ACE
Engineering College
An Autonomous Institution
(NBA ACCREDITED B.TECH COURSES, ACCORDED NAAC 'A'GRADE)
Ghatkesar, Hyderabad- 501 301

R22- B.TECH. FOUR YEAR DEGREE COURSE
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
COURSE STRUCTURE –II Year II SEM

II Year							**II Semester**
S.No.	**Course Type**	**Course Code**	**Course Title**	**Periods Per Week**			**Credits**
				L	**T**	**P**	
1	PCC	CS401PC	Discrete Mathematics	3	0	0	3
2	HSMC	SM402MS	Business Economics and Financial Analysis	3	0	0	3
3	PCC	CS403PC	Operating Systems	3	0	0	3
4	PCC	CS404PC	Database Management Systems	3	1	0	4
5	PCC	CS405PC	Java Programming	3	1	0	4
6	PCC	CS406PC	Operating Systems Lab	0	0	3	1.5
7	PCC	CS407PC	Database Management Systems Lab	0	0	3	1.5
8	PCC	CS408PC	Java Programming Lab	0	0	2	1
9	MC	*MC409	PDA	1	0	2	0
Total				**16**	**2**	**10**	**21**

Note: *MC = Satisfactory/Unsatisfactory

CS401PC: DISCRETE MATHEMATICS

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS401PC	PCC	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite:

Course Objectives:

- Introduces the elementary discrete mathematics for computer science andengineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes:

- Ability to understand and construct precise mathematical proofs
- Ability to use logic and set theory to formulate precise statements
- Ability to analyze and solve counting problems on finite and discrete structures
- Ability to describe and manipulate sequences
- Ability to apply graph theory in solving computing problems

Unit - 1	The Foundations: Logic and Proofs	No. of Classes:9

The Foundations: Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

Unit - 2		No. of Classes:9

Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

Unit - 3	Algorithms, Induction and Recursion	No. of Classes:8

Algorithms, The Growth of Functions, Complexity of Algorithms

Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness

Unit - 4	Discrete Probability and Advanced Counting Techniques	No. of Classes:10

Discrete Probability and Advanced Counting Techniques : An Introduction to Discrete Probability, Probability Theory, Bayes' Theorem, Expected Value and Variance

Advanced Counting Techniques: Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, **Algebraic Structures, Semi-group and Monoids, Group Theory, Residue Arithmetic.**

Unit - 5	**Graphs**	No. of Classes:9

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.
Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees

Text Books:

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory- Kenneth H Rosen, 7thEdition, TMH.

Reference Books:

1. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblayand R. Manohar, TMH,
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Teodore P. Baker, 2nded, PearsonEducation.
3. Discrete Mathematics- Richard Johnsonbaugh, 7thEdn., PearsonEducation.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M.Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5thedition, PearsonEducation.

Web References:

E-Text Books:

SM402MS : BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
SM402MS	HSMC	3	0	0	3	30	70	100
Contact Classes: 50	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 50		

Prerequisite:

Course Objectives: To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcomes:

The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analyzing the Financial Statements of a Company.

Unit - 1	Introduction to Business and Economics	No. of Classes:10

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

Unit - 2	Demand and Supply Analysis	No. of Classes:12

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

Unit - 3	Production, Cost, Market Structures & Pricing	No. of Classes:12

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly,

Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, cost Volume Profit Analysis.

Unit - 4	**Financial Accounting**	No. of Classes:8

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, preparation of Final Accounts.

Unit - 5	**Financial Analysis through Ratios**	No. of Classes:8

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).Introduction to Fund Flow and Cash Flow Analysis (simple problems).

Text Books:

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, TataMcGraw Hill Education Pvt. Ltd. 2012.

Reference Books:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e,Vikas Publications, 2013.

Web References:

E-Text Books:

CS403PC: OPERATING SYSTEMS

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS403PC	PCC	3	0	0	3	30	70	100
Contact Classes: 50	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 50		

Prerequisite:

- A course on "Computer Programming and Data Structures".
- A course on "Computer Organization and Architecture".

Course Objectives:

- Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, inter process communication and I/O inUnix

Course Outcomes:

- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computer and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

Unit - 1	Introduction	No. of Classes:8

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Unit - 2	Scheduling	No. of Classes:8

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.
System call interface for process management-fork, exit, wait, waitpid, exec

Unit - 3	Process Management	No. of Classes:12

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

Unit - 4	**Memory Management**	No. of Classes:12

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

Unit - 5	**File System**	No. of Classes:10

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usageof open, create, read, write, close, lseek, stat, ioctl system calls.

