SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
Sree Sainath Nagar, Tirupati

Department of Master of Computer Applications

Supporting Document for 1.1.3

Courses having focus on

Employability/ Entrepreneurship/ skill Development

Program: MCA- Master of Computer Applications

Regulations : SVEC-19

The Courses (with course outcomes) under SVEC-19 Regulations which focus on ***employability/ entrepreneurship/ skill development*** are highlighted with the following colours.

Skill

Employability

Entrepreneurship

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

Sree Sainath Nagar, A. Rangampet-517 102.

MASTER OF COMPUTER APPLICATIONS

MCA I-SEMESTER

(19MC1HS01) FINANCIAL AND MANAGEMENT ACCOUNTING (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITE: --

COURSE DESCRIPTION:

Accounting concepts, Principles of accountancy, Types of accounts, Journal, Ledger and Trial Balance; Trading account, Profit and Loss account, Balance sheet; Ratio analysis of investments; Analysis and determination of Break-Even-Points; Methods of capital budgeting.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Demonstrate the concepts of Financial Accounting in preparation of Financial Statements.

CO2: Analyze and interpret the financial data using Ratio Analysis, Break-Even Analysis and Capital Budgeting Techniques for the decision-making of an Organization.

DETAILED SYLLABUS:

UNIT I - ACCOUNTING (11 periods)

Meaning and Definition, Objectives, Functions; Principles of accountancy: Concepts and Conventions, Double entry system of accounting, Types of accounts, Journal, Ledger and Trial Balance.

UNIT II - PREPARATION OF FINANCIAL STATEMENTS (11 periods)

Trading account, Profit and Loss Account and Balance Sheet (with simple adjustments).

UNIT III - RATIO ANALYSIS (11 periods)

Capital Structure Ratios, Liquidity Ratios, Activity Ratios, Profitability Ratios (Simple Problems).

UNIT IV - BREAK-EVEN-ANALYSIS (11periods)

Concept of Break Even Point (BEP), Determination of BEP, Profit/Volume (P/V) ratio, Margin of safety (Simple Problems).

UNIT V - CAPITAL BUDGETING (11periods)

Features, Proposals, Methods of Capital Budgeting: Payback Period Method, Accounting Rate of Return (ARR), Time value of money, Net Present Value Method (NPV), Profitability Index (PI) and Internal Rate of Return (IRR) (Simple problems).

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Tyagi, C.L. and Madhu Tyagi, "*Financial and Management Accounting*," Atlantic Publishers and Distributors, New Delhi, 2016.

2. Madhu Vij, "*Financial and Management Accounting*," Anmol Publishers, New Delhi, 11th Edition, 2018.

REFERENCE BOOKS:

1. Pauline Weetman, "Financ*ial and Management Accounting – An Introduction*," Financial Times Prentice Hall, New Delhi, 4th Edition, 2014.

2. Jain, S.P. and Narang, K.L., "*Financial Accounting*," Kalyani Publishers, Ludhiana, 2nd Edition, 2016.

MCA I- SEMESTER

(19MC10101) COMPUTER ORGANIZATION (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITE: --

COURSE DESCRIPTION:

Digital logic circuits and its components; Types of data in circuits; Design of control unit; Organizations of Central Processing Unit(CPU), instruction formats, addressing modes, types of instructions; Design of basic computer; Types of peripheral devices, modes of transfers, interrupts, memory and mappings.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Design control unit using logic circuits and analyze central processing unit, instruction formats, addressing modes, types of instructions, modes of transfer for effective utilization of a system.

CO2: Apply Boolean algebra and map simplification techniques to design logic circuits and basic computer using memory mappings, techniques of I/O and instruction sets.

DETAILED SYLLABUS:

UNIT I - DIGITAL LOGIC CIRCUITS AND DIGITAL COMPONENTS (11 Periods)

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map simplification, Combinational Circuits, Flip-Flops, Sequential Circuits.

Digital Components: Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters.

UNIT II - DATA REPRESENTATION (10 Periods)

Data Representation: Data Types, Complements, Fixed-Point Representation, Floating-Point Representation, Binary Codes, Error Detection Codes.

UNIT III - MICRO PROGRAMMED CONTROL AND CENTRAL PROCESSING UNIT (12 Periods)

Micro programmed Control: Control Memory, Address Sequencing, Micro-program Example, Design of Control Unit.

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data transfer and manipulation, Program control, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC).

UNIT IV - BASIC COMPUTER ORGANIZATION AND DESIGN (11 Periods)

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-output and interrupt, Complete computer description, Design of basic computer.

UNIT V - INPUT-OUTPUT ORGANIZATION AND MEMORY ORGANIZATION (11 Periods)

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. M. Morris Mano, "*Computer System Architecture,*" Pearson Education, 3rd Edition, 2017.

REFERENCE BOOKS:

1. T. Rajaraman and V. Radhakrishnan, "*Computer Organization and Architecture,*" Prentice Hall India Learning Private Limited, 2007.
2. William Stallings, "*Computer Organization and Architecture,*" Pearson Education, 10th Edition, 2016.

ADDITIONAL LEARNING RESOURCES:

1. http://nptel.ac.in/courses/106106092
2. https://swayam.gov.in/course/3724-computer-architecture-and-organization.

MCA I- SEMESTER

(19MC10102) MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	--	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Mathematical logic and predicates; Functions and Relations; Algebraic Structures; Mathematical Reasoning; Recurrence Relations; Graphs and Trees.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Identify the types of functions, formulate truth tables and solve normal forms using the knowledge of mathematical logic.

CO2: Analyze computer algorithms using the knowledge of graph theory and solve recurrence relations using discrete mathematics.

DETAILED SYLLABUS:

UNIT I - MATHEMATICAL LOGIC AND PREDICATES (10 Periods)

Mathematical Logic: Statements and Notations, Connectives, Well formed formulas, Truth Tables, Tautology, Normal forms.

Predicates: Predicate calculus, Rules of inference, Consistency, Proof of contradiction.

UNIT II - RELATIONS AND FUNCTIONS (8 Periods)

Relations: Properties of Binary Relations, Equivalence Relations, Partial Ordering Relations, Hasse diagrams.

Functions: Inverse Functions, Composition of functions, Recursive functions, Lattice and its Properties.

UNIT III - ALGEBRAIC STRUCTURES AND MATHEMATICAL REASONING (9 Periods)

Algebraic structures: Algebraic system problems and general properties, Semi groups and monoids, Groups, Homomorphism, Isomorphism.

Mathematical Reasoning: Methods of Proof, Mathematical Induction, The Inclusion-Exclusion Principle, The Pigeonhole principle.

UNIT IV - RECURRENCE RELATIONS (9 Periods)

Recurrence Relation: Generating functions of Sequences, Calculating co-efficient of Generating functions, Homogeneous Recurrence relation, Solving recurrence relations by substitution and generating functions, Methods of characteristic roots.

