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Vinjanampadu, Vatticherukuru Mandal, Guntur, Andhra Pradesh522017

Department of Computer Science and Engineering

Course Structure – R20

(With effect from 2020-2021)

I Year - I Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	Basic Science Course	20SH1T06	Differential Equations	3	0	0	3
2	Basic Science Course	20SH1T04	Applied Chemistry	3	0	0	3
3	Engineering Science Course	20CS1T01	Problem Solving and Programming Using C	3	0	0	3
4	Engineering Science Course	20ME1T01	Engineering Graphics	1	0	4	3
5	Engineering Science Course	20EE1T02	Basics of Electrical and Electronics Engineering	3	0	0	3
6	Basic Science Course (Lab)	20SH1L04	Applied Chemistry Lab	0	0	3	1.5
7	Engineering Science Course (Lab)	20CS1L01	Problem Solving and Programming Using C Lab	0	0	3	1.5
8	Engineering Science Course (Lab)	20CS1L02	IT Workshop	0	0	3	1.5
			Total	**13**	**0**	**13**	**19.5**

Theory: BSC-2, ESC-3 Practical: BSC-1, ESC-2

Category	Credits
Basic Science Course	**7.5**
Engineering Science Course	**12**
Total	**19.5**

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I Year - II Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	Basic Science Course	20SH2T07	Linear Algebra and Vector Calculus	3	0	0	3
2	Basic Science Course	20SH2T02	Applied Physics	3	0	0	3
3	Humanities and Social Science Course	20SH2T01	Communicative English	3	0	0	3
4	Engineering Science Course	20EC2T01	Digital Logic Design	3	0	0	3
5	Engineering Science Course	20CS2T01	Python Programming	3	0	0	3
6	Humanities and Social Science Course (LAB)	20SH2L01	Communicative English Skills Lab	0	0	3	1.5
7	Basic Science Course (LAB)	20SH2L02	Applied Physics Lab	0	0	3	1.5
8	Engineering Science Course (LAB)	20CS2L01	Python Programming Lab	0	0	3	1.5
9	Mandatory Course (AICTE suggested)	20GE2M01	Environmental Sciences	2	0	0	0
			Total	**17**	**0**	**9**	**19.5**

Theory: BSC-2, HSMC-1, ESC-2 Practical, MC-1: BSC-1, HSMC-1, ESC-1

Category	Credits
Basic Science Course	**7.5**
Engineering Science Course	**7.5**
Humanities and Social Science	**4.5**
Mandatory Course (AICTE suggested)	**0**
Total	**19.5**

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I I Year - I Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	Professional Core Course	xx	Software Engineering	3	0	0	3
2	Professional Core Course	xx	Computer Organization and Architecture	3	0	0	3
3	Professional Core Course	xx	Data Structures & Algorithms	3	0	0	3
4	Professional Core Course	xx	Discrete Mathematics	3	0	0	3
5	Professional Core Course	xx	Object Oriented Programming through Java	3	0	0	3
6	Professional Core Course (LAB)	xx	Object Oriented Analysis and Design Lab	0	0	3	1.5
7	Professional Core Course (LAB)	xx	Data Structures Lab	0	0	3	1.5
8	Professional Core Course (LAB)	xx	OOPS through Java lab	0	0	3	1.5
9	Skill Oriented Course	xx	Skill Oriented Course-Arts	1	0	2	2
10	Mandatory Course (AICTE suggested)	xx	Indian Constitution	2	0	0	0
			Total	**18**	**0**	**11**	**21.5**

Theory: PCC-5, SC-1,MC-1 Practical: PCC-3

Category	Credits
Basic Science Course	**0**
Professional Core Course	**19.5**
Skill oriented Course	**2**
Mandatory Course (AICTE suggested)	**0**
Total	**21.5**

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Department of Computer Science and Engineering

II Year - II Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	Engineering Science Course	xx	Database Management Systems	3	0	0	3
2	Basic Science Course/Prof Core Course	xx	Formal Languages & Automata Theory	3	0	0	3
3	Basic Science Course	xx	Probability & Statistics	3	0	0	3
4	Professional Core Course	xx	Web Technologies	3	0	0	3
5	Humanities and Social Sciences	xx	Managerial Economics and Financial Analysis	3	0	0	3
6	Engineering Science Courses/Prof Core Course (LAB)	xx	Database Management Systems Lab	0	0	3	1.5
7	Professional Core Course (LAB)	xx	Data Visualization Lab	0	0	3	1.5
8	Professional Core Course (LAB)	xx	Web Technologies Lab	0	0	3	1.5
9	Skill oriented Course	xx	Design Thinking and Innovation	1	0	2	2
			Total	**16**	**0**	**11**	**21.5**

Theory: BSC-1, ESC-1, PCC-2, HSMC-1 SC-1, Practical : PCC-2, ESC-1

Category	Credits
Basic Science Course	**3**
Engineering Science Course	**4.5**
Professional Core Course	**9**
Humanities and Social Sciences	**3**
Skill oriented Course	**2**
Mandatory Course (AICTE suggested)	**0**
Total	**21.5**

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III Year - I Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	Professional Core Course	xx	Design and Analysis of Algorithms	3	0	0	3
2	Professional Core Course	xx	Compiler Design	3	0	0	3
3	Professional Core Course	xx	Operating Systems	3	0	0	3
4	Open Elective Course/Job oriented Elective	xx	Job Oriented Open Elective	2	0	2	3
5	Professional Elective Courses	xx	Professional Elective-I	3	0	0	3
6	Professional Core Course (LAB)	xx	Internet of Things Lab	0	0	3	1.5
7	Professional Core Course (LAB)	xx	Linux Programming Lab	0	0	3	1.5
8	Skill advanced Course/ soft skill Course	xx	Drone Technology/Game Development	1	0	2	2
9	Mandatory Course (AICTE suggested)	xx	IPR & Patents	2	0	0	0
10	Internship	xx	Summer Internship(after second year)	0	0	0	1.5
			Total	**17**	**0**	**10**	**21.5**

Theory: PCC-3, PEC-1,OEC-1 SC-1,MC-1, Practical: PCC-2,SAC-1

Category	Credits
Open Elective Course/Job oriented Elective	**3**
Professional Elective Courses	**3**
Professional Core Course	**12**
Skill oriented Course	**2**
Internship	**1.5**
Mandatory Course (AICTE suggested)	**0**
Total	**21.5**

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III Year - II Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	Professional Core Course	xx	Artificial Intelligence & Machine Learning	3	0	0	3
2	Professional Core Course	xx	Data Science with R	3	0	0	3
3	Professional Core Course	xx	Computer Networks	3	0	0	3
4	Professional Elective Courses	xx	Professional Elective-II	3	0	0	3
5	Open Elective Course/Job oriented Elective	xx	Full Stack Development	2	0	2	3
6	Professional Core Course (LAB)	xx	AI & ML Lab	0	0	3	1.5
7	Professional Core Course (LAB)	xx	Full Stack Development Lab	0	0	3	1.5
8	Professional Core Course (LAB)	xx	Data Science with R Lab	0	0	3	1.5
9	Skill Advanced Course/ Soft Skill Course	xx	Soft Skills	1	0	2	2
10	Mandatory Course (AICTE suggested)	xx	Professional Ethics	2	0	0	0
11	Industrial/Research Internship(Mandatory -2 months during Summer vacation)			-	-	-	-
			Total	**17**	**0**	**13**	**21.5**

Theory: PCC-3,PEC-1,OEC-1 SC-1,MC-1, Practical: PCC-3

Category	Credits
Open Elective Course/Job oriented Elective	**3**
Professional Elective Courses	**3**
Professional Core Course	**13.5**
Skill oriented Course	**2**
Research/ Industrial Internship	**0**
Mandatory Course (AICTE suggested)	**0**
Total	**21.5**

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IV Year - I Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	Professional Elective Courses	xx	Professional Elective-III	3	0	0	3
2	Professional Elective Courses	xx	Professional Elective-IV	3	0	0	3
3	Professional Elective Courses	xx	Professional Elective-V	3	0	0	3
4	Open Elective Course/Job oriented Elective	xx	Job Oriented Elective-I	2	0	2	3
5	Open Elective Course/Job oriented Elective	xx	Job Oriented Elective-II	2	0	2	3
6	Humanities and Social Science Elective	xx	Management Science	3	0	0	3
7	Skill advanced Course/ soft skill Course	xx	Amazon Web Services/DevNet	1	0	2	2
8	Mandatory Course	xx	Industrial/Research Internship(after third year)	0	0	0	3
			Total	**17**	**0**	**6**	**23**

Theory: PEC-3, OEC-2 SC-1, MC-1, HSMC-1, Practical: OEC-2

Category	Credits
Open Elective Course/Job Oriented Elective	**6**
Professional Elective Courses	**9**
Humanities and Social Science Elective	**3**
Skill oriented Course	**2**
Mandatory Course (AICTE suggested)	**3**
Total	**23**

IV Year - II Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	Major Project	xx	Major Project & Internship (6 Months)	0	0	0	12
			Total	**0**	**0**	**10**	**12**

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L – Lectures, T – Tutorials, P – Practical, C – Credits, IM – Internal Marks, EM – External Marks, TM – Total Marks

Category	Credits
Major Project	**12**
Total	**12**

S.N0	Category	Code	Suggested Breakup of Credits(APSCHE)
1	Humanities and social science including management courses	HSMC	**10.5**
2	Basic science courses	BSC	**21**
3	Engineering science courses	ESC	**24**
4	Professional core courses	PCC	**51**
5	Open elective courses	OEC	**12**
6	Professional elective courses	PEC	**15**
7	Internship, seminal, project work	PROJ	**16.5**
8	Mandatory courses	MC	**Non-credit**
9	Skill oriented courses	SC	**10**
	Total credits		**160**

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Department of Computer Science and Engineering

Programme: Common to CSE,CAI,CSD,IT,ECE,EEE,ME, & CE					Semester: I
Course Code	Course Name	L	T	P	C
20CS1T01	Problem Solving and Programming Using C Lab	3	0	0	3
Subject Category : ESC					

Course Objectives:

The objectives of Programming for Problem Solving Using C are

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C
- To learn about the design concepts of arrays, strings, enumerated structure and union types. To learn about their usage.
- To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor.
- To assimilate about File I/O and significance of functions

Course Outcomes:

At the end of the Course, the student will be able to

CO 1: Build algorithms and to draw flowcharts for solving problems

CO 2: Convert flowcharts/algorithms to C Programs, compile and debug programs

CO 3: Use different operators, data types and write programs that use two-way/ multi-way selection

CO 4: Select the best loop construct for a given problem

CO 5: Design and implement programs to analyze the different pointer applications

CO 6: Decompose a problem into functions and to develop modular reusable code

UNIT I

Introduction to Computers: Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Type Qualifiers. Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs.

