clauses: - where, order by, AND, OR, Between, Like, CASE, Distinct, Group by
Having

Unit 4 VIEW, JOIN and DATA CONSTRAINTS in SQL

[L: 10 M: 20]

Constraints - Data Integrity, Entity Integrity

Keys - PRIMARY KEY, UNIQUE, FOREIGN KEY, CHECK, Not Null

Views - Create, Alter, Drop

Join - Joins, Cross Join, Inner Join, Outer Join, Self-Join

Subqueries -Subqueries as Constants, Subqueries as Correlated Values,

Subqueries as Lists of Values, NOT IN and Subqueries with NULL Values,

Subqueries Returning Multiple Columns

Statement - MERGE Statement

Set operations-UNION, EXCEPT, and INTERSECT

Clauses -ANY, ALL, and EXISTS Clauses

Unit 5 Transaction Commands, Indexes & Sequences

[L: 5 M: 10]

Transaction commands-Commit, Rollback

Indexing -Creating an Index, Unique Indexes

Sequences- Creating Sequence, using nextval(), currval() and setval()

Unit 6 PL/PGSQL - SQL PROCEDURAL LANGUAGE

[L: 15 M: 20]

Introduction to PL/PGSQL-Advantages of PL/PGSQL, structure of
PL/PGSQL, basic statements and control structures

Function -Creating functions, removing functions

Cursors-Creation of Cursors, Using Cursors, Looping

Triggers-Introduction, Triggers Vs constraints, DML Triggers, DDL Triggers

Error handling -Introduction Error Handling, RAISE Statement

REFERENCE BOOKS:

1. Bruce Momjian , PostgreSQL Introduction and Concepts, Addison.Wesley, ISBN 0-201-70331-9
2. NEIL MATTHEW AND RICHARD STONES , Beginning Databases with PostgreSQL, From Novice to Professional, Second Edition, ISBN (pbk): 1-59059-478-9
3. Sudhakar Bhoite, "RDBMS With Oracle Developer 2000", ISBN: 978-8189065164
4. Himanshu Dabir, Dipali Meher "Advanced RDBMS Using Oracle", ISBN:978-9350161500, Vision Publications; Second edition.

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CS-603 Computer Networks

Course Objectives:

This paper helps to understand

- How network works? & types of networks & its applications.
- It helps to understand the various models.
- It helps to understand various layers & their functionality.
- It get the idea of how cryptography works.

Course Outcomes:

After completion of the course:

- Students understand the information exchange done across the network with the help of OSI & TCP/IP models.
- Student understands how errors are captured & handled in network.
- Student understands various attack & its prevention techniques.

Unit-1 Introduction to Computer Network and Network Model

L-8 M- 12

What is Computer Network?

Application of Computer Networks

Transmission Mode, Network Structure

Network Topologies

ISO OSI Reference Models, TCP / IP Reference Model & their Comparison.

Unit-2 Physical Layer

L-8 M- 15

Guided Media:

Twisted Pair

Coaxial Cable

Fiber Optics

Satellite Communication

Microwave Communication

2.1.6 Submarine Cables.

Unguided Media

Electromagnetic Spectrum

Radio Transmission
Microwave Transmission
Infrared & Millimeter Waves
Light wave Transmission

Unit 3 The Data link Layer

L-8 M- 15

Services Provided to Network Layer
Framing, Error Control, Flow Control
Error Detection – Redundancy, Parity Check, Checksum & CRC
Error Correction – Hamming Code.

Unit 4 The Network Layer

L-7 M- 18

Logical Addressing
IP v4 Addresses - Address Space - Classful Addressing - Classless Addressing
Routing Algorithm
Shortest Path
Multicast Routing
Congestion Control
Introduction to Congestion Control
4.3.2 Deadlocks

Unit-5 Transport Layer

L-7 M- 15

Process to Process Delivery
Client-Server Paradigm
Multiplexing and DE multiplexing
Connectionless v/s Connection Oriented Services
Reliable v/s Unreliable Transmission
UDP and TCP
UDP – Operations and uses
TCP – Services and features

Unit-6 Cryptography and Public key Infrastructure

L-7 M-15

Introduction:
Cryptography, Cryptanalysis, Cryptology, Substitution
Techniques: Caesar’s cipher, Mon alphabetic and Polyalphabetic,
Transposition techniques – Rail fence technique, Simple Columnar
Public key infrastructures:
Basics, digital certificates, certificate authorities, registration
authorities, Digital Signature.