UNIT V - GRAPHS AND TREES **(9 Periods)**

Graphs: Introduction to Graphs, Types of Graphs, Graphical representations, Paths and Circuits, Euler and Hamiltonian Paths and Circuits, Graph Coloring.

Trees: Introduction to Trees, Binary Search Trees, Spanning Trees, Depth-First Search, Breadth-First Search, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Trembly J.P. and Manohar.P, *"Discrete Mathematical Structures with applications to computer science,"* Tata McGraw Hill, New Delhi, 2017.
2. Kenneth H. Rosen, *"Discrete Mathematics and its Applications,"* Tata McGraw Hill, New Delhi, 7th edition, 2017.

REFERENCE BOOKS:

1. J.L. Mott, A. Kandel, T.P Baker, *"Discrete Mathematics for Computer Scientists and Mathematicians,"* Prentice Hall India, 2nd Edition 2015.
2. D. S. Chandrasekharaiah, *"Mathematical Foundations of computer science (Discrete Structures),"* Prism Books Pvt. Ltd, India, 2006.

MCA I- SEMESTER

(19MC10103) OPERATING SYSTEMS (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	--	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Operating Systems; Design and Implementation of Operating System Structure; Evaluation of Multithreading and CPU Scheduling Algorithms; Deadlocks and Synchronization Methods; Memory Management Techniques; Protection and Security.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Identify and analyze Inter Process Communication (IPC), Process Synchronization, Memory Management, Process Scheduling, System protection and Security mechanisms and algorithms to solve problems of resource utilization.

CO2: Select and apply Deadlock handling mechanisms, Synchronization tools, Process Scheduling and Page Replacement algorithms to interpret and resolve optimal resource allocation problems.

DETAILED SYLLABUS:

UNIT I – SYSTEM STRUCTURES AND PROCESSES (10 periods)

System Structures: Operating System concepts, Role of Operating System, Operating System services, user operating system interface, Operating System Operations, Computing Environments, Operating system structure, System calls, types of system calls, System programs, Virtual machines.

Processes: Process concept, Process scheduling, Operations on processes, Inter process communication (IPC), Examples of IPC systems.

UNIT II- MULTITHREADED PROGRAMMING AND PROCESS SCHEDULING (12 periods)

Multithreaded Programming: Multithreaded models, Thread libraries, Threading Issues, Operating System Examples.

Process Scheduling: Basic Concepts, Type of Scheduler, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling.

UNIT III - PROCESS SYNCHRONIZATION AND DEADLOCKS (11 periods)

Process Synchronization: Concepts, Critical-Section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of Synchronization, Critical regions, Monitors.

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT IV - MEMORY MANAGEMENT (11 periods)

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

Virtual Memory Management: Concepts, Demand paging, Copy on write, Page replacement, Allocation of frames, Thrashing.

UNIT V - SYSTEM PROTECTION AND SECURITY (11 periods)

System Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights.

System Security: The Security problem, Program threats, System and Network threats.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *"Operating System Concepts,"* John Wiley and Sons. Inc, 8th Edition, 2009.

REFERENCE BOOKS:

1. Achyut S. Godbole, *"Operating Systems,"* Tata McGraw-Hill, 3rd Edition, 2017.
2. William Stallings, *"Operating Systems: Internals and Design Principles,"* Pearson Education, 9th Edition, 2018.

ADDITIONAL LEARNING RESOURCES:

1. https://www.javatpoint.com/os-tutorial
2. https://www.os-book.com/OS10/slide-dir/index.html

MCA I- SEMESTER
(19MC10104) PROGRAMMING IN C (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Problem Solving; Analysis and Efficiency of Algorithms; Problem solving approaches; Elements of C and Data types; Program design; Operators and Expressions; Data Input and Output ; Control Statements; Functions ; Arrays ; Strings ; Pointers; Structures and Unions and File handling Techniques; Preprocessor directives; Command line argument and its usage.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Design algorithms using problem-solving approaches, C language Tokens, Input/output Formatting styles, Control statements, Dynamic memory allocation functions, parameter passing mechanism, command line arguments and functions to solve problems.

CO2: Select and apply control statements, 'C' language constructs, functions, pre-processor directives, sequential and random access of text/binary files for persistent data storage to solve computational problems.

DETAILED SYLLABUS:

UNIT I - PROBLEM SOLVING AND C LANGUAGE (11 Periods)

Problem Solving: Problem solving, Top-Down Design, Implementation of Algorithms, Program Verification, Efficiency of Algorithms, Analysis of Algorithms.

C Language: Identifiers, Types, Variables, Constants, Keywords, Expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion, Structure of a C Program, Prepare and Run a C Program.

UNIT II -PROGRAM CONTROL STATEMENTS, ARRAYS AND STRINGS (11 Periods)

Program Control Statements: Two way Selection: If, If-Else, Nested If-Else; Multi way selection: else if-ladder and switch statement; Repetition: Concept of Loop, For Loop, While Loop, Do-While Loop; Break, Continue and goto statement.

Arrays and Strings: Array concept, types of Arrays: One Dimensional, Two Dimensional and Multi-Dimensional Arrays; Strings, String Representation and initialization, Array Of Strings, String Manipulation Functions.

UNIT III -POINTERS AND FUNCTIONS (11 Periods)

Pointers: Pointers declaration and initialization, Arithmetic operations on Pointers, Array of Pointers, Pointer to an Arrays, Dynamic Memory Management Functions: malloc, calloc and realloc and free.

Functions: Declaring Functions, System Defined and User Defined Function; Local and Global Variables, Parameter Passing Mechanism: Pass By Value and Pass By Reference; Scope, Storage Classes, Recursion: Recursive Function, Application of Recursion: Factorial Calculation and Fibonacci number generation.

UNIT IV -DERIVED DATA TYPES (11 Periods)

Derived Data Types: Structures: Structure declaration and initialization, Anonymous structure, Accessing Operators, Nested Structure, Array of structure, Array within a structure, Pointer to Structure, Passing Structures through Functions; Union: Declaration, Initialization and its usage; Typedef, Enumerated types and Bit field, Application of structure with pointers: Static and Dynamic linked list representation.

UNIT V- FILES AND PREPROCESSOR DIRECTIVES (11 Periods)

Files, types of files: Unformatted Data, Binary and Text file; Operations on File: open, close, read, write, seek, tell, read data from files, writing data to files; Program to implement Sequential access and Random access; Preprocessor directive statements and its usage; Command line argument and its usage.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. B.A. Forouzan, "*A Structured programming approach using C,*" Cengage learning, 3rd Edition, 2007.
2. R.G. Dromey, "*How to Solve it by Computer,*" Pearson Education, 2006.

REFERENCE BOOKS:

1. Ajay Mittal, "*Programming in C – A practical approach*," Pearson Education in south Asia, 2010.
2. Byron Gottfried, "*Programming in C*," Schaum Outline Series, Tata MC Grawhill, 3rd Edition, 2017.
3. M.T. Somashekara, "*Problem Solving with C,"* PHI Learning Private Limited, New Delhi, 2009.