UNIT II

Bitwise Operators: Exact Size Integer Types, Logical, Bitwise Operators, Shift Operators.
Selection & Making Decisions: Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions. Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples.

UNIT III

Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application.

UNIT IV

Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application. Processor Commands: Processor Commands.

UNIT V

Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter-Function Communication, Standard Functions, Storage Classes, Scope, life time, Passing Array to Functions, Passing Pointers to Functions, Command Line Arguments, Recursion Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.

Text Books:

1) Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, CENGAGE.
2) The C Programming Language, Brian W.Kernighan, Dennis M. Ritchie, 2e, Pearson.

Reference Books:

1) Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill.
2) Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson.
3) Computer Fundamentals and Programming in C, PradipDey, Manas Ghosh, OXFORD.

E-Resources:

1. https://www.tutorialspoint.com/cprogramming/index.htm
2. https://www.programiz.com/c-programming
3. https://www.javatpoint.com/c-programming-language-tutorial

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Department of Computer Science and Engineering

Programme: Common to CSE,CAI,CSD,IT,ECE,EEE,ME, & CE					Semester: I
Course Code	Course Name	L	T	P	C
20CS1L01	Problem Solving and Programming Using C Lab	0	0	3	1.5
Subject Category : ESC					

Course Objectives:

- Apply the principles of C language in problem solving.
- To design flowcharts, algorithms and knowing how to debug programs.
- To design & develop of C programs using arrays, strings pointers & functions.
- To review the file operations, preprocessor commands.

Course Outcomes:

At the end of the Course, the student will be able to

CO 1:Gains Knowledge on various concepts of a C language.

CO 2: Draw flowcharts and write algorithms.

CO 3:Design and development of C problem solving skills.

CO 4:Design and develop modular programming skills.

CO 5:Trace and debug a program

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r and s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1. Write a program in C to print all unique elements in an array.

2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( ) function.

Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16: 1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.

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Department of Computer Science and Engineering

Programme: Semester I: Common to CSE, CSD,CSI,ME & CE Semester: II: Common to ECE, EEE & IT					
Course Code	Course Name	L	T	P	C
20CS1L02	**IT Workshop**	0	0	3	1.5
Subject Category : ESC					

Course Objectives:

The objective of IT Workshop is to

- Explain the internal parts of a computer, peripherals, I/O ports, connecting cables
- Demonstrate basic command line interface commands on Linux
- Teach the usage of Internet for productivity and self paced lifelong learning
- Demonstrate Office Tools such as Word processors, Spreadsheets and Presentation tools

Course Outcomes:

At the end of the Course, the student will be able to

CO1: Describe evolution of computers, storage devices, networking devices, transmission media and peripherals of a computer .

CO2: Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems

CO3: Construct a fully functional virtual machine, Summarize various Linux operating system commands.

CO4: Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex .

Computer Hardware:

Experiment 1:

Identification of peripherals of a PC, Laptop, Server and Smart Phones: Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Operating Systems:

Experiment 2:Virtual Machine setup:

- Setting up and configuring a new Virtual Machine
- Setting up and configuring an existing Virtual Machine
- Exporting and packaging an existing Virtual Machine into a portable format

Experiment 3: Operating System installation:

- Installing an Operating System such as Linux on Computer hardware.

Experiment 4:Linux Operating System Commands

- General command syntax ,Basic help commands,Basic File system commands,Date and Time
- Basic Filters and Text processing, Basic File compression commands
- Miscellaneous: apt-get, vi editor

Networking and Internet

Experiment 5: Networking Commands

ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp.

Internet Services:

Experiment 6:

- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/ plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Email creation and usage, Creating a Digital Profile on LinkedIn

Productivity Tools:

Office Tools

Experiment 7:

Demonstration and Practice on Text Editors like Notepad++, Sublime Text, Atom, Brackets,Visual code, etc

Experiment 8:

Demonstration and practice on Microsoft Word, Power Point

Experiment 9:

Demonstration and practice on Microsoft Excel.

Experiment 10:

Demonstration and practice on LaTeX and produce professional PDF documents.

Experiment 11:

Internet of Things (IoT): IoT fundamentals, applications, protocols, Architecture, IoT Devices communication models.

Introduction to HTML:

Experiment 12:

Understanding HTML tags and creation of simple web pages.

Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Text Books:

1. Computer Fundamentals, Anita Goel, Pearson Education, 2017

2. PC Hardware Trouble Shooting Made Easy, TMH

3. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Vekateswarlu, S.Chand.

4. HTML & CSS ,The Completee Reference , Fifth Edition , Thomas A. powell

5. LaTeX Companion – Leslie Lamport, PHI/Pearson.

Reference Text Books:

1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", 2nd edition, Tata McGraw-Hill, 2002

2. "MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.

3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.

4. Bigelows, "Trouble shooting, Maintaining& Repairing PCs", TMH.

5. Excel Functions and Formulas, Bernd held, Theodor Richardson, Third Edition

E-Resources:

1. https://explorersposts.grc.nasa.gov/post631/20062007/computer_basics/ComputerPorts.doc
2. https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc
3. https://www.thegeekstuff.com/2009/07/linux-ls-command-examples
4. https://www.pcsuggest.com/basic-linux-commands/
5. https://www.vmware.com/pdf/VMwarePlayerManual10.pdf
6. https://gsuite.google.com/learning-center/products/#!/
7. *https://www.raspberrypi.org*

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Department of Computer Science and Engineering

Programme: Common to CSE,CAI,CSD,IT, &ECE					Semester: II
Course Code	Course Name	L	T	P	C
20CS2T01	PYTHON PROGRAMMING	3	0	0	3
Subject Category : ESC					

Course Objectives:

The Objectives of Python Programming are

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops &functions
- To be familiarized with general coding techniques and object-oriented programming

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

CO1:Develop essential programming skills in computer programming concepts like data types, containers

CO2:Apply the basics of programming in the Python language

CO3: Solve coding tasks related conditional execution, loops

CO4:Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming

UNIT I

Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output.

Data Types, and Expression: Strings Assignment, and Comment, Numeric Data Types and Character Sets.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables.

Programming**:** Introduction to Programming Concepts with Scratch.

UNIT II

Repetition Structures: Introduction, while loop, for loop, Nested Loops.

Control Statement: Definite iteration for Loop Formatting Text for output, Selection if and if else Statement Conditional Iteration The While Loop

Strings and Text Files: Accessing Character and Substring in Strings, Data Encryption, Strings and Number Systems, String Methods TextFiles, string pattern matching. Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

UNIT III

List and Dictionaries: Lists, tuple, Dictionaries and sets, frozen sets.

Design with Function: Defining Simple Functions, Functions as Abstraction Mechanisms, Problem Solving with Top Down Design, Design with Recursive Functions, Managing a Program's Namespace, Higher Order Function.

Modules: Modules, Standard Modules, Packages.

UNIT IV

Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support.

Design with Classes: Objects and Classes, Data modeling Examples, Case Study An ATM, Structuring Classes with Inheritance and Polymorphism.

UNIT V

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Redefined Clean-up Actions.

Graphical User Interfaces: The Behavior of Terminal Based Programs and GUI -Based, Programs, Coding Simple GUI-Based Programs, Other Useful GUIResources, Turtle Graphics

Testing: Basics of testing? unit testing in python, writing test cases, running tests.

Text Books

1) Fundamentals of Python First Programs, Kenneth. A. Lambert,Cengage.
2) Python Programming: A Modern Approach, VamsiKurama,Pearson.
3) ReemaThareja, Python Programming using problem solving Approach, Oxford University Press 2017
4) R. NageswaraRao core python Programming second Edition.

Reference Books:

1) Introduction to Python Programming, Gowrishankar.S, VeenaA, CRC Press.
2) Introduction to Programming Using Python, Y. Daniel Liang,Pearson.