Reference Books: -

1. Andrew S.Tanenbaum , “Computer Networks “ ISBN: 978-0130661029, Prentice Hall, Fourth Edition .
2. Behrouz A. Forouzan , “Data Communication & Networking”, ISBN: 978- 0071232418 , McGraw Hill Higher Education , Third Edition 3.
3. U.D. Black , “Data Communication & Distributed Networks”, ISBN: 9780835913416, Published by Prentice-Hall, Englewood Cliffs, N.J., 1987 , Second Edition ,
4. AtulKahate , “ Cryptography and Network Security “ Edition 3, McGraw Hill.

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CS-604 Theoretical Computer Science

**Total lectures: 45
Total Marks: 90**

Course Outcome

- 1) Understanding the use of Sets, Relations and Graphs.
- 2) Understand Languages in TCS.
- 3) Introduction of Regular Languages and Expressions.
- 4) Understanding Pumping Lemma and its applications.
- 5) Explore the knowledge of Pushdown Automata.
- 6) Understanding Normal Forms with Examples.
- 7) Understanding Turing Machine.

Unit-1. Mathematical Preliminaries

[L-04 M-12]

Symbol, Alphabet, String, Formal Language, Operation on languages
Sets, Relations
Sets and Subsets
Relations
Closure of Relations
Graphs Trees
Graphs
Trees
Principle of Induction
Method of Proof by Induction

Unit-2. Finite Automata

[L-14 M-20]

Definition of Automata
Why study Automata Theory?
Introduction to finite Automata
Structural representations
Automata and Complexity
Descriptions of Finite Automata, Transition Systems, Transition Functions
Deterministic Finite Automata (DFA)
Nondeterministic Finite Automata (NFA)
The Equivalence of DFA and NFA
Minimization of DFA
Finite Automata with ϵ -Moves
Melay and Moore Machines: Definition and Examples
Applications of Finite Automata

Unit-3. Regular Expressions & Regular Sets [L-08 M-16]

Regular Expressions
FA & Regular Expressions
Convert Regular Expression to FA
Construct FA from Regular Expression
Pumping Lemma for Regular Sets and applications

Unit-4. Context Free Grammars [L-10 M-18]

Introduction to Context Free Grammars
Derivation Trees
Ambiguity in CFG
Simplification of Context Free Grammars
Useless Symbols
Null Production
Unit Production
Normal forms for CFG
Chomsky Normal Form (CNF)
Greibach Normal Form (GNF)

Unit-5 Pushdown Automata [L-04 M-12]

Basic Definitions
Types of PDA
Acceptance by Pushdown Automata
PDA and Context Free Language

Unit-6 Turing Machine [L-05 M-12]

Introduction
Turing Machine Model
Representation of Turing Machine
Design of Turing Machine

References:

1. John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory, Languages & Computations", ISBN: 978-0321455369, Pearson publication, Third edition
2. K. L. P. Mishra, N. Chandrasekaran, "Theory of Computer Science", ISBN: 9788120329683, Published by Prentice-Hall of India Pvt Ltd, Third edition.
3. Daniel A. Cohen, "Introduction to Computer Theory", ISBN: 978-0471137726, John Wiley & Sons; 2nd Revised edition edition.
4. Smita Rajpal, "Theory of Automata and Formal Languages", Galgotia Publications, ISBN: 1234027054
5. <http://nptel.ac.in/>

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CS-605 Python Programming – II

Total lectures: 45

Total Marks: 90

Course Objectives:

- The course is designed to provide advance knowledge of Python.
- Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.
- To learn how to design and program Python applications.
- To develop problem solving skills and their implementation through Python.
- Master the fundamentals of writing Python scripts
- To develop the ability to write database applications in Python

Course Outcome: At the end of the course, the student will be able to

- Explain basic principles of Python programming language
- Implement object oriented concepts, database applications.
- Construct regular expressions for pattern matching and apply them to various filters for a specific task.
- Design and implement Database Application and Content providers.
- Apply the best features of mathematics, engineering and natural sciences to program real life problems.