ADDITIONAL LEARNING RESOURCES

1. https://nptel.ac.in/courses/106104074/
2. https://swayam.gov.in/course/1388-introduction-to-programming-in-c

MCA I- SEMESTER
(19MC1HS31) COMMUNICATIVE ENGLISH LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITE: --

COURSE DESCRIPTION:

Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Reading Comprehension; Information Transfer; Listening Comprehension

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.

CO2: Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.

CO3: Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.

CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.

CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

***First ten exercises are mandatory among the following:**

LIST OF EXERCISES:

1. **Just a Minute, Elocution/Impromptu**
   Steps to be followed, Useful tips, Do's & Don'ts, Preparation, Examples**.**

2. **Phonetics**
   Sounds of English, Consonants, Vowels, Speech Organs, Phonetic Transcription, Word Accent, Basics of Intonation.

3. **Vocabulary Building**
   Prefixes & Suffixes, Synonyms & Antonyms, Phrasal verbs, Idioms, One word substitutes, Words often confused.

4. **Grammar**
   Tenses, Nouns, Word order and error correction.

5. Giving Directions
Useful phrases, Sample conversations, Exercises.

6. Role Plays
Useful tips, Do's & Don'ts, Exercises, Role Plays for practice.

7. Public Speaking
Stage presence, Voice control, Body Language, Rehearsals, Audience, Delivery, Do's & Don'ts, Project Submission.

8. Letter Writing
Introduction, Objective, Formats, Types, Exercises.

9. Describing Objects
Jargon, Useful Phrases,Do's & Don'ts, Exercises.

10. Reading Comprehension
Introduction, Types of listening, Practice, Benefits of listening, Exercises.

11. Information Transfer
Tables, Pie-Charts, Venn Diagrams, Graphs, Flow Charts, Steps to be followed, Exercises.

12. Listening Comprehension
Introduction, Types of reading, Inferring, Critical analysis, Exercises.

TEXT BOOK:
1. Communicative English Lab Manual, SVEC, 2019.

REFERENCE BOOKS:
1. D. Sudha Rani, "*A Manual for English Language Laboratories*," Pearson, Noida, 2010.
2. Nira Kumar, "*English Language Laboratories*," PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARES:
1. SoftX
2. Speech Solutions
3. English Pronunciation Dictionary by Daniel Jones
4. Learning to Speak English 8.1, The Learning Company – 4 CDs.
5. Mastering English: Grammar, Punctuation and Composition.
6. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
7. Dorling Kindersley Series of Grammar.
8. Language in Use 1, 2 and 3
9. Cambridge Advanced Learner's Dictionary - 3rd Edition
10. Centronix – Phonetics
11. Let's Talk English, Regional Institute of English South India.

ADDITIONAL LEARNING RESOURCES:
1. https://goo.gl/IjE45p: Amazon India site – with thousands of different product descriptions.
2. https://goo.gl/3ozeO6: 15 ways to calm your nerves before giving a presentation.
3. https://goo.gl/p20ttk: useful site for more language about introducing yourself.
4. https://goo.glsvMHZ1: information and advice about describing line graphs
5. https://goo.gl/NqFJuc: an informative presentation about using line graphs

MCA I-SEMESTER
(19MC10131) PC SOFTWARE LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITE: --

COURSE DESCRIPTION:

Peripherals of a computer; Disassembling and Assembling the Personal Computer(PC); Linux file system, File handling utilities and Text processing utilities; Productivity tools including Word, Excel, Power Point, Access and publisher.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Identify and analyze functional parts of PC, functionalities of Operating System and Information Management.

CO2: Apply Troubleshooting techniques for Assembling and Disassembling of PC and create professional word documents, Excel Spreadsheets and power point presentations for effective management of data.

CO3: Work independently and in a team to solve problems with effective communication.

LIST OF EXERCISES:

PC Hardware

1. a) Identification of peripherals of a computer, components in a CPU and its functions. Construct block diagram of CPU along with the configuration of each peripheral.

b) Demonstration of disassembling and assembling the PC.

2. Demonstrate Operating System, Components of OS, Installation of Microsoft Windows XP Operating System.

3. Implement Basic MS-DOS Internal and External commands.

4. a) Introduction to Linux file system, perform File handling utilities and Text processing Utilities.

b) Implement Shell Script to generate Fibonacci series.

MS Word and LaTeX

5. Implement Mail merge using MS-Word.

6. a) Design a visiting card using MS-Word.

b) Create a project Certificate using LaTeX with the features like Formatting Fonts,

Text Effects, Borders and Colors.

MS Excel

7. The ABC Company shows the sales of different products for 5 years. Create Column Chart, Pie Chart and Bar chart for the following data:

YEAR	PRODUCT-1	PRODUCT-2	PRODUCT-3	PRODUCT-4
2014	1000	800	900	1000
2015	800	80	500	900
2016	1200	190	800	400
2017	400	200	300	1000
2018	1800	400	400	1200

MS Power Point

8. Design a power point presentation on Department of MCA which includes Animations, Design, Sound effects and Images.

MS Access

9. Create Employee and Department tables with the following fields:

Employee table: enumber, ename, salary, deptno.

Department table: deptno, dname, location.

a) Create one-to-many relationship between above two tables.

b) Create a table, form and generate a report with the following fields:

Book_No, Book_Name, Author, Publisher and Price.

10. Design Form and generate Reports for the above employee table and implement the queries as per the given criteria:

a) Retrieve employee details whose salary is above 30,000.

b) Retrieve employee details whose deptno is 20.

11. Mini Project:

Create a Web page with the given features: Home page, About us, Department, Contact page using Microsoft Publisher.

REFERENCE BOOKS:

1. ITL Education Solutions Limited, "*Introduction to Information Technology,"* Pearson Education India, 2nd Edition, 2012.

2. John Walkenbach, Herb Tyson, Michael R. Groh, Faithe Wempen, Lisa A. Bucki, "*Microsoft Office 2010 Bible,"* John Wiley and Sons, 2010.

3. Peter Norton, "*Introduction to Computers*," Tata McGraw-Hill, New Delhi, 7th Edition, 2012.

4. Vikas Gupta, "*Comdex Information Technology Course Tool Kit,"* WILEY Dreamtech, New Delhi, 10th Edition, 2009.

5. Sumitabha Das, "*UNIX Concepts and Applications*," Tata McGraw Hill, 4th Edition, 2017.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106106144/2
2. https://support.office.com/
3. https://www.latex-project.org/
4. https://www.pcworld.com/

MCA I - SEMESTER
(19MC10132) PROGRAMMING IN C LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:--

COURSE DESCRIPTION:

Program Design and Problem Solving using the C Programming Language; Control Structures; Functions; Arrays; Strings; Pointers; File I/O and the usage of Preprocessor Directives.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Analyze and implement algorithms using C language Tokens, Input/output formatting styles and Programming components to solve problems.