E resources:

1) https://www.tutorialspoint.com/python3/python_tutorial.pdf
2) https://bugs.python.org/file47781/Tutorial_EDIT.pdf

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Vinjanampadu, Vatticherukuru Mandal, Guntur, Andhra Pradesh522017

Department of Computer Science and Engineering

Programme: Common to CSE,CAI,CSD,IT, & ECE					Semester: II
Course Code	Course Name	L	T	P	C
20CS2L01	PYTHON PROGRAMMING Lab	0	0	3	1.5
Subject Category : ESC					

Course Objectives:

The aim of Python Programming Lab is

- To acquire programming skills in core Python.
- To acquire Object Oriented Skills in Python
- To develop the skill of designing Graphical user Interfaces in Python
- To develop the ability to write database applications in Python

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

CO 1: Write, Test and Debug Python Programs
CO 2: Use Conditionals and Loops for Python Programs
CO 3: Use functions and represent Compound data using Lists, Tuples and Dictionaries
CO 4: Use various applications using python

1) Write a program that asks the user for a weight in kilograms and converts it to pounds. There are 2.2 pounds in a kilogram.
2) Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
3) Write a program that uses a *for* loop to print the numbers 8, 11, 14, 17, 20, . . . , 83, 86,89.
4) Write a program that asks the user for their name and how many times to print it. The program should print out the user's name the specified number of times.
5) Use a *for* loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.

```
*
**
***
****
```

6) Generate a random number between 1 and 10. Ask the user to guess the number and print a message based on whether they get it right or not.
7) Write a program that asks the user for two numbers and prints *Close* if the numbers are within .001 of each other and Not closeotherwise.
8) Write a program that asks the user to enter a word and prints out whether that word contains any vowels.

9) Write a program that asks the user to enter two strings of the same length. The program should then check to see if the strings are of the same length. If they are not, the program should print an appropriate message and exit. If they are of the same length, the program should alternate the characters of the two strings. For example, if the user enters *abcde* and *ABCDE* the program should print out *AaBbCcDdEe*

10) Write a program that asks the user for a large integer and inserts commas into it according to the standard American convention for commas in large numbers. For instance, if the user enters 1000000, the output should be1,000,000.

11) Write a program that generates a list of 20 random numbers between 1 and100.
   (a) Print the list.
   (b) Print the average of the elements in the list.
   (c) Print the largest and smallest values in the list.
   (d) Print the second largest and second smallest entries in the list
   (e) Print how many even numbers are in the list.

12) Write a program to use split and join methods in the given string and store them in a dictionary data structure.

13) Write a program that removes any repeated items from a list so that each item appears at most once. For instance, the list [1,1,2,3,4,3,0,0] would become [1,2,3,4,0].

14) Write a program that asks the user to enter a length in feet. The program should then give the user the option to convert from feet into inches, yards, miles, millimeters, centimeters, meters, or kilometers. Say if the user enters a 1, then the program converts to inches, if they enter a 2, then the program converts to yards, etc. While this can be done with if statements, it is much shorter with lists and it is also easier to add new conversions if you use lists.

15) Write a function called *sum_digits*that is given an integer num and returns the sum of the digits of num.

16) Write a function called *first_diff*that is given two strings and returns the first location in which the strings differ. If the strings are identical, it should return-1.

17) Write a function called *number_of_factors*that takes an integer and returns how many factors the number has.

18) Write a function called *is_sorted*that is given a list and returns True if the list is sorted and False otherwise.

19) Write a function called root that is given a number x and an integer n and returns x1/n. In the function definition, set the default value of n to 2.

20) Write a function called merge that takes two already sorted lists of possibly different lengths, and merges them into a single sortedlist.
(a)Do this using the sort method. (b) Do this without using the sort method

21) Write a program that asks the user for a word and finds all the smaller words that can be made from the letters of that word. The number of occurrences of a letter in a smaller word can't exceed the number of occurrences of the letter in the user's word.
22) Write a program that reads a file consisting of email addresses, each on its own line. Your program should print out a string consisting of those email addresses separated by semicolons.
23) Write a program that reads a list of temperatures from a file called *temps.txt*, converts those temperatures to Fahrenheit, and writes the results to a file calledftemps.txt.
24) Write a class called Product. The class should have fields called name, amount, and price, holding the product's name, the number of items of that product in stock, and the regular price of the product. There should be a method *get_price*that receives the number of items to be bought and returns a the cost of buying that many items, where the regular price is charged for orders of less than 10 items, a 10% discount is applied for orders of between 10 and 99 items, and a 20% discount is applied for orders of 100 or more items. There should also be a method called *make_purchase*that receives the number of items to be bought and decreases amount by thatmuch.
25) Write a class called Time whose only field is a time in seconds. It should have a method called *convert_to_minutes*that returns a string of minutes and seconds formatted as in the following example: if seconds is 230, the method should return '5:50'. It should also have a method called *convert_to_hours*that returns a string of hours, minutes, and seconds formatted analogously to the previous method.
26) Write a Python class to implement pow(x,n).
27) Write a Python class to reverse a string word byword.
28) Write a program to demonstrate Try/except/else.
29) Write a function nearly _equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
30) Write a python program to create wheel using turtle graphics.
31) Write a python program on GUI to create a Registration form.
32) Write a python program to check whether a string starts and ends with the same character or not (using Regular Expression re module).

Text Books

5) Fundamentals of Python First Programs, Kenneth. A. Lambert,Cengage.
6) Python Programming: A Modern Approach, VamsiKurama,Pearson.
7) ReemaThareja, Python Programming using problem solving Approach, Oxford University Press 2017
8) R. NageswaraRao core python Programming second Edition.

Reference Books:

3) Introduction to Python Programming, Gowrishankar.S, VeenaA, CRC Press.
4) Introduction to Programming Using Python, Y. Daniel Liang,Pearson.

Web resources:

3) https://www.tutorialspoint.com/python3/python_tutorial.pdf
https://bugs.python.org/file47781/Tutorial_EDIT.pdf

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Department of Computer Science and Engineering

Programme: CSE					Semester: III
Course Code	Course Name	L	T	P	C
	Software Engineering	3	0	0	3
Subject Category : PCC					

Course Outcomes:

At the end of the Course the Student will be able to:

CO1: Explain about appropriate software process models for software project/product.

CO2: Interpret the functional, non–functional requirements and requirement Engineering Process.

CO3: Choose the Architecture for a given software application.

CO4: Identify appropriate test strategies that can be applied to a given software application.

CO5: Analyze various Risk Management and Quality Management Techniques.

UNIT-I

INTRODUCTION TO SOFTWARE ENGINEERING: Software, The Nature of Software, The Software Process, A Generic Process Model, CMMI.

PROCESS MODELS: Prescriptive Process Models- The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models. Specialized Process Models. The Unified Process, Agile Development.

UNIT-II

SOFTWA REREQUIREMENTS: Functional and Nonfunctional Requirements, the software requirements document, Requirements Specification, The Requirements Engineering Process, Requirements Elicitation and Analysis, Requirements Validation, Requirements Management.

UNIT-III

DESIGN ENGINEERING: The Design Process, Design Concepts, the Design Model.

ARCHITECTURAL DESIGN: Software Architecture, Architectural Styles, Architectural Design, Architectural Mapping using Data Flow.

UNIT-IV

SOFTWARETESTINGSTRATEGIES:

A Strategic Approach to Software Testing, Test Strategies for Conventional Software and Object Oriented Software, Validation Testing, White- Box Testing, Basis Path Testing, Black-Box Testing, System Testing.

UNIT-V

RISK MANAGEMENT:

Reactive versus Proactive Risk Strategies, Risk Identification, Risk Projection, Risk Refinement, RMMM, RMMM Plan.

QUALITY MANAGEMENT:

Software Quality, Informal Reviews, Formal Technical Reviews, Statistical Software Quality Assurance, Software Reliability.

TEXTBOOKS:

1. RogerS.Pressman, *Software Engineering a Practitioner's Approach*, 7thEdition, TMH,2010.
2. Sommerville, *Software Engineering*, 9thEdition, Pearson Education, 2011.

REFERENCES**:**

1. K.K.Agarwal & Yogesh Singh, *Software Engineering*, 3rdEdition, New Age International Publishers, 2008.
2. PankajJalote, *An Integrated Approach to Software Engineering*, 3rdEdition, Narosa PublishingHouse,2011.

WEBREFERENCES:

1. https://nptel.ac.in/Courses/SoftwareEngineering
2. https://www.Coursera.org/Courses?query=software engineering
3. .https://www.udemy.com/Courses/development/software-engineering

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Department of Computer Science and Engineering

Programme: CSE					Semester: III
Course Code	Course Name	L	T	P	C
	Computer Organization and Architecture	3	0	0	3
Subject Category : PCC					

Course Outcomes:

At the end of the Course the Student will be able to:

CO1: Identify the basic structure, organization and design of a computer.

CO2: Outline the elements in the RTL and micro operations, CPU organization and micro-programmed controlled unit.

CO3: Apply numerous algorithms to perform computer arithmetic operations and propose suitable hardware for them.

CO4: Contrast about the different types of memory organizations and their cost-performance trade offs.

CO5: Determine and get familiarized with the design characteristics I-O Organization, multiprocessors and pipelining.

UNIT I: Basic Structure of Computers: Computer Types, functional unit, basic operational concepts, bus structures. Data Representation: fixed point representation, floating- point representation.

Register Transfer Language and Micro Operations: Register Transfer Language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logical micro operations, shift micro operations, Arithmetic logic shift unit.

UNIT II: Basic Computer Organization and Design: Instruction codes, Computer Register, Computer Instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions. Input-Output and Interrupt, Design of basic computer, Design of Accumulator Logic.

UNIT III: Central Processing Unit: General Register Organization, STACK Organization, Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction Set Computer.

Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

UNIT IV: Computer Arithmetic: Addition and subtraction, multiplication algorithms, division algorithms, floating- point arithmetic operations.

UNIT V: The Memory System: Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, modes of transfer, priority interrupts, direct memory access. Introduction to Multi Processors: Characteristics and Inter connection structures. Introduction to pipelining.