Text Books:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7thEdition, JohnWiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearsoneducation.

Reference Books:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition– 2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley,TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2ndedition,Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ PearsonEducation
5. UNIX Internals -The New Frontiers, U. Vahalia, PearsonEducation.

Web References:

E-Text Books:

CS404PC: DATABASE MANAGEMENT SYSTEMS

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS404PC	PCC	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite: A course on "Data Structures".

Course Objectives:

- To understand the basic concepts and the applications of databasesystems.
- To master the basics of SQL and construct queries usingSQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and accesstechniques.

Course Outcomes:

- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

Unit - 1	Database System Applications	No. of Classes:12

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ERModel

Unit - 2	Introduction to the Relational Model	No. of Classes:10

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

Unit - 3	SQL	No. of Classes:14

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

Unit - 4	Transaction Management	No. of Classes:12

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

Unit - 5	File Organization	No. of Classes:12

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Text Books:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc GrawHill*3rd Edition
2. Database System Concepts, Silberschatz, Korth, *Mc Graw hill*, Vedition.

Reference Books:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, ElmasriNavrate, *PearsonEducation*
3. Introduction to Database Systems, C. J. Date, *PearsonEducation*
4. Oracle for Professionals, The X Team, S.Shah and V. Shah,*SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,*PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student*Edition.

Web References:

E-Text Books:

CS405PC: JAVA PROGRAMMING

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS405PC	PCC	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite:

Course Objectives:

- To introduce the object oriented programming concepts.
- To understand object oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes:

- Able to solve real world problems using OOPs techniques.
- Able to understand the use of abstract classes.
- Able to solve problems using java collection framework and I/O classes.
- Able to develop multithreaded applications with synchronization.
- Able to develop applets for web applications.
- Able to design GUI based applications

Unit - 1	Object-Oriented Thinking	No. of Classes:12

Object-Oriented Thinking- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism- ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

Unit - 2	Packages	No. of Classes:12

Packages- Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

Unit - 3	Exception handling	No. of Classes:12

Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

Unit - 4	**Collections Framework**	No. of Classes:12

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hashtable ,Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

Unit - 5	**GUI Programming**	No. of Classes:12

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, **The Swing Buttons**- JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs.

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

Reference Books:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley &sons
2. Introduction to Java programming, Y. Daniel Liang, PearsonEducation.
3. Object Oriented Programming through Java, P. Radha Krishna, UniversityPress.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ.Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

Web References:

1. https://nptel.ac.in/courses/106/105/106105191/

E-Text Books:

1.https://www.oracle.com/technetwork/java/newtojava/java8book-2172125.pdf

CS406PC :OPERATING SYSTEMS LAB

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS406PC	PCC	0	0	3	1.5	30	70	100
Contact Classes: 0	Tutorial Classes: 0	Practical Classes:45				Total Classes:45		

Prerequisite:

- A course on "Programming for Problem Solving".
- A course on "Computer Organization and Architecture".

Course Objectives:

- To provide an understanding of the design aspects of operating system concepts through simulation
- Introduce basic Unix commands, system call interface for process management, inter-process communication and I/O in Unix

Course Outcomes:

- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix system calls

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms

   a) FCFS b)SJF c)Round Robin d)priority

2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)

3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

5. Write C programs to illustrate the following IPC mechanisms

   a) Pipes b) FIFOs c)Message Queues d) Shared Memory

6. Write C programs to simulate the following memory management techniques

   a) Paging b) Segmentation

List of Equipment/Software (with Specifications or Range) Required:

A Computer System with Ubuntu operating system and GCC Compiler

References

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, PearsonEducation/PHI
2. Operating System - A Design Approach-Crowley,TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition,Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/PearsonEducation
5. UNIX Internals: The New Frontiers, U. Vahalia, PearsonEducation

Member Secretary

Chairman

CS407PC :DATABASE MANAGEMENT SYSTEMS LAB

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS407PC	PCC	0	0	3	1.5	30	70	100
Contact Classes: 0	Tutorial Classes: 0	Practical Classes: 45				Total Classes:45		

Prerequisite: Nil

Course Objectives:

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes:

- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

List of Experiments:

1. Concept design with E-RModel
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraint setc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, updatetrigger)
9. Procedures
10. Usage of Cursors

List of Equipment/Software (with Specifications or Range) Required:

- System with MySQL / Oracle

References

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.