CO2: Design and develop programs using Control Structures, Loops, Functions, Parameter Passing Mechanism, Command Line Arguments, File Handling to solve complex problems.

CO3: Work independently and in a team to solve problems with effective Communication.

LIST OF EXERCISES:

1. a) Design a flow chart and algorithm to add two numbers and find the largest number among two numbers.
b) Design a flow chart and algorithm for printing prime numbers for a given range of numbers.

2. a) Write a C Program to find the sum of individual digits of a positive integer.
b) Write a C Program to find the roots of a quadratic equation.

3. Write a C language programs to implement non-recursive and recursive functions for the following task:
a) Calculating Factorial of a given number
b) GCD of a given numbers

4. a) Write a C Program to Add, Subtract and Multiply Two Matrices Using Functions (Passing arrays as arguments to the function)
b) Write a C program to determine whether a given string is a palindrome or not.

5. a) Write a C program to Insert a Substring into a given main String at a given Position.
b) Write a C program to delete 'n' characters from a given position in a given string.

6. a) Write a C program to generate Electricity Bill for different categories of users based on different slabs in each category. (Using Nested if else Statement).

b) Write a c program to evaluate the following expression using loops:
$1+x^2/2!+x^4/4!+...$upto 5 terms.

7. Write a menu driven program to read list of student names and perform the following operations using array of character pointers:
a) To insert a student name
b) To delete a student name

8. a) Write a program to read in an array of names and sort them.
Note: Use functions and pointers.

b) Write a program to read and display values of an integer array.
Note: Allocate space dynamically for the array using the malloc ().

9. a) Write a C program to copy contents of one file to another file.
b) Write a C program to reverse the first 'n' characters in a file.
Note: The file name and n are specified on the command line.

10. a) Write a C program to display the contents of a file.
b) Write a C program to merge two files into a third file
Note: The contents of the first file followed by those of the second are put in the third file).

Mini Project-1:
Create a list of Employees with the following fields and calculate minimum and maximum salaries of an employee: Emp_Id, Name: First name, Middle name, Last name, Address: Area, City, State, Age, Salary, Designation.

Mini Project-2: Estimation of Tax for an Employee, given the following conditions:
If income is less than 1,50,000 then no tax.
If taxable income is in the range 1,50,001 – 3,00,000 then charge 10% tax.
If taxable income is in the range 3,00,001 – 5,00,000 then charge 20% tax.
If taxable income is above 5,00,001 then charge 30% tax.

REFERENCE BOOKS:

1. Byron Gottfried, "*Programming in C*," SchaumOutline Series, Tata MC Grawhill, 3rd Edition, 2017.
2. M.T. Somashekara, "*Problem Solving with C,"* PHI Learning Private Limited, New Delhi, 2009.

MCA II – SEMESTER

(19MC2BS01) PROBABILITY AND STATISTICS (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Concepts of Probability; Probability distributions; Random variables; Sampling, Correlation and regression analysis; Statistical quality control; Testing of hypothesis.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Analyze the correlation and regression, estimation and sampling distributions to identify and solve the problems for testing of hypothesis.

CO2: Apply the methods of probability and its distributions to solve the problems on random variables and formulate statistical quality control charts.

DETAILED SYLLABUS:

UNIT I- PROBABILITY AND RANDOM VARIABLES (9 Periods)

Probability: Random experiment, event, sample space, probability, Addition and Multiplication theorems of probability, conditional probability, Bayes' theorem.

Random Variables: Discrete and continuous random variables, probability mass function and probability density function of a random variable, Distribution function and its properties, problems on random variable and Mathematical expectation of a random variable.

UNIT II- PROBABILITY DISTRIBUTIONS AND STATISTICAL QUALITY CONTROL (10 Periods)

Probability Distributions: Discrete Distributions: Binomial Distribution, Mean and variance of Binomial distribution, Poisson distribution, Mean and variance of Poisson distribution.

Continuous Distributions: Normal Distribution- Mean, variance and area properties.

Statistical Quality Control: Construction of quality control charts $\overline{X}$, R, p, np and c-charts.

UNIT III - CORRELATION AND REGRESSION ANALYSIS (8 Periods)

Correlation Analysis: Types of Correlation, Karl Pearson's coefficient of Correlation and Spearman's Rank correlation coefficient.

Regression Analysis: Fitting of two lines of Regression, Regression coefficients.

UNIT IV - SAMPLING DISTRIBUTIONS, ESTIMATION AND TEST OF SIGNIFICANCE FOR LARGE SAMPLES (10 Periods)

Sampling distributions and Estimation: Population, sample, parameter, statistic, sampling distribution of sample mean and sample standard deviation, standard error of a statistic; Point estimation and Interval estimation.

Test of Significance for large samples: Null hypothesis and Alternative hypothesis, Type-I and Type-II errors, Level of significance, Critical Region, one tailed and two tailed tests; Test of Significance of single proportion, Difference of two Proportions, Single mean, Difference of two Means.

UNIT V - TEST OF SIGNIFICANCE FOR SMALL SAMPLES (8 Periods)

Student's t-test: Single Mean, Difference of two sample means; Paired t-test, F-test for equality of two population variances; Chi-square test of goodness of fit and independence of attributes.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi etal., *"Probability and Statistics,"* S. Chand and Company ltd: New Delhi, 3rd Edition, 2011.

2. S.P. Gupta, "*Statistical Methods,"* Sultan and Chand, New Delhi, 34th Edition, 2005.

REFERENCE BOOKS:

1. Shanaz Bhatul, *"Probability and Statistics,"* RIDGE Publications, 2nd Edition, 2006.

2. S.C. Gupta and V.K. Kapoor, *"Fundamentals of Applied Statistics,"* S. Chand and Sons, New Delhi, 2010.

MCA II-SEMESTER

(19MC20101) DATABASE MANAGEMENT SYSTEMS (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A course on Operating Systems.

COURSE DESCRIPTION:

Databases; Database Architecture and Database Design; Concepts of Relational Database and its Design; Representation of ER Diagram to Relational model; SQL queries; Normal forms; Recovery and Concurrency Control mechanism; Storage and Indexing mechanism.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Identify and analyze the problems arise due to redundancy, Data normalization techniques, Transaction processing approaches, Concurrency control and Recovery mechanisms for an optimal database application system.

CO2: Select and apply integrity constraints over relations, relational models, storage and indexing, hashing techniques for the construction of relational database systems.

DETAILED SYLLABUS:

UNIT I- INTRODUCTION TO DATABASES, DATABASE ARCHITECTURE AND DATABASE DESIGN (11 Periods)

Databases and Database Users: Concepts, Characteristics of the Database approach, Actors on the Scene, Workers behind the scene, Advantages of the using the DBMS Approach.