TEXT BOOKS:

1. M. Moris Mano, Computer System Architecture, 3rded, Pearson/PHI.
2. Carl Hamacher, ZvonksVranesic, SafeaZaky, Computer Organization, 5th ed, McGraw Hill.
3. William Stallings,Computer Organization and Architecture, 6th ed, Pearson/PHI.
4. B. Ram, Computer Fundamentals Architecture and Organization, 5th ed., New Age International Publications.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, Structured Computer Organization, 4th ed. PHI/ Pearson.
2. SivaraamaDandamudi, Fundamentals or Computer Organization and Design,Springer Int. Edition. John L.Hennessy and David A.Patterson, Computer Organization a quantitative approach, 4th ed, Elsevier.

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Department of Computer Science and Engineering

Programme: CSE					Semester: III
Course Code	Course Name	L	T	P	C
	Data Structures & Algorithms	3	0	0	3
Subject Category : PCC					

COURSEOUTCOMES:

At the end of the Course the student shall be able to

CO 1: Analyze algorithms and Describe searching, sorting and hashing techniques.

CO 2: Describe the concepts of stacks and queues.

CO 3: Apply the concepts of linked lists.

CO 4: Describe the concepts of trees.

CO 5: Explain the concepts of graphs.

UNIT-1 :Analysis of Algorithms: Efficiency of algorithms, Apriori Analysis, Asymptotic notations, TimecomplexityofalgorithmsusingOnotation,PolynomialVsExponentialalgorithms,Average,Best,Worstcasecomplexities,Analyzing recursive programs.

Searching: Introduction, Linear Search, Binary Search, Fibonacci Search.
Internal Sorting: Introduction, Bubble Sort, Insertion Sort, Selection Sort.
Hashing : Introduction, Hash Table Structure, Hash Functions.

UNIT-II : Stacks: Introduction, Stack operations, Applications.

Queues : Introduction, Operations on queues, circular queues, Priority queues, Applications.

UNIT-III

Linked Lists: Introduction, Singly linked lists, Circular linked lists, Doubly linked lists, Multiple linked lists, Applications.

Linked Stacks and Linked Queues: Introduction, Operations on linked stacks and linked queues, Dynamic memory management, Implementation of linked representations, Applications.

UNIT-IV: Trees and Binary Trees: Introduction, Trees: Definition and Basic Terminologies, Representation of trees. Binary trees: Basic terminologies and types, representation of binary trees, binary tree traversals, applications.

Binary Search Trees and AVL Trees : Introduction, Binary search trees: Definition and operations, AVL Trees: Definition and operations, Applications.

UNIT-V

Graphs: Introduction, Definitions and basic terminologies, Representations of graphs, Graph traversals and applications.

TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, *Fundamentals of Data structures in C++*,2nd Edition, University Press (India)Pvt.Ltd.,2008.

REFERENCES:

1. G.A.V. PAI, *Data Structures and Algorithms, Concepts, Techniques and Applications*,Volume1,1stEdition , TataMcGraw-Hill,2008.
2. Richard F. Gilberg & Behrouz A. Forouzan, *Data Structures, Pseudo code Approach withC*,2ndEdition, CengageLearningIndiaEdition,2007.
3. angsam,M.J.Augenstein,A.M.Tanenbaum,*Data structure susing C and C++*, 2ndEdition, PHIE ducation, 2008.
4. Sartaj Sahni, Ellis Horowitz, *Fundamentals of Data Structures in C*, 2nd Edition, Orient blacks wan, 2010.

WEB REFERENCES:

1. https://www.cs.usfca.edu/~galles/visualization/Algorithms.html

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Department of Computer Science and Engineering

Programme: CSE					Semester: III
Course Code	Course Name	L	T	P	C
	Discrete Mathematics	3	0	0	3
Subject Category : PCC					

Course Outcomes:

At the end of the Course, the student will be able to

CO1:Verify the validity of a logical flow of arguments.

CO2: Identify various types of relations and their properties.

CO3: Solve recurrence relations of various types.

CO4: Identify algebraic structures and learn modular arithmetic.

CO5: Understand various concepts of graphs and spanning trees.

Unit I: Mathematical logic

Statements and notations, connectives, well formed formulas, tautologies, equivalence of formulas, duality law, tautological implications, other connectives, normal forms, rules of inference, consistency of premises and indirect method of proof, automatic theorem proving.

Unit II : Relations

Relations, properties of binary relations in a set, Relation matrix and Graph of a relation, partition and covering of a set, equivalence relations, compatibility relations, composition of binary relations.

Unit III: Recurrence Relations

Generating function of sequences, calculating coefficients of a generating function, recurrence relations, solving linear recurrence relations by substitution method, generating function method and method of characteristic roots, solving in homogeneous recurrence relations.

Unit IV: Algebraic structures

Algebraic structure, group, abelian group, subgroup, ring, field-definitions and examples, residue arithmetic- applications of Chinese remainder theorem, Fermat's theorem, Euler's theorem.

Unit V: Graph theory

Basic concepts of a graph, isomorphism and sub graph, tree and its properties, DFS, BFS algorithms for finding a spanning tree, Kruskal's and Prim's algorithms for finding a minimals panning tree.

Textbooks:

1. J.P. Tremblay and R. Manohar, "*Discrete Mathematical Structures with Applications to Computer Science*", Tata Mc Graw Hill, 1997.
2. Joe L. Mott, Abraham Kandel and T. P. Baker, "*Discrete Mathematics for Computer Scientists & Mathematicians*" , 2nd edition, Prentice Hall of India Ltd, 2012.

References:

1. Keneth. H. Rosen, "*Discrete Mathematics and its Applications*", 6th edition, Tata McGraw-Hill, 2009.
2. Richard Johnsonburg, "*Discrete mathematics*", 7th edition, PearsonEducation,2008.
3. NarsinghDeo, "*Graph Theory with Applications to Engineering and Computer Science*", Prentice Hall of India, 2006.

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Department of Computer Science and Engineering

Programme: CSE					Semester: III
Course Code	Course Name	L	T	P	C
	Object Oriented Programming through Java	3	0	0	3
Subject Category : PCC					

Course Outcomes:

At the end of the Course the student shall be able to

CO1: Interpret object orientation and Utilize programming strategies and Contrast classes and objects

CO2: Analyze Inheritance and Dynamic Method Dispatch

CO3: Design Packages and Interpret various classes in different packages

CO4.Manage Exceptions and Apply Threads

CO5: Create GUI screens along with event handling and write network programs

UNIT-I: INTRODUCTION TO OBJECTS & CLASSES

What is Object Oriented Programming? Object Orientation as a New Paradigm: The Big Picture 2),An Overview of Java: Process Oriented Vs Object Oriented Programming, OOP Principles, Java Buzz Words, The Byte Code, A First Simple Program. Class Fundamentals with Variables and Methods, Declaring objects for accessing variables and methods.Data Types and Variables, Operators and Expressions, Control Statements, Type Conversion and casting, Lexical Issues in Java, Arrays: Single Dimension, command line arguments, Arrays: Multi Dimension.

Constructors: Default and Parameterized, this keyword and Garbage Collection, Final and Static Keywords, Overloading Methods, Overloading Constructors, Using objects as Parameters, Returning objects, String and String Buffer.

UNIT-II: INHERITANCE

Inheritance Basics, Types of Inheritance, Using Super keyword for constructors, Super to call variables and methods, Method Overriding, Dynamic Method Dispatch.

UNIT-III: PACKAGES AND INTERFACES **:**Defining a Package, importing a package, Package Example, Access Protection, An Access Example, Abstract classes, Interfaces: Defining and Implementing Interfaces Exploring java.lang: Wrapper classes, Object, Math, Runtime

Exploringjava.util:
The collection framework: ArrayList, HashSet and HashMap, StringTokenizer, Calendar, Random, Scanner

Exploringjava.io:
File class, Byte Streams, Character Streams, FileInputStream, FileOutputStream, FileReader and FileWriter

UNIT-IV: Exception Handling: Exception Handling Fundamentals, Exception Types, throw, throws and finally, Creating your own exceptions, Chained Exceptions

Multithreaded Programming : Java Thread Model, The Main thread, Two ways of Creating a Thread, Creating Multiple Threads, isAlive(), join(), Synchronization, Inter Thread Communication

UNIT-V: Introducing GUI Programming with Swings: Swing Features, MVC Connection, Components and Containers, Panes, Simple Swing Application, Simple Swing Applet, Layout Managers: Flow, Border, Card, Grid, Grid Bag, Working with Color, Working with Fonts, Painting in Swing, Exploring Swing Components.

Delegation Event Model: Event Classes, Sources and Listeners.
Exploringjava.net:
Socket, ServerSocket, InetAddress, DataGramSocket, URL, Client-Server Program using Sockets

Textbooks:

1. Herbert Schildt, "*Java The Complete Reference*", 11thEdition,McGrawHill,2019

2. Timothy budd, "*An Introduction to Object-oriented Programming"*, 3rd Edition, Pearson Education, 2009.

Reference book:

1. Y. Daniel Liang "*Introduction to Java Programming Comprehensive Version*" 10th Edition,Pearson,2015

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Department of Computer Science and Engineering

Programme: CSE					Semester: III
Course Code	Course Name	L	T	P	C
	Object Oriented Analysis and Design Lab	0	0	3	1.5
Subject Category : PCC					

Course Outcomes:

At the end of the Course the student shall be able to

CO1: Interpret software requirements of various real-time applications.

CO2: Construct structural elements of the application in terms of object-oriented-design.

CO3: Classify the modeling of interaction diagrams of the application to represent functionalities of a software system.

List of Case Studies:

1) ATM System
2) Online Reservation System
3) Online Quiz System
4) Banking System
5) Stock Maintenance System
6) Student Marks Analysis System
7) Course Registration System
8) Library Management System
9) Real-time Scheduler

List of Experiments:

1) Draw Use case diagrams for above case studies.
2) Draw Class diagrams for above case studies.
3) Draw Object diagrams for above case studies.
4) Draw Sequence diagrams for above case studies.