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2. Fundamentals of Database Systems, ElmasriNavrate, *PearsonEducation*

3. Introduction to Database Systems, C.J. Date, *PearsonEducation*

4. Oracle for Professionals, The X Team, S. Shah and V. Shah,*SPD*.

5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah,*PHI*.

6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley StudentEdition*.

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CS408PC :JAVA PROGRAMMING LAB

B.Tech. II Year II Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
CS408PC	**PCC**	0	0	2	1	30	70	100
Contact Classes: 0	**Tutorial Classes: 0**	**Practical Classes:45**				**Total Classes:45**		

Prerequisite: Nil

Course Objectives:

- To write programs using abstract classes.
- To write programs for solving real world problems using java collection framework.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands on experience with java programming.

Course Outcomes:

- Able to write programs for solving real world problems using java collection framework.
- Able to write programs using abstract classes.
- Able to write multithreaded programs.
- Able to write GUI programs using swing controls in Java.

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List of Experiments:

1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a forloop.

2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided byzero.

3. a)Develop an applet in Java that displays a simple message.

   b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.

4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

6. Write a Java program for the following: Create a doubly linked list of elements. Delete a given element from the above list. Display the contents of the list after deletion.

7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially, there is no message shown.

8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

9. Suppose that a table named Table.txt is stored in a text file. The first line in the

file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

12. Write a Java program that correctly implements the producer – consumer problem using the concept of interthread communication.

13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order

15. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

List of Equipment/Software (with Specifications or Range) Required:

- Ubuntu System
- Eclipse or Net bean

References

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition *Pearson*education.
2. Thinking in Java, Bruce Eckel, *Pearson*Education.
3. Java Programming, D. S. Malik and P. S. Nair, *Cengage*Learning.
4. Core Java, Volume 1, 9thedition, Cay S. Horstmann and G Cornell,*Pearson*.

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MC409: PDA

(PROGRAMMING IN DATA STRUCTURES AND ALGORITHMS)

B.Tech. II Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MC409	MC	1	0	2	0	30	70	100
Contact Classes: 15	Tutorial Classes: Nil	Practical Classes: 30				Total Classes: 45		

Prerequisite: Nil

Course Objectives:

1. **To prepare students for international programming contests conducted by MNC**
2. **To explore students beyond academic courses.**
3. **To develop programming skills among students.**
4. **To develop and implement logical skills among students.**

List of Experiments:

UNIT-1

Solving puzzles in 'C' language based on the concepts of

1. Data Types
2. Operators
3. Control Statements
4. Loops
5. Storage Classes
6. Functions

(Note: Problems and Puzzles will be taken from GATE, TIFR, ISRO, TCS, Accenture…)

UNIT-2

Puzzles with Arrays, Structures, Strings, Pointers, Pointers to Strings, Pointers to Structures, Pointers to Functions, Multilevel Pointers, File Handling in C

(Note: Problems and Puzzles will be taken from GATE, TIFR, ISRO, TCS, Accenture…)

UNIT-3

Advanced problem solving with data structures: Arrays, Linked List, Trees, Graphs, Heaps, Hash Table, Sets, Strings

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UNIT-4

Analysis of Algorithms: Analyzing Time and space Complexities of Recursive and Non-Recursive Algorithms, Program segments with loops, Asymptotic Notations and Properties.

Divide and Conquer: Merge sort, Quick sort, Counting Inversions, Long Integer Multiplication, Master Method

UNIT-5

Problem solving with Dynamic Programming and Greedy Method: Spanning Trees, Shortest Paths, Longest Common Subsequence, Matrix chain multiplication, Kadane's Algorithm

Backtracking: n-Queens, Sum of Subsets, Rat in a maze, Knight tour problem

(Note: Problems will be taken from HackerRank, CodeChef, LeetCode….)

Text Books:

1. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
2. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson
   Freed, Universities Press.
3. Introduction to Algorithms, 4th Edition, Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, Clifford Stein, The MIT Press.

Reference Books:

1. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
2. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning.
3. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

Web References:

1. https://www.hackerrank.com/
2. https://www.coursera.org/learn/algorithms-part1/
3. https://www.coursera.org/learn/algorithms-part2/

E-Text Books:

1. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
2. Data structures and algorithm analysis in c, 4th-edition, Mark.A.Weiss
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R.Tamassia, John Wiley and sons.

List of Equipment/Software (with Specifications or Range) Required:

1. WINDOWS/LINUX Operating Systems
2. C/C++/JAVA/Python

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