Database System Concepts and Architecture: Data Models, Schemas and Instances, Three Schema architecture and Data Independence, Database Languages and Interfaces, Database system environment, Centralized and Client/Server Architectures for DBMS, Classification of Database Management Systems.

Database Design: Database design and ER-diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER-model, Conceptual Design with the ER-Model.

UNIT II - RELATIONAL MODEL AND BASIC SQL (10 Periods)

Relational Model: Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational.

Case Study: ER-diagram for banking enterprise and university database.

Basic SQL: SQL data definition and data types, CREATE table command in SQL, attribute data types in SQL, Specifying constraints in SQL: specifying attribute constraints and attribute defaults, specifying key and Referential integrity constraints, specifying CHECK constraints on tuples.

UNIT III - SQL, SCHEMA REFINEMENT AND NORMAL FORMS (12 Periods)

SQL: Form of Basic SQL Query, Examples of queries in SQL: Insert, Delete and Update statements; Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregate Operators, NULL values, Comparison using Null values, Logical connectives: AND, OR , NOT; Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Views, Destroying /altering Tables and Views, Triggers and Active Databases.

Schema Refinement and Normal Forms: Schema Refinement: Problems Caused by redundancy, Decompositions; Problem related to decomposition, Functional Dependencies, Normal Forms: FIRST, SECOND, THIRD Normal forms, BCNF; Properties of Decompositions: Loss less, join Decomposition, Dependency preserving Decomposition.

UNIT IV - OVERVIEW OF TRANSACTION MANAGEMENT, CRASH RECOVERY AND CONCURRENCY CONTROL (11 Periods)

Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock Based Concurrency Control, Performance of Locking.

Concurrency Control: 2Phase Locking (2PL), Serializability and Recoverability, Lock Management, Lock Conversions.

Crash recovery: ARIES, the Log, Other Recovery related Structures, Write-Ahead Log Protocol, Check pointing, Recovering from a System Crash.

UNIT V - OVERVIEW OF STORAGE AND INDEXING (11 Periods)

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing: Clustered Indexes, Primary and Secondary Indexes; Index Data Structures: Hash based Indexing, Tree based Indexing.

Storing Data: Memory Hierarchy: Magnetic disks, Performance implications of disk structure; Redundant Arrays of Independent Disks.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, "*Data base Management Systems*," Tata McGraw-Hill, 3rd Edition, 2013.
2. Ramez Elmasri, Shamkant B. Navathe, *"Database Systems*," Pearson Education, 6th Edition, 2013.

REFERENCE BOOKS:

1. A.Silberschatz, H.F. Korth, S.Sudarshan, "*Data base System Concepts*," McGraw hill, 6th Edition, 2011.
2. C.J.Date, "*Introduction to Database Systems,*" Pearson Education, 8th Edition, 2006.

ADDITIONAL LEARNING RESOURCES:

1. http://www.nptelvideos.in/2012/11/database-management-system.html
2. http://www.oracle.com/technetwork/tutorials/index.html
3. https://www.tutorialcup.com/dbms
4. https://www.javatpoint.com/oracle-tutorial

MCA II-SEMESTER
(19MC20102) DATA STRUCTURES (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITE:
A course on Programming in C.

COURSE DESCRIPTION:

Pseudo code; Abstract Data Type (ADT); Implementation of Stack; Queues; Linked Lists; Graphs; Tree ADT's and its Application; Sorting and Searching techniques; Binary Search Tree ADT, AVL- Height balanced trees and its Applications; Graphs; Shortest Path algorithms.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Analyze abstract data types to implement stacks, queues, linked lists, trees and graphs to solve computational problems.

CO2: Select and apply sorting, searching, tree and graph traversal techniques for designing algorithms.

DETAILED SYLLABUS:

UNIT I - BASIC CONCEPTS AND STACKS (9 Periods)

Basic Concepts: Algorithm**,** Pseudo code, Abstract Data Type, Model for an Abstract Data Type, Abstract Data Type Implementations.

Stacks: Concepts of Stack**,** Stack Operations, Representation of Stack using arrays, Applications- Recursion, Infix to Postfix Transformation, Evaluating Postfix Expressions.

UNIT II - QUEUES AND GENERAL LINEAR LISTS (10 Periods)

Queues: Concepts of Queue, Queue Operations, Representation of Queue using arrays, Various Queue Structures: Circular Queue, Double ended queue, Priority queue, Applications –Simulation.

General Linear Lists: Operations, Implementations- Single linked list, Double linked list, Circular Linked List, Applications- Stacks using Linked List, Queue using Linked List, Polynomial Addition, Sparse Matrix Implementation.

UNIT III - SORTING AND SEARCHING (8 Periods)

Sorting: Sort Concepts, Sort Stability, Sort Efficiency, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge sort, Heap Sort.

Searching: Sequential Search, Binary Search, Analyzing Search Algorithms.

UNIT IV -TREES **(10 Periods)**

Trees: Tree Concepts, Binary Trees, General Trees, Binary Tree Traversals.

Binary Search Trees: Concepts, BST Operations, Binary Search Tree Abstract Data Type, Binary Search Tree Applications, Threaded Trees.

AVL Search Trees: AVL Tree Concepts, AVL Tree Implementations, AVL Tree Abstract Data Type, AVL Tree Algorithms.

UNIT V - GRAPHS **(8 Periods)**

Graphs: Concepts of graph, Operations, Graph Storage Structures, Graph Algorithms, Graph Abstract Data Type.

Application of Graph Structures: Dijkstra's Algorithm, Topological Sorting,

Minimum Spanning Tree: Kruskal's, Prim's Algorithm, Euler's and Hamiltonian Circuits.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Richard F.Gilberg and Behrouz A. Forouzan, "*Data Structure: A Pseudo code Approach with C,*" Thomson India Edition, 2nd Edition, 2007.
2. D Samanta, "*Classic Data Structures,*" PHI Publications, New Delhi, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Mark Allen Weiss, "*Data Structures and Algorithm Analysis in C,*" Pearson Education, 2nd Edition, 2002.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran "*Fundamentals of Computer Algorithms,*" Galgotia publications Pvt. ltd., New Delhi, 2010.
3. Jean-Paul Tremblay and Paul G. Sorenson, "*An Introduction to Data Structures with Applications,*" McGraw-Hill education, 2nd Edition, 2017.

ADDITIONAL LEARNING RESOURCES:

1. https://www.coursera.org › Browse › Computer Science › Algorithms
2. https://nptel.ac.in/courses/106102064
3. https://nptel.ac.in/courses/106103069
4. https://nptel.ac.in/courses/106102064/24
5. https://swayam.gov.in/course/235-data-structure

MCA II-SEMESTER

(19MC20103) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PREREQUISITES:

A course on Programming in C.