5) Draw Collaboration diagrams for above case studies.

6) Draw Activity diagrams for above case studies.

7) Draw State chart diagrams for above case studies.

8) Draw Component diagrams for above case studies.

9) Draw Deployment diagrams for above case studies.

TEXT BOOKS:

1. GradyBooch, James Rumbaugh, Ivar Jacobso, The Unified Modeling Language User Guide, Pearson Education.

REFERENCE BOOKS:

1. Meilir Page-Jones, Fundamentals of Object-oriented Design in UML, Pearson Education.

Martina Seidl, Marion Scholz, Christian Huemer, GertiKappel, UML@Classroom - An introduction to Object-Oriented Modeling, Springer

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Department of Computer Science and Engineering

Programme: CSE					Semester: III
Course Code	Course Name	L	T	P	C
	Data Structures Lab	0	0	3	1.5
Subject Category : **PCC**					

Course Outcomes:

At the end of the Course the student shall be able to

CO1:Apply recursive and iterative methodologies to solve complex engineering problems.

CO2: Solve searching and sorting techniques and evaluate time & space complexities.

CO3: Develop solutions to create and implement operations of linear and nonlinear data structures.

CO 4:Identify and apply suitable data structure for a given real time problem

List of Experiments:

Exercise 1:

a) Write a recursive C program to calculate Factorial of an integer.
b) Write a recursive C program which computes the n^{th} Fibonacci number, for appropriate values of n.

Exercise 2:

a) Write a recursive C program to calculate GCD (n, m).
b) Write a recursive C program for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise 3:

a) Write a C program that implements Selection sort, to sort a given list of integers in ascending order.
b) Write a C program that implements Insertion sort, to sort a given list of integers in ascending order.

Exercise 4:

a) Write a C program that implements Quick sort, to sort a given list of integers in ascending order.
b) Write a C program that implements Radix sort, to sort a given list of integers in ascending order.
c) Write a C program that implements Merge sort, to sort a given list of integers in ascending order.

Exercise 5:

a) Write a C program that implements Stack (its operations) using arrays.

b) Write a C program that uses Stack operations to convert infix expression into postfix expression.

Exercise 6:

a) Write a C program that implements Queue (its operations) using arrays.
b) Write a C program that implements Circular Queue (its operations) using arrays.

Exercise 7:

a) Write a C program that uses functions to create a singly linked list and its operations(insert, delete, search).
b) Write a C program to reverse elements of a singly linked list.

Exercise 8:

a) Write a C program that implements Stack (its operations) using Linked list.
b) Write a C program that implements Queue (its operations) using Linked list.

Exercise 9:

a) Write a C program to create a Circular Linked list and its operations(insert, delete, search).
b) Write a C program to create a Doubly Linked list and its operations(insert, delete, search).

Exercise 10:

a) Write a C program to create a Binary Search Tree and its operations.
b) Write a recursive C program for traversing a Binary Search Tree in preorder, inorder and postorder.

Exercise 11:

a) Write a C program to perform BFS traversal on given graph.
b) Write a C program to perform DFS traversal on given graph.

TEXT BOOKS:

1. Richard F, Gilberg, Forouzan, Data Structures, 2nd edition, Cengage
2. Aaron M. Tenenbaum, YedidyahLangsam, Moshe J Augenstein, Data Structures usingC, Pearson.
3. Mark Allen Weiss, Data structures and Algorithm Analysis in C, 2nd edition, Pearson Education. Ltd.

REFERENCE BOOKS:

1. Jean-Paul Tremblay Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd edition, Mc Graw Hill Higher Education
2. Seymour Lipschutz, Data Structure with C, TMH
3. ReemaThareja, Data Structures using C, 2nd edition, Oxford

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Department of Computer Science and Engineering

Programme: CSE					Semester: III
Course Code	Course Name	L	T	P	C
	OOPS through Java lab	0	0	3	1.5
Subject Category : PCC					

Course Outcomes:

At the end of the Course the student shall be able to

CO1: Implement the programs using various basic programming constructs related to language.
CO2: Apply the concepts of Object oriented programming using Java to design the solutions of various problems.
CO3: Develop the applications by using different exception handling mechanisms and also multithreading
CO4: Write simple GUI interfaces for computer applications to interact with users and to understand the event-based GUI handling principles.

List of Experiments:

1. Write a JAVA program to display default value of all primitive data types of JAVA.
2. Write a JAVA program to displays the roots of a quadratic equation $ax^2+bx+c=0$. Calculate the discriminate D and basing on the value of D, describe the nature of roots.
3. Write a JAVA program to check the compatibility for multiplication, if compatible multiply two matrices.
4. Write a JAVA program to show usage of 'this' keyword to refer current class instance variables and also use 'this' keyword as return statement.
5. Write a JAVA program to demonstrate static variables, methods, and blocks.
6. Write a JAVA program that illustrates single inheritance.
7. Write a JAVA program that illustrates multi-level inheritance.
8. Write a JAVA program to give the example for 'super' keyword.
9. Write a JAVA program to demonstrate method overriding.
10. Write a JAVA program demonstrating the difference between method overloading and constructor overloading.
11. Write a program to accept a string from the console and count the number of vowels, digits, characters in that string.
12. Write a JAVA program, using StringTokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.
13. Write a JAVA program to create an abstract class named Shape, that contains an empty method named number Of Sides(). Provide three classes named Trapezoid, Triangle and Hexagon, such

that each one of the classes contains only the methodnumberOfSides(), that contains the number of sides in the given geometrical figure.

14. Write a JAVA program illustrating multiple inheritance using interfaces.
15. Write a JAVA program to create a package named p1 and implement this package in ex1 class.
16. Write a JAVA program to read array of integer values and formulate to create both "division by zero" exception and "array index out of bound" exception.
17. Write a JAVA program to read two numbers, and sum these two values if the first value is positive number, otherwise generate a user define exception.
18. Write a JAVA program to implement a Queue and handle its exceptions using throw, throws mechanisms.
19. Write a JAVA program to illustrate creation of threads using Runnable Interface(start method start each of the newly created thread. Inside the run method there is sleep () for suspend the thread for 500 milliseconds).
20. Write a JAVA program to illustrate creation of threads using extends Thread class(start method start each of the newly created thread. Inside the run method there is sleep () for suspend the thread for 1000 milliseconds).
21. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
22. Write a JAVA program that describes the life cycle of an applet.
23. Write a JAVA program that displays the x and y position of the cursor movement using Mouse.
24. Write a JAVA program to create a simple calculator.
25. Write a Java program to illustrate collection classes ArrayList and LinkedList.

TEXT BOOKS:

1. Herbert schildt and Dale skrien, Java Fundamentals- A Comprehensive introduction, TMH.

2. P.J.Dietel and H.M.Dietel, Java: How to Program , PHI.

REFERENCE BOOKS:

1. P.Radha Krishna, Object Oriented Programming through java, Universities Press.

2. Bruce Eckel, Thinking in Java, Pearson Education.

3. S.Malhotra and S.Choudhary, Programming in Java, Oxford University Press.

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Department of Computer Science and Engineering

Programme: CSE					Semester: IV
Course Code	Course Name	L	T	P	C
	Database Management Systems	3	0	0	3
Subject Category :	ESC				

COURSE OUTCOMES:

At the end of the Course the student shall be able to

CO 1: Illustrate the DBMS architecture and model a data base using ER diagram.

CO 2: Solve queries using procedural and non-procedural languages.

CO 3: Apply the normalization techniques to improve the database design.

CO 4: Explain the processing and controlling the consequences of concurrent data access.

CO 5: Demonstrate the storage, accessing and recovery mechanisms.

UNIT-I

History of Database Systems, Database System Applications, Database System vs File System –View of Data – Data Abstraction –Instances and Schemas – Data Models – The ER Model –Relational Model–OtherModels–DatabaseLanguages–DDL,DML–TransactionManagement-Database System Structure–Storage Manager–The Query Processor.

Database Design and ER Diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship Sets –Additional Features of ER Model – Concept Design withthe ER Model–Conceptual Design for Large enterprises.

UNIT-II

Introduction to the Relational Model – Integrity Constraint Over Rrelations – Enforcing Integrity Constraints – Querying Relational Data – Logical Database Design – Introduction to Views – Destroying / Altering Tables and Views. Relational Algebra – Selection and Projection SetOperations – Renaming – Joins – Division – Relational calculus –Tuple Relational Calculus–Domain Relational Calculus.

UNIT-III

Schema Refinement – Problems Caused by Redundancy – Decompositions – Problem related to Decomposition – Reasoning about FDS – FIRST, SECOND, THIRD Normal Forms – BCNF–Schema Refinement in Database Design – Multi Valued Dependencies – FOURTH Normal Form.

UNIT-IV

Transaction Concept-Simple Transaction Model-Storage Structure-Transaction State-Implementation of Atomicity and Durability, Isolation–Concurrent–Executions–Serializability- Recoverability – Implementation of Isolation-Transactions as SQL Statements. Concurrency Control: Lock – Based Protocols-Deadlock Handling– Timestamp Based Protocols-Validation Based Protocols-Multi Version Schemes – Insert, Delete and Predicate Operations–Multiple Granularity.

UNIT-V

Recovery System: Recovery and Atomicity – Log Based Recovery– Recovery with Concurrent Transactions–Buffer Management–Failure with Loss of Non Volatile Storage-Advance Recovery Systems- ARIES.