Unit – 1 Object Oriented Concepts in Python

L: 05 M: 10

Overview of OOP Terminology

Creating Classes

Creating Instance Objects

Accessing Attributes

Built-In Class Attributes

Garbage Collection: Constructor

Overloading Methods and Operator

Inheritance - Implementing a subclass, Overriding Methods

Unit – 2 Python Exception Handling and Regular Expression

L: 10 M: 20

Introduction

Syntax Error

Handling Exception

Multiple except Clauses

try...finally

Raising Exception

User Defined Exception

List of Standard Exception

Regular Expression

Unit – 3 File Handling in Python

L: 10 M: 20

File Objects,

Writing Text Files,

Appending Text to a File,

Reading Text Files,

File Exceptions,

Paths and Directories,

Exceptions in OS, Paths,

Directory Contents,

Obtaining Information about Files, Renaming, Moving, Copying, and Removing Files,

Creating and Removing Directories, Globing

Unit – 4 GUI with Python

L: 10 M: 20

GUI Programming Toolkits for Python,

Kinter Introduction,

Creating GUI Widgets with Tkinter,

Resizing the Widget,

Configuring Widget Options,

Putting the Widgets to Work,

Creating Layouts, Packing Order,

Controlling Widget Appearances, Radio Buttons and Checkboxes, Dialog Boxes,

OtherWidget Types

Unit – 5 Python with MySQL

L: 10 M: 20

Introduction to MySQL

Installing MySQL Driver - MySQL Connector or MySQLdb

MySQL Database connection with Python

Creating Database in MySQL using Python

Create a Table in MySQL with Python

Insert, Select, Update and Delete Operation in MySQL with Python

COMMIT Operation
ROLLBACK Operation
Disconnecting Database

References:

1. John V Guttag (2013), Introduction to Computation and Programming Using Python, Prentice Hall of India, 2013, ISBN: 9780262525008
2. Peter C. Norton, Alex Samuel and others, –Beginning Python||, Wrox Publication,2005 ISBN 10: 0764596543 ISBN 13: 9780764596544
3. R. NageswaraRao(2016), Core Python Programming, Dreamtech Press, 2016, ISBN-13: 9789351199427
4. Wesley J. Chun(2006), Core Python Programming - Second Edition, Prentice Hall, ISBN-13: 978-0132269933, ISBN-10: 0132269937
5. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser(2013), Data Structures and Algorithms in Pyhon”, Wiley, 2013, ISBN : 978-1-118-54958-2, ISBN : 978-1-118-29027-9(HardCover)
6. Kenneth A. Lambert(2011), Fundamentals of Python – First Programs, CENGAGE

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CS-606 JAVA Programming- II

Course Objectives:

Total lectures: 45

Total Marks: 90

- To design User Interface using Swing and AWT
- Learn the advanced concept of java
- To aware about the applet programming

Course Outcomes:

- Program using graphical user interface with Swing classes
- Handle different kinds of events generated while handling GUI components
- Create programs using menus and dialog boxes
- Program to create applets
- Understand advanced java concepts like JDBC, Java Beans

Unit-1 GRAPHICS Programming

[L-08 M-14]

Introduction- frames, frame layouts

Displaying information in a frame, Graphics objects and paint component method

Text and Fonts, Colors

Drawing Shapes, Filling Shapes

Paint mode and Images.

Unit-2 Event Handling

[L-10M-18]

Event Handling Mechanism

Concept: AWT, Swing, Difference between AWT and Swing.

The AWT event hierarchy

Event handling summary- event sources and listener, adapter classes.

Low level events - Focus, window, keyboard, mouse events.