COURSE DESCRIPTION:

Principles of Object Oriented Programming; Representation of Java Classes and methods; Inheritance and Polymorphism using Java, Creation of Packages and Interfaces; Implementation of Utility Classes and Input/output; Exception handling mechanism and multithreading; Event handling techniques; GUI applications by using AWT and Swings.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Analyze Object Oriented Programming Principles and apply Exception Handling mechanisms and Multithreading for application development.

CO2: Design and develop complex user interface applications using AWT, Applets, Swings, Java Collection API and Java standard class libraries to solve complex problems.

DETAILED SYLLABUS:

UNIT I - JAVA PROGRAMMING **(9 Periods)**

Java Programming: Java Buzzwords, Object-Oriented Programming, Beginner Program, Data Type, Variables, Operators, Control Statements, Arrays; Classes: Class and Objects, Methods, Constructors, this Keyword, Garbage Collection, finalize Method; Overloading Methods, Access Control, static Keyword, final Keyword, Nested and Inner Classes, String Class.

UNIT II - INHERITANCE AND POLYMORPHISM **(9 Periods)**

Inheritance and Polymorphism: Inheritance, super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Final with Inheritance, Object Class.

Packages and Interfaces: Packages, Access Protection, Importing Packages; Interfaces: Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

UNIT III - UTILITY CLASSES AND INPUT/OUTPUT (9 Periods)

Utility Classes: Java Collections, Java Collection Frame Work, Collection Interfaces: Set, List, Queue, Map; Collection Classes: Hash Set, LinkedHashSet, SortedSet, Linked List, Stack, Array List, Vector, Hash table; Iteration over Collections: Iterator Interface, Comparator Interface, ListIterator Interface and Enumeration Interface; StringTokenizer, Date, Calendar.

Input/output: Stream Classes: Byte Streams, Character Streams, Console Class, Stream I/O, Serialization.

UNIT IV - EXCEPTION HANDLING AND MULTITHREADING (9 Periods)

Exception Handling: Exception Handling, Exception Types, Uncaught Exceptions, try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, User defined Exceptions, Exception Subclasses, Chained Exceptions.

Multithreading: Java Thread Model, Thread life Cycle, Main Thread, Threads, Multiple Threads, Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming and Stopping Threads.

UNIT V - EVENT HANDLING AND GUI PROGRAMMING WITH JAVA (9 Periods)

Event Handling: Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces.**GUI Programming with Java:** Abstract Window Toolkit (AWT): AWT Classes, Windows, Working with Frame Windows, Graphics and Color, AWT Controls: Labels, Buttons, Check Boxes, Lists, Scroll Bars, Text Field, Text Area, Layout Managers; Applets: Applet, Applet Architecture, Applet Skeleton, Applet Display Methods, Passing Parameters to Applets.

Swings: Swings, Hierarchy of Swing Components, JFrame, JWindow, JDialog, JPanel ; Swing Components: JLabel, JTextField, JButton, JToggleButton, Check Boxes, Radio Buttons, JTabbedPane, JScrollPane, JList, JComboBox, Trees, JTable.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. Herbert Schildt, "*The Complete Reference Java,*" Tata McGraw-Hill, 10th Edition, 2017.

REFERENCE BOOKS:

1. B. Eswar Reddy, T. V. Suresh Kumar and P. Ragavan, *"Object Oriented Programming with Java,"* Pearson Sanguine Publications, 2nd Edition, 2011.
2. H. M. Dietel and P. J. Dietel, *"Java How to Program,"* Pearson Education India, 10th Edition, 2016.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106105191
2. https://javabeginnerstutorial.com/core-java-tutorial
3. https://www.javatpoint.com/java-tutorial

MCA II- SEMESTER
(19MC20104) SOFTWARE ENGINEERING (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Nature of Software, Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice; Process Models, Agile Development, Understanding Requirements, Requirements Modeling; Design Concepts, Architectural And Component-Level Design; User Interface Design and Testing Strategies; Product Metrics, Risk Management And Quality Management.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Identify and analyze software requirements, cost estimations, risk and quality management using the principles of software engineering, process models, design models, testing strategies, risk and management strategies to develop an application software.

CO2: Design software applications by applying design principles, user interface design rules, architectural design process, component-level design, agile development and metrics to develop a quality software product.

DETAILED SYLLABUS:

UNIT I - SOFTWARE AND SOFTWARE ENGINEERING, PROCESS MODELS AND AGILE DEVELOPMENT (11 Periods)

Software and Software Engineering: Nature of Software, Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: Agility, Agility and Cost of Change, Agile Process, Extreme Programming, Other Agile Process Models.

UNIT II - UNDERSTANDING REQUIREMENTS AND REQUIREMENTS MODELING

(11 Periods)

Understanding Requirements: Requirements Engineering, Establishing the groundwork, Eliciting Requirements, Developing Use Cases, Building the requirements model, Negotiating Requirements, Validating Requirements.

Requirements Modeling (Scenarios, Information and Analysis Classes): Requirements Analysis, Scenario-Based Modeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.

Requirements Modeling (Flow, Behavior, Patterns and WEBAPPS): Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modeling, Requirements Modeling for WebApps.

UNIT III- DESIGN CONCEPTS, ARCHITECTURAL AND COMPONENT-LEVEL DESIGN

(11 Periods)

Design Concepts: Design with Context of Software Engineering, Design Process, Design Concepts, Design Model.

Architectural Design: Software Architecture, Architecture Genres, Architecture Styles, Architectural Design, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow.

Component-Level Design: Component, Designing Class-Based Components, Conducting Component-level Design, Component Level Design for WebApps, Designing Traditional Components, Component-Based Development.

UNIT IV- USER INTERFACE DESIGN AND TESTING STRATEGIES (11 Periods)

User Interface Design: Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

Testing Strategies: Strategic approach to software testing, test strategies for conventional software, Black-box and White-box testing, Validation testing, System testing, the art of debugging.

UNIT V - PRODUCT METRICS, RISK MANAGEMENT AND QUALITY MANAGEMENT

(11 Periods)

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

Metrics for Process and Products: Software measurement, metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Roger S. Pressman, "*Software engineering A practitioner's Approach,*" Tata Mc-Graw Hill International Education, 7th Edition, 2016.
2. Ian Sommerville, "*Software Engineering,*" Pearson, 9th Edition, 2011.

REFERENCE BOOKS:

1. Rajib Mall, "*Fundamentals of Software Engineering,*" PHI, 5th Edition, 2018.
2. Hans Van Vliet, "*Software Engineering: Principles and Practices,"* Willey Publications, 3rd Edition, 2010.

ADDITIONAL LEARNING RESOURCES:

https://nptel.ac.in/courses/106101061

MCA II-SEMESTER

(19MC20131) DATABASE MANAGEMENT SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:

A course on Database Management Systems

COURSE DESCRIPTION:

Creation of Data Definition commands; Implementation of Data Manipulation Commands; Table level and Column level Constraints; Construction of ER diagrams; Implementation of GROUP BY, HAVING, ORDER By clause; Creation and dropping of Views; Implementation of Nested Queries, Joins, Cursors, Functions, Procedures and Triggers.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Design and implement ER-diagrams, Relational schemas, table and column level constraints, Cursors, Triggers, Functions and procedures to develop Relational Database applications.