Data on External Storage – Overview of Physical Storage Media – RAID - File Organization and Indexing - Data Dictionary Storage – Cluster Indexes, Primary and Secondary Indexes – Index Data Structures – Hash Based Indexing – Tree Base Indexing – B+ Trees : A Dynamic Index Structure.

Text Book:

1.Raghurama Krishnan, Johannes Gehrke, *Database Management Systems*, 3rd Edition, Tata Mc Graw Hill, 2008.

References:

1. Silberschatz, Korth, *Database System Concepts*, 6th Edition, Tata McGraw Hill, 2010.
2. C.J.Date, *Introduction to Database Systems*,7th Edition, Pearson Education, 2002.
3. Peter Rob & Carlos Coronel, *Database Systems design, Implementation, and Management*, 7th Edition, Pearson Education, 2000.
4. ElmasriNavate, *Fundamentals of Database Systems*, 5th Edition, Pearson Education, 2007.

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Department of Computer Science and Engineering

Programme: CSE					Semester: IV
Course Code	Course Name	L	T	P	C
	Formal Languages & Automata Theory	3	0	0	3
Subject Category :	PCC				

Course Outcomes:

At the end of the Course the student shall be able to

CO1: Employ finite state machines for modeling and their power to recognize the languages.

CO2: Understand the concept of Regular languages and Converting Regular Expression to Finite Automata (Vice Versa)

CO3:Understandtheconceptofcontextfreelanguagesandnormalforms CO4:DesignCFG'sandPDAaswellf or the given set of grammars

CO5: Designing turing machines for the given set of grammars.

UNIT-I

Fundamentals: Formal Languages, Strings, Alphabets, Languages, Chomsky Hierarchy of languages.

Finite Automata: Introduction to Finite State machine, Acceptance of strings and languages, Deterministic finite automaton (DFA) and Non-deterministic finite automaton(NFA), Equivalence of NFA and DFA–Equivalence of NDFAs with and without €-moves, Minimization of finite automata, Equivalence between two DFA's, Finite automata without put – Moore and Mealy machines, conversion of Moore to Mealy and Mealy to Moore

UNIT-II

Regular Languages: Regular sets, Regular expressions, Operations and applications of regular expressions, Identity rules, Conversion of a given regular expression into a finite automaton, Conversion of finite automata into a regular expression, Pumping lemma for regular sets, Closure properties of regular sets (proofs not required).

UNIT-III

Regular Grammars: Definition of a grammar, Regular grammars, Right linear and left linear grammars, Conversion from left linear to right linear grammars, Equivalence of regular grammar and finite automata, Inter conversion.

Context Free Grammars: Context free grammars and languages, Derivation trees, Left most and rightmost derivation of strings and Sentential forms, Ambiguity, left recursion and left factoring in context free grammars, Minimization of context free grammars, Normal forms for context free grammars, Chomsky normal form, Greibach normal form, Pumping Lemma for Contextfree Languages, Closure and decision properties of context free languages

UNIT-IV

Pushdown Automata: Introduction to Push down automata, Acceptance of context free languages, Acceptance by final state and acceptance by empty state and its equivalence, Equivalence of context free grammars and pushdown automata, Inter-conversion (Proofs not required), Introduction to deterministic pushdown automata.

UNIT-V

Turing Machine: Introduction to Turing Machine, Design of Turing machines, Types of Turing machines, Computable functions, Recursive and recursively enumerable languages, closure properties of recursive and recursively enumerable languages

TextBook:

1. John E Hopcroft, Rajeev Motwani, Jeffrey D.Ullman, "*Introduction to Automata Theory Languages and Computation*", 3rdEdition, Pearson Education,2011.

ReferenceBooks:

1. Peter Linz, " *An introduction to Formal Languages and Automata*", 6th Edition, Jones&Bartlett,2016
2. Mishra and Chandrashekaran, "*Theory of Computer Science – Automata Languages and Computation*", 3rdEdition, PHI,2009
3. K.V.N.Sunitha , N.Kalyani, "*Formal Languages and Automata Theory*", 1st Edition,TMH, 2010
4. Michel Sipser, "*Introduction to Theory of Computation*", 2ndEdition, Thomson, 2012

WebReference:

https://swayam.gov.in/nd1_noc19_cs79/preview

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Department of Computer Science and Engineering

Programme: CSE					Semester: IV
Course Code	Course Name	L	T	P	C
	PROBABILITY AND STATISTICS	3	0	0	3
Subject Category :	BSC				

Course Outcomes:

At the end of the Course, the student will be able to

CO 1: Determine the mean and variance of discrete and continuous random variables.

CO 2 : Calculate probabilities using normal distribution and construct sampling distribution of means.

CO 3: Estimate the confidence interval for the mean of a population and test a hypothesis concerning means.

CO 4: Estimate the confidence intervals, test a hypothesis concerning variances and proportions.

CO 5: Calculate correlation coefficient and determine line a regression for bivariate data

Unit I: Random Variables: Random variables, types of random variables, probability distribution function, probability density function, mean and variance of a random variable

Unit II: Probability Distributions and Sampling Distributions :

Normal distribution: calculating normal probabilities, normal approximation to the Binomial distribution. Sampling distributions: population and sample, sampling distribution of the mean (known), sampling distribution of the mean (unknown).

Unit III: Estimation and Test of Hypothesis of Means

Point estimation, interval estimation, introduction to test of hypothesis, hypotheses is concerning one mean, hypothesis concerning two means, matched pair comparisons.

Unit IV: Estimation, Test of Hypothesis of Variances and Proportions Estimation of variance, hypothesis concerning one variance, hypothesis concerning two variances, estimation of proportion, hypothecs is concerning one proportion, hypotheses is concerning several proportions.

Unit V: Regression analysis

The method of least squares, curvilinear regression, multiple regression, correlation (excluding causation).

Text book:

Richard A. Johnson,"*Miller & Freund's Probability and Statistics for Engineers*", 8th edition, PHIL earning India Private Limited, 2011.

Reference Books:

1. S.Ross,"*A First Coursein Probability*", Pearson Education India, 2002.
2. W. Feller, "*An Introduction to Probability Theory and its Applications*", 1st edition,Wiley,1968.
3. Gilbert Strang, "*Introduction to Linear Algebra*", 5thedition, Wellesely- CambridgePress,2016.

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Department of Computer Science and Engineering

Programme: CSE					Semester: IV
Course Code	Course Name	L	T	P	C
	Web Technologies	3	0	0	3
Subject Category :	PCC				

Course Outcomes:

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

CO 1:Elucidate the foundations and issues of distributed systems
CO 2: Illustrate the various synchronization issues and global state for distributed systems
CO 3: Illustrate the Mutual Exclusion and Deadlock detection algorithms in distributed systems
CO 4: Describe the agreement protocols and fault tolerance mechanisms in distributed systems
CO 5: Describe the features of peer-to-peer and distributed shared memory systems

UNIT I

Distributed Systems: Definition, Relation to computer system components, Motivation, Relation to parallel systems, Message-passing systems versus shared memory systems, Primitives for distributed communication, Synchronous versus asynchronous executions, Design issues and challenges.

A model of distributed computations: A distributed program, A model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Models of process communications.

Logical Time: A framework for a system of logical clocks, Scalar time, Vector time, Physical clock synchronization: NTP.

UNIT II

Message Ordering & Snapshots: Message ordering and group communication: Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order. Global state and snapshot recording algorithms: Introduction, System model and definitions, Snapshot algorithms for FIFO channels.

UNIT III

Distributed Mutex & Deadlock: Distributed mutual exclusion algorithms: Introduction – Preliminaries – Lamport's algorithm – Ricart-Agrawala algorithm – Maekawa's algorithm – Suzuki–Kasami's broadcast algorithm. Deadlock detection in distributed systems: Introduction – System model – Preliminaries – Models of deadlocks – Knapp's classification – Algorithms for the single resource model, the AND model and the OR model.

UNIT IV: Recovery & Consensus: Check pointing and rollback recovery: Introduction – Background and definitions – Issues in failure recovery – Checkpoint-based recovery – Log-based rollback recovery – Coordinated check pointing algorithm – Algorithm for asynchronous check pointing and recovery. Consensus and agreement algorithms: Problem definition – Overview of results – Agreement in a failure – free system – Agreement in synchronous systems with failures.

UNIT V:Peer-to-peer computing and overlay graphs: Introduction – Data indexing and overlays – Chord – Content addressable networks – Tapestry.

Distributed shared memory: Abstraction and advantages – Memory consistency models – Shared memory Mutual Exclusion.

Text Books:

1) Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore and Tim Kindberg, Fifth Edition, Pearson Education, 2012.
2) Distributed computing: Principles, algorithms, and systems, Ajay D Kshemkalyani and Mukesh Singhal, Cambridge University Press, 2011.

Reference Books:

1) Distributed Operating Systems: Concepts and Design, Pradeep K Sinha, Prentice Hall of India, 2007.
2) Advanced concepts in operating systems. Mukesh Singhal and Niranjan G. Shivaratri, McGraw-Hill, 1994.
3) Distributed Systems: Principles and Paradigms, Tanenbaum A.S., Van Steen M.,Pearson Education, 2007.

Web-Resources:

1) https://nptel.ac.in/courses/106/106/106106168/

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Department of Computer Science and Engineering

Programme: CSE		Semester: IV
Course Code	Course Name	L
	Managerial Economics and Financial Analysis	3
Subject Category : **HSMC**		

Course Outcomes:

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

CO 1: To adopt the Managerial Economic concepts for decision making and forward planning. Also know law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services.

CO 2: To assess the functional relationship between Production and factors of production and listout various costs associated with production and able to compute breakeven point to illustrate the various uses of break even analysis

CO 3: To outline the different types of business organizations and provide a frame work for analyzing money in its functions as a medium of exchange.