Multicasting

Unit-3 User Interface Components Using SWING

[L-10M-18]

Introduction to layout management - Panels, Border Layout, Grid Layout,

Text Input- Text Field, Text Area, Password field

Labels and Buttons

Making choices - Check boxes, Radio buttons, List, Combo boxes

Unit-4 Menu and Dialog Box**[L-08M-14]**

Menus – Building menus

Menu events,

Popup menu,

Keyboard mnemonics and Accelerators, enabling and disabling menus

Dialog boxes - opening dialogs using inbuilt dialog box

Unit-5 APPLETS**[L-05 M-13]**

Introduction to applet

Converting application to applets

Life cycle of applet

Applet tag, Param Tag

Unit-6 Introduction to Advanced JAVA**[L-04 M-13]**

Collections

Interfaces-

List, Set

Classes-

Array List, Vector

Database connectivity -JDBC

Introduction to JavaBeans- Servlets, Java Server Pages (JSP)

References:

1. Cay's Horstmann and Gary Cornell ,“Core Java Volume 2”, ISBN: 978-0-13- 708160-8, 9THedition, published by Prentice Hall
2. E. Balaguruswamy ,”Programming with Java – A primer”, ISBN:978-0-07-061713-1
3. Herbert Schildt, “The complete reference JAVA-2”, ISBN: 978-0-07-049543-2, FifthEdition,(TMH)
4. Java Programming Black Book.
5. Buyya, Selvi, Chu, , “Object Oriented Programming with Java”, ISBN: 978- 0070678835, TataMcGraw Hill Education2010

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CS LAB-607 LAB on Python Programming – II

1. Write a program to demonstrate Exception Handling mechanism
2. Write a program to demonstrate Regular expression in python.
3. Write a program to demonstrate the working of classes and objects.
4. Write a program to demonstrate the working of Inheritance and Overloading Methods and Operator.
5. Write a program to demonstrate read & write file.
6. Write a program to demonstrate to Renaming, Moving, Copying, and Removing Files,
7. Write a program to demonstrate to learn GUI programming using Tkinter.
8. Write a program to create a database application for insert, update and delete in a table using MySQL.

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CS LAB- 608 Lab on RDBMS

1. To create one or more tables with following constraints, in addition to the first two constraints (PK & FK)
 - a. Check constraint
 - b. Unique constraint
 - c. Not null constraint
2. To drop a table, alter schema of a table, insert / update / delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)
3. To query the tables using simple form of select statement Select <field-list> from table [where <condition> order by <field list>] Select <field-list, aggregate functions > from table [where <condition> group by <> having <> order by <>]
4. To query table, using set operations (union, intersect)
5. To query tables using nested queries.
6. To create views.
7. To create Stored Procedure
 - A Simple Stored Procedure
 - A Stored Procedure with IN, OUT and IN/OUT parameter
8. Stored Function
 - A Simple Stored Function
 - A Stored Function that returns
9. Cursors
 - A Simple Cursor
 - A Parameterize Cursor

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Elective A

DSC (UG-CS-609 A): Lab on Lab on ASP.NET

1. Write an ASP .net program that demonstrate use of HTML Controls
2. Write an ASP .net program that demonstrate use of web controls.
3. Write an ASP .net that return the windows name of your computer and URL of the page that you are visiting.
4. Write an ASP .net program that demonstrate use of Validation Controls.
5. Write an ASP .net program that demonstrate use of Intrinsic Objects.
6. Write an ASP .net program that demonstrate Application and Session Scope Variables using Global. Ajax
7. Write an ASP .net program that demonstrate Page directives.
8. Write an ASP .net page that used the connection object to connect the database and display information using data grid Controls.

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DSC (UG-CS-609 B): Lab on JAVA Programming II

1. Write a program in Java to display messages in various fonts in a frame
2. Write a program in Java to draw various geometric shapes like circle, line, rectangle etc.
3. Write a program in Java to demonstrate paint mode.
4. Write a program in Java to demonstrate window events.
5. Write a program in Java to demonstrate Mouse events.
6. Write a program in Java to demonstrate Keyboard events.(key pressed, key released)
7. Write a program in Java to demonstrate multicasting
8. Write a program in Java to demonstrate user interface component list boxes and combo box.
9. Write a program in Java to demonstrate user interface component radio button and check box.
10. Write a program in Java to demonstrate menus as interface component.
11. Write an Applet to display human face.
12. Write a program in Java to demonstrate Java Applet with parameter
13. Write a program in java to demonstrate collection interfaces. (List and Set).