CO2: Select and apply Nested Queries, Joins, Views, Group functions in updating and managing the databases to solve relational database problems using SQL and PL/SQL languages.

CO3: Work independently and in team to solve problems with effective Communication.

LIST OF EXERCISES:

1. Creation of DDL Commands

Consider the following relation schemas:

Client_master(Client_no, Name, Address1, Address2, City, State, Pincode, Bal_due)

Product_master(Product_no, Description, Unit_measure, Qty_on_hand, Record_lvl, Sell_price, Cost_price)

Salesman_master(Salesman_id, Name, Address1, Address2, City, State, Pincode, Sal_amt, Target_amt, Remarks)

Create the above tables, insert suitable tuples and perform the following DDL operations (CREATE, ALTER, DROP, RENAME, TRUNCATE) in Oracle SQL.

2. Creation of DML Commands

Using the table client master and product master answer the following Questionnaires.

i. Change the selling price of '1.44 floppy drive to Rs.1150.00

ii. Delete the record with client 0001 from the client master table.

iii. Change the city of client_no'0005' to Bombay.

iv. Change the bal_due of client_no '0001, to 1000.

v. Find the products whose selling price is more than 1500 and also find the new selling price as original selling price *15.

vi. Find out the clients who stay in a city whose second letter is a.

vii. Find out the name of all clients having 'a' as the second letter in their names.

viii. List the products in sorted order of their description.

ix. Count the total number of orders

x. Calculate the average price of all the products.

xi. Calculate the minimum price of products.

xii. Determine the maximum and minimum prices . Rename the tittle as 'max_price' and min_price respectively.

xiii. Count the number of products having price greater than or equal to 1500.

3. Creation of Table level and Column level Constraints

Implement table level and column level constraints like Domain Integrity constraints (NOT NULL, CHECK), Entity integrity constraints (UNIQUE, PRIMARRY KEY) and Referential integrity constraints (FOREIGN KEY) for the below tables.

Create table Salesman_master with the following columns and constraints-

Column name	Data type	Size	Attributes
Salesman_no	Varchar2	6	Primary key/first letter must start with 's'
Sal_name	Varchar2	20	Not null
Address	Varchar2	20	Not null
City	Varchar2	20	
State	Varchar2	20	
Pincode	Number	6	
Sal_amt	Number	8,2	Not null, cannot be 0
Tgt_to_get	Number	6,2	Not null, cannot be 0
Ytd_sales	Number	6,2	Not null, cannot be 0
Remarks	Varchar2	30	

Create table sales_order with following columns and constraints

Column name	Data type	Size	Attributes
S_order_no	Varchar2	6	Primary/first letter must be 0

S_order_date	Date	6	Primary key reference client_no of client_master table
Client_no	Varchar2	25	
Dely_add	Varchar2	6	
Salesman_no	Varchar2	6	Foreign key references salesman_no of salesman_master table
Dely_type	Char	1	Delivery part(P)/full(F), default F
Billed_yn	Char	1	
Dely_date	Date		Can not be lessthan s_order_date
Order_status	Varchar2	10	Values ('In Process'; 'Fulfilled'; Back Order'; Canceled

Create table sales_order_details with following columns and constraints

Column name	Data type	Size	Attributes
S_order_no	Varchar2	6	Primary key/foreign key references s_order_no of sales_order
Product_no	Varchar2	6	Primary key/foreign key references product_no of product_master
Qty_order	Number	8	
Qty_disp	Number	8	
Product_rate	Number	10,2	

4. Construction of ER diagram

a) Construct an ER diagram for a **University** database application. Identify the Relations and include necessary integrity constraints.

An University has many departments, where each department has multiple Instructors. An Instructor belongs to only one department. Each department offers multiple Courses, each of which is taught by a single Instructor. A student may enroll for many courses offered by the department.

For the above problem create the following:

i. Analyze the date required

ii. Normalize the attributes

iii. Create the logical data model (ER diagram)

b) Construct an ER diagram for a **Bank Database** by considering the following set of requirements that is used to keep track of Customer.

i. Each bank has a unique name.

ii. Each branch has a number, name, address (number, street, city), and set of phones.

iii. Customer includes their name, set of address (P.O. Box, city, zip code, country), set of phones, and social security number.
iv. Accounts have numbers, types (e.g. saving, checking) and balance. Other branches might use the same designation for accounts. So to name an account uniquely, we need to give both the branch number to which this account belongs to and the account number.
v. Not all bank customers must own accounts and a customer may have at most 5 accounts in the bank.
vi. An account must have only one customer.
vii. A customer may have many accounts in different branches.

5. Group functions: Implement queries using Aggregate functions, GROUP BY, HAVING, ORDER By clause and Creation, dropping of Views for the above tables using SQL.

6. Subqueries: Implement queries using SUBQUERIES for the above tables using SQL.

7. Joins: Implement queries using JOINS and OUTER JOINS for the above tables using SQL.

PL/SQL PROGRAMS:

8. PL/SQL **CURSOR** program

Write a PL/SQL program for generation of Electricity Bill using CURSORS.

Note: Create a table for Electricity bill consists of Customer_no, Customer_name, Customer_type, Prev_met_read, Curr_met_read, Month_name. Assume there are three Customer types namely Industrial, Agriculture and Domestic. Calculate the total charges based on the type of customer.

9. Triggers

Generate a database trigger to update the salary of an employee before/after performing any DML operations.

10. Procedures and Functions

a) Write a procedure which takes the department_id as an input parameter and lists the names of all employees belonging to that department.

b) Write a PL/SQL block of code that lists the highest salary drawn by an employee in each of the departments. It should make use of a function dept_highest which return the highest salary drawn by an employee for the given department.

Mini Project 1: Consider the following schema for a **Library Database:**

BOOK(Book_id, Title, Publisher_Name, Pub_Year)

BOOK_AUTHORS(Book_id, Author_Name)

PUBLISHER(Name, Address, Phone)

BOOK_COPIES(Book_id, Branch_id, No-of_Copies)

BOOK_LENDING(Book_id, Branch_id, Card_No, Date_Out, Due_Date)

LIBRARY_BRANCH(Branch_id, Branch_Name, Address)

Implement the following SQL queries to:

a) Retrieve details of all books in the library–id, title, name of publisher, authors, number of copies in each branch, etc.
b) Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
c) Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
d) Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
e) Create a view of all books and its number of copies that are currently available in the Library.