CO 4: To adopt the principles of accounting to record, classify and summarize various transactions in books of accounts for preparation of final accounts.

CO 5: To implement various techniques for assessing the financial position of the business.

UNIT-I: INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND

Definition, Nature and Scope of Managerial Economics.

Demand Analysis: Definition-types of demand-Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Significance of Elasticity of Demand. Demand Forecasting: definition, methods of demand

Forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT-II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Law of Variable Proportion, Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns.

Cost Analysis: Types of Cost, Break-even Analysis(BEA)-Determination of Break-Even Point (Simple numerical problems) –Managerial Significance and limitations of BEA.

UNIT-III: BUSINESS ENVIRONMENT

Features of Business Organization, Sole Proprietorship, Partnership and Joint Stock Company, Steps for formation and Registration of the company.

Monetary Economics: Inflation, GDP, Per-capita Income.

UNIT-IV: INTRODUCTION TO FINANCIAL ACCOUNTING

Accounting Principles, Concepts & conventions, Double-Entry Book Keeping, Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments)

UNIT-V:

PREPARATION AND ANALYSIS OF FINANCIAL STATEMENTS

Financial statement Analysis (Comparative and Common Size Statements)-Ratio analysis (Liquidity Ratios, Activity ratios, Solvency and Profitability ratios)

TEXTBOOKS

1. ARAryasri, *"Managerial Economics and Financial Analysis"*, 4th Edition, TMH Publication, 2012.
2. S A Siddiqui & A. S. Siddiqui *"Managerial Economics and Financial Analysis"*, 1st Edition, New Age Publishers, 2012.
3. P.K.Sharma& Shashi K. Gupta, *"Management AccountingPrinciples and Practice"*, 12th Edition, Kalyani Publishers,2004.
4. R.L.Varshney& K.L Maheswari, *"Managerial Economics"*, 22nd Edition, S.Chand Publishers, 2004.

REFERENCES

1. Dominick Salvatore,*"Managerial Economics: Principles and Worldwide Applications"*, 7th Edition, Oxford UniversityPress,2012.
2. RamachandranN,RamKumarKakani,*"FinancialAccountingforManagement"*,2nd Edition,PearsonEducation,2007.
3. DNDwivedi, *"Managerial Economics"*, 8th Edition, PHIPublication,2010.
4. S P Jain & KL Narang, *"Cost and Management Accounting"*, 3rd Edition, Kalyani Publishers, 2004.
5. PVenkata Rao&J.V.PrabhakarRao,*"Managerial Economics & Financial Analysis"*,1st Edition, Maruti Publications, 2012.
6. CarlE. Walsh, *"Monetary Theory & Policy"*, 3rd Edition,The MIT Press Cambridge, 2010.

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Department of Computer Science and Engineering

Programme: CSE					Semester: IV
Course Code	Course Name	L	T	P	C
	Database Management Systems Lab	0	0	3	1.5
Subject Category :	ESC				

Course Outcomes:

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

CO1: Demonstrate the database design using ER Diagrams.
CO2: Develop SQL Queries to manipulate the data in the database.
CO3: Inspect and handle errors using exception handling mechanism.
CO4: Apply Procedural Language constructs to execute block of SQL statements.

List of Experiments:

Experiment 1: Working with ER Diagram

Example: ER Diagram for Sailors Database

Entities:1 Sailor 2. Boat

Relationship: Reserves

Primary Key Attributes:

1. SID (Sailor Entity)
2. BID (Boat Entity)

Experiment 2: Working with DDL, DML, DCL and Key Constraints

Creating, Altering and Dropping of Tables and Inserting Rows into a Table (Use Constraints While Creating Tables), Examples using Select command.

Experiment 3: Working with Queries and Nested Queries

Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSECT and Constraints.

Experiment 4: Working with Queries using Aggregate Operators & Views

Queries using Aggregate Functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING, Creation and Dropping of Views.

Experiment 5: Working with Conversion Functions & String Functions

Queries using Conversion Functions (to_char, to_number and to_date), String Functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), Date Functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date).

Experiment 6: Working with Triggers using PL/SQL

Develop programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers.

Experiment 7: Working with PL/SQL Procedures

Develop programs using Procedures, passing Parameters IN and OUT of Procedures.

Experiment 8: Working with Loops using PL/SQL and Exception Handling

Develop programs using WHILE loops, FOR loops, Nested loops using ERROR handling, BUILT-IN Exceptions, USER defined Exceptions, and RAISE_APPLICATION_ERROR.

Experiment 9: Working with Functions using PL/SQL

Develop programs using stored Functions, invoke Functions in SQL statements and write complex Functions.

Experiment 10: Working with Cursors using PL/SQL

Develop programs using Cursors, parameters in a Cursor, FOR UPDATE Cursor, WHERE CURRENT OF clause and Cursor variables.

TEXT BOOKS:

1. Benjamin Rosenzweig, Elena SilvestrovaRakhimov, Oracle PL/SQL by Example, 3rdEdition,Pearson Education.
2. Scott Urman, Ron Hardman,MichaelMclaughlin,Oracle Database 10G PL/SQL Programming, Tata Mc-Graw Hill.
3. Dr .P.S. Deshpande,SQL and PL/SQL for Oracle 11g, Black Book.

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Department of Computer Science and Engineering

Programme: CSE					Semester: IV
Course Code	Course Name	L	T	P	C
	Data Visualization Lab	0	0	3	1.5
Subject Category :	PCC				

PREREQUISITES: Familiarity in Python programming.

COURSE OBJECTIVE:

The objective is to expose the students to the various key aspects of data visualization tools and technologies because data visualization is essential to analyze massive amounts of information and make data-driven decisions. Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data. This lab uses the desirable and unique features tableau or python for data visualization tool because of ease in tableau tool interface or python graphical packages. Their powerful data discovery and exploration application allows users to answer important questions in seconds and solutions for all kinds of industries, departments, and data environments.

COURSE OUTCOMES:

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

CO1: Understand the importance of data visualization and its design features to use many visual components

CO2: Apply and analyze best practices in data visualization to develop charts, tables, maps, and other visual representations of data.

CO3: Plan and compel interactive dashboards to combine several visualizations into a single unit for effective communication.

CO4: Evaluate data with advanced visualizations techniques and by exploring visualization on geospatial data

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Department of Computer Science and Engineering

LIST OF EXPERIMENTS:

1. Tableau overview, environment setup, navigation and data types,
2. Introduction to usage of python 3 packages - matplotlib, numpy, pandas, seaborn, ggplot, ggplot2, plotly
3. Demonstrate the usage of data sources, custom data view and extracting data fields operations
4. Experimenting with data editing, metadata, data joining and data blending
5. Implementation of calculations with operators functions, and numeric calculations
6. Implementation of calculations with operations on string, date and table
7. Experiment to working with sorting and filtering operations
8. Experiment to demonstrate data visualization with charts: bar chart, line chart and pie chart
9. Experiment to demonstrate data visualization with charts: crosstab, scatter plot and bubble chart
10. Experiment to demonstrate data visualization with charts: bullet graph, box plot and tree map/heat map
11. Experiment to demonstrate data visualization with charts: bump chart, gantt chart and histograms
12. Experiment to demonstrate data visualization with charts: motion charts and waterfall charts
13. Experiment to demonstrate building a dashboard with tables and charts for any business applications
14. Experiment to demonstrate data visualization for prediction and forecasting with trend lines
15. Construction of advanced visualization with waffle charts.
16. Construction of advanced visualization with word clouds
17. Construction of advanced visualization sea born and regression plots
18. Creating maps and visualizing geospatial data with folium and map styles
19. Creating maps and visualizing geospatial data using maps with markers
20. Creating maps and visualizing geospatial data using choropleth maps

TEXT BOOKS:

1. Joshua N Milligan, Learning Tableau 2019 Tools for Business Intelligence, data prep, and visual analytics, 3e,Packt publications, 2020.
2. Wes McKinney, Python for Data Analysis, ie, O'Reilly, 2013
3. Fabio Nelli, Python Data Analytics With Pandas, NumPy, and Matplotlib, 2e, A Press, 2018
4. Ryan Sleeper, Practical Tableau 100 TIPS, TUTORIALS, AND STRATEGIES FROM A TABLEAU, 1e, O'Reilly, 2018
5. A shutosh Nandesh war, Tableau Data Visualization Cookbook, 1e, Packt Publishing, 2013

REFERENCE BOOKS:

1. Daniel G. Murray, Tableau your data, 1e, Wiley, 2019
2. Fabio Nelli, Python Data Analytics, 1e, A Press, 2018
3. Ben Jones, Communicating Data with Tableau,1e, O'Reilly, 2014

Web Links:

1. https://www.tableau.com/academic/students
2. https://www.tableau.com/learn/articles/data-visualization

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Department of Computer Science and Engineering

Programme: CSE					Semester: IV
Course Code	Course Name	L	T	P	C
	Web Technologies Lab	0	0	3	1.5
Subject Category :	PCC				

Course Outcomes:
At the end of the course, the students will be able to:

CO 1: Analyze and apply the role of languages like HTML, CSS, XML
CO 2: Review JavaScript, PHP and protocols in the workings of the web and web applications
CO 3: Apply Web Application Terminologies, Internet Tools, E – Commerce and other web services
CO 4: Develop and Analyze dynamic Web Applications using PHP & MySql
CO 5:Install & Use Frameworks

List of Experiments:

1) Design the following static web pages required for an online book store web site:
   (a) HOME PAGE:

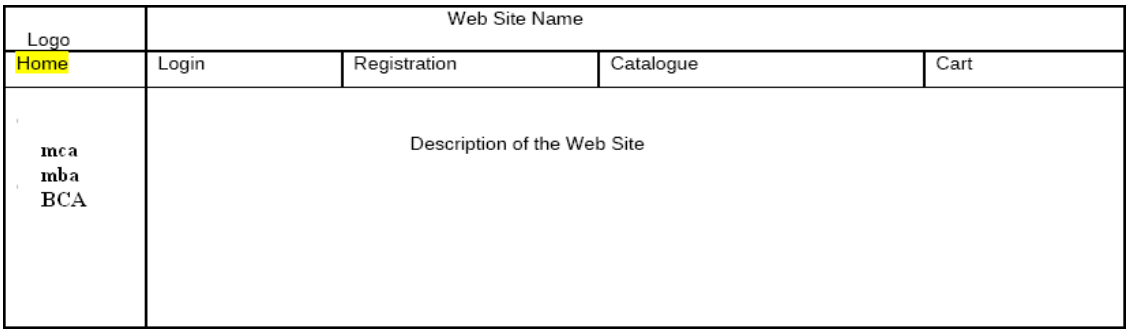
The static home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

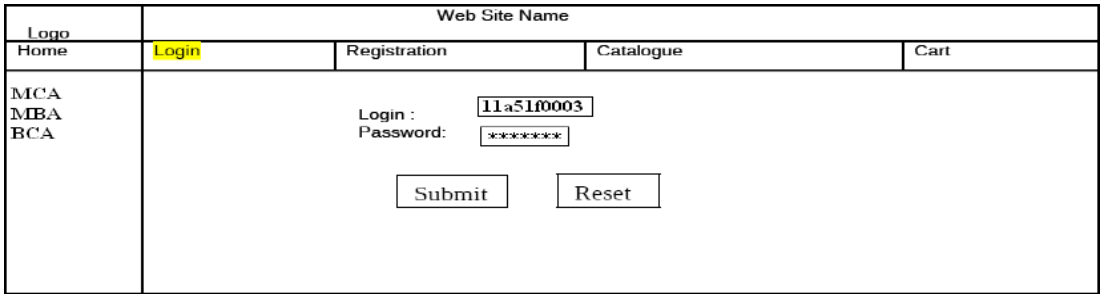
Left frame: At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link **"MCA"** the catalogue for MCA Books should be displayed in the Right frame.

Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.



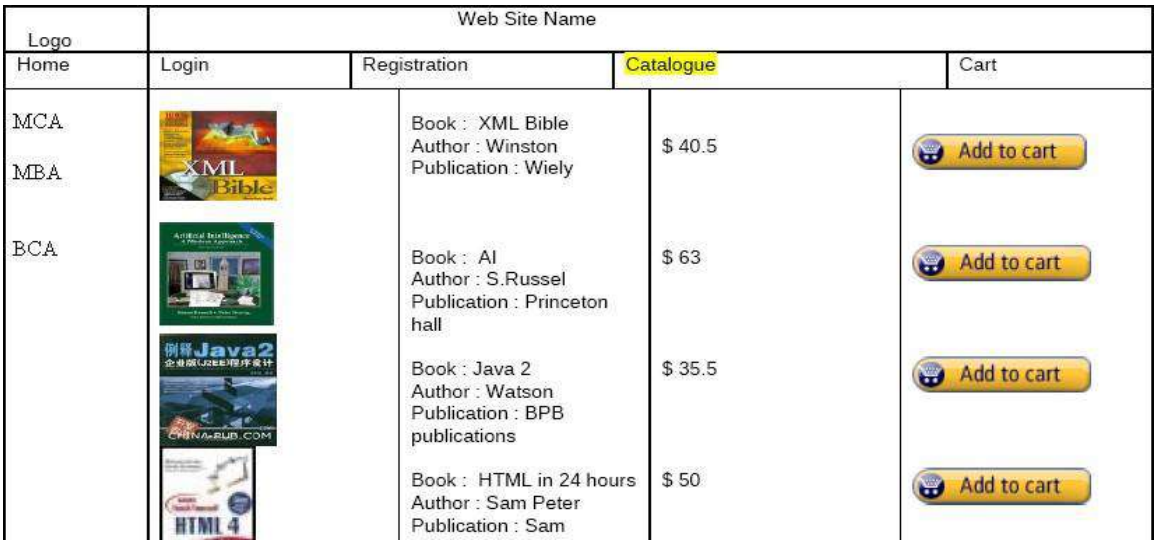
(b)LOGIN PAGE:



(C) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table: The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.



(d). **REGISTRATION PAGE:**

Create a "*registration form* "with the following fields

1)Name (Text field)
2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)

5) Sex (radio button) 6) Date of birth (3 select boxes)

7)Languages known (check boxes – English, Telugu, Hindi, Tamil)
8)Address (text area)

2)Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following: Use different font, styles:
In the style definition you define how each selector should work (font, color etc.).

Then, in the body of your pages, you refer to these selectors to activate the styles

3)Design a dynamic web page with validation using JavaScript.
4)Design a HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display

a. Factorial of that number
b. Fibonacci series up to that number
c. Prime numbers up to that number
d. Is it palindrome or not

5)Write JavaScript programs on Event Handling
a. Validation of registration form
b. Open a Window from the current window
c. Change color of background at each click of button or refresh of a page
d. Display calendar for the month and year selected from combo box
e. On Mouse over event

6)Write an XML file which will display the Book information which includes the following:
1) Title of the book 2) Author Name 3) ISBN number

4) Publisher name 5) Edition 6) Price
a) Write a Document Type Definition (DTD) to validate the above XML file.
b)Write a XML Schema Definition (XSD) to validate the above XML file.

7) Create Web pages using AJAX.
8) User Authentication:

Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ''.Use init-parameters to do this..

9)Example PHP program for registering users of a website and login.

10)Install a database (Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email- id, phone number (these should hold the data from the registration form).

Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

11)Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using

registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

12)Implement a Servlet program on request response processing.
13)Implement a Servlet program for Registration Page.
14)Connect to a database using JSP and practice SQL Queries (MySql or Oracle).

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Vinjanampadu, Vatticherukuru Mandal, Guntur, Andhra Pradesh522017

Department of Computer Science and Engineering

Programme: CSE					Semester: IV
Course Code	Course Name	L	T	P	C
	Design Thinking and Innovation	1	0	2	2
Subject Category :	SC				

Course Outcomes:

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

CO1: Outline a problem, apply methods of Empathy on user groups

CO2: Describe and Define the problem specific to the user group

CO3: Apply Ideation tools to generate Ideas to solve the problem

CO4: Develop prototype

CO5: Test the ideas and demonstrate Story telling ability to present the Ideas

Students shall form in to groups and Identify a problem (preferably societal problem with engineering orientation to solve) suitable for the design thinking and go through the process week-wise. At the end of each phase, brief documentation shall be submitted and a final report covering all phases has to be submitted at the end of the semester.

Weeks1-3:

Introduction to Design Thinking: A primer on design thinking - Traditional approach, the new design thinking approach. Stages in Design Thinking: Empathize, Define, Ideate, Prototype, Test. Mind set for design thinking, Design thinking for product and process innovation, Difference between engineering design and design thinking.

Case Studies: General, Engineering and Service applications.

Activities: Identify an Opportunity and Scope of the Project to explore the possibilities and Prepare Design brief

Weeks4-6:

Methods and Tools for Empathize and Define phases:

Empathize - Methods of Empathize Phase: Ask 5 Why / 5W+H questions, Stakeholder map, Empathy Map, Peer observation, Trend analysis

Define-Methods of Define Phase: Storytelling, Critical items diagram, Define success

Activities: Apply the methods of empathize and Define Phases Finalize the problem statement

Weeks7-8:

Methods and Tools for Ideate phase:

Ideate - Brainstorming, 2X2 matrix, 6-3-5 method, NABC method;
Activities: Apply the methods of Ideate Phase: Generate lots of Ideas

Weeks9-11: Methods and Tools for Prototype Phase:

Prototype - Types of prototypes - Methods of prototyping - Focused experiments, Exploration map, Minimum Viable Product;

Activities: Apply the methods of Prototype Phase: Create prototypes for selected ideas

Weeks12-13: Methods and Tools for Test Phase:

Test - Methods of Testing: Feedback capture grid, A/B testing Activities:
Collect feedback; iterate and improve the ideas **Weeks14-15:**

Solution Overview-Create a Pitch –Plan for scaling up-Road map for implementation

Activities: Present your solution using Storytelling method

Week16:

Project Submission: Fine tuning and submission of project report

Reference books:

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2. Michael Lewrick, Patrick Link, Larry Leifer, *The Design Thinking Toolbox*, John Wiley&Sons, 2020.
3. Michael Lewrick, Patrick Link, Larry Leifer, *The Design Thinking Playbook*, John Wiley&Sons, 2018.
4. KristinFontichiaro, *DesignThinking*,CherryLakePublishing,USA,2015.
5. Walter Brenner, Falk Uebernickel, *Design Thinking for Innovation - Research andPractice*,Springer Series,2016.
6. GavinAmbrose,PaulHarris, *DesignThinking*,AVAPublishing,2010.
7. MuhammadMashhoodAlam,*TransforminganIdeaintoBusinesswithDesignThinking*, FirstEdition,TaylorandFrancisGroup,2019.

8. S.Balaram,*ThinkingDesign*,SagePublications,2011.

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1. https://designthinking.ideo.com/
2. https://thinkibility.com/2018/12/01/engineering-vs-design-thinking/
3. https://www.Coursera.org/learn/design-thinking-innovation
4. https://swayam.gov.in/nd1_noc20_mg38/preview