Mini Project 2: Consider the schema for **College Database**:

STUDENT(USN, SName, Address, Phone, Gender)

SEMSEC(SSID, Sem, Sec)

CLASS(USN, SSID)

SUBJECT(Subcode, Title, Sem, Credits)

IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)]

Implement the following SQL queries to:

a) List all the student details studying in fourth semester 'C' section.
b) Compute the total number of male and female students in each semester and in each section.
c) Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.
d) Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
e) Categorize students based on the following criterion: If FinalIA = 17 to 20 then CAT = 'Outstanding' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA< 12 then CAT = 'Weak' Give these details only for 8th semester A, B, and C section students.

REFERENCE BOOKS:

1. Ivan Bayross, *"SQL, PL/SQL The Programming Language of ORACLE,"* BPB Publications, 2010.
2. Dr. P. S. Deshpande, *"SQL & PL/SQL for Oracle 10g Black Book,"* Dreamtech Press, 2011.
3. J. J. Patrick, "*SQL Fundamentals,"* Pearson Education, 3rd Edition, 2008.
4. Rick F. Vander Lans*, "Introduction to SQL,"* Addison-Wesley Professional, 4th Edition, 2006.

MCA II-SEMESTER
(19MC20132) DATA STRUCTURES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITE:

Courses on Programming in C Lab and Data Structures.

COURSE DESCRIPTION:

Logical and physical representation of data, Abstract data types of Linear and Non-linear Data structures; Singly and Doubly Linked lists; Queues, Stacks and their applications; Binary tree, Binary Search Tree and AVL trees; Usage of graphs, Sorting and Searching techniques.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Analyze and implement algorithms to perform the operations of stacks, queues, linked lists, trees and graphs using problem solving approaches to solve computational problems.

CO2: Develop programs using sorting and searching techniques, trees and graph traversal techniques to solve memory utilization problems.

CO3: Work independently and in a team to solve problems with effective Communication.

LIST OF EXERCISES:

1. Write a C program to implement Stack and Queues using pointers.

2. Write a C program to perform the following expression using Stack operations

a) Convert infix expression into postfix expression

b) Evaluate postfix expression

3. Write a C program to implement the following:

a) Singly linked list

b) Doubly Linked List

4. Write a C program to implement Towers of Hanoi using Stack.

5. Write a C program to implement the following sorting algorithms:

i) Bubble sort ii) Selection sort iii) Quick sort iv) Merge sort

6. Write a C program that use both Recursive and non-recursive functions to perform the following searching operations:

i) Linear search ii) Binary search

7. Write a C program to create Binary Search Tree and perform operations on it.

8. a) Write a C program to implement Recursive Tree traversal techniques.

b) Write a C program to implement non-recursive Tree traversal techniques.

9. Write a C program to create AVL-tree and perform operations on it.

10. Write a C Program to implement Prim's Algorithm.

Mini Project-1:

Design, Develop and Implement a Program in C for the following operations on Graph of Cities

a. Create a Graph of N cities using Adjacency Matrix.

b. Print all the nodes reachable from a given starting node in a digraph using DFS/BFS method.

Mini Project-2:

Design, Develop and Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept, Designation, Sal, PhNo.

Perform the following operations on Employee data:

a. Create a DLL of N Employees Data by using end insertion.
b. Display the status of DLL and count the number of nodes in it
c. Perform Insertion and Deletion at End of DLL
d. Perform Insertion and Deletion at Front of DLL
e. Demonstrate how this DLL can be used as Double Ended Queue
f. Exit

REFERENCE BOOKS:

1. P. Padmanabham, "*C programming and Data Structures,"* B.S. Publications, 3rd Edition, 2008.
2. M.T. Somashekara, D. S. Guru, K. S. Manjunatha, "*Problem Solving with C,*" PHI Learning, 2nd Edition, 2018.
3. E. Karthikeyan, *"A Textbook on C: Fundamentals, Data Structures and Problem Solving,"* Prentice Hall of India Private Limited, 2008.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106102064
2. https://nptel.ac.in/courses/106103069
3. https://nptel.ac.in/courses/106102064/24
4. https://swayam.gov.in/course/235-data-structure

MCA II-SEMESTER

(19MC20133) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:

Courses on Programming in C and Object-Oriented Programming through JAVA.

COURSE DESCRIPTION:

Object oriented concepts, recursive and non recursive function; String Tokenizer class; Method Overloading; String Operations; Creation of package and Interfaces; Handling predefined and User Defined Exceptions; Creation of Files and its Operations; Implementation of Multithreading; Creating and testing Applets; Event handling techniques**,** GUI applications using AWT and Swings.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Apply object-oriented Programming Principles to solve problems using control Structures, strings, functions, packages, interfaces, types of file streams and I/O operations on files.

CO2: Design and develop applications and graphical user interface components using Applet, AWT, Swings components, multithreading techniques, Inter threaded communication and Process synchronization to solve problems.

CO3: Work independently and in team to solve problems with effective communication.

LIST OF EXERCISES:

1. a)Write a Java program that prints all real solutions to the quadratic equation

$ax^2 + bx + c = 0$.

b) Write a Java program to implement nth value of Fibonacci sequence using recursive and non recursive functions.

2. a) Write a Java program that prompts the user for an integer and print out all prime numbers up to the given integer.

b) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use StringTokenizer class of java.util)

3. Write a Java program to illustrate method overloading.

4. Write a Java program to implement the matrix ADT using a class:

a) Addition and Subtraction of matrices. b) Multiplication of matrices.

5. Write a Java program to implement the following:

a) Create and Access a package b) Interfaces.

6. Write a Java program to implement the following:

a) Predefined exceptions b) User defined exceptions

7. a) Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) Write a Java program to display the number of characters, lines and words in a text file.

8. a) Write a Java program to implement multithreading techniques.

b) Write a Java program to implement producer consumer problem using the concept of inter thread communication.

9. a)Write a java program to develop GUI components in java (AWT) with appropriate Event Handling techniques .

b)Write a Java program to create user interface to perform integer divisions using Swings.

10. a) Develop an applet in Java to display a message.

b) Develop an applet to perform factorial of a given value.

Mini Project

1. Use Eclipse IDE to implement calculator using AWT and SWINGS.

2. Application for Temperature Conversion

a).Write a temperature conversion applet that converts from Fahrenheit to Celsius.

Use the following formula for the conversion:

Celsius = ((5/9)*(Ferenheit-32)).

b).Enhance the temperature conversion applet by adding the Kelvin temperature scale.

Use the following formula for the conversion between Kelvin and Celsius

Kelvin = Celsius + 273.15

REFERENCE BOOKS:

1. B. Eswar Reddy, T. V. Suresh Kumar and P. Ragavan, *"Object Oriented Programming with Java,"* Pearson Sanguine Publications, 2nd Edition, 2011.
2. Harvey Dietel and Paul Dietel, *"Java How to Program,"* Pearson Education, 11th Edition, 2018.

ADDITIONAL LEARNING RESOURCES:

1. https://javabeginnerstutorial.com/core-java-tutorial/
2. https://www.javatpoint.com/java-tutorial
3. URL: http://docs.oracle.com/javase/
4. URL: http://www.ibm.com/developerworks/java/