



INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited "A++" Grade by NAAC | 12B Status by UGC | Approved by AICTE
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SCHOOL OF COMPUTING

Academic Year 2023-2024

ODD SEMESTER

Board of Studies Meeting

Date: 10.05.2023

Time: 9.30 AM

Venue: Board Room, St Paul's Block

Agenda:

- Approval for Regulations 2023 curriculum and Syllabus.
- Inclusion of Service now course as a professional Elective for academic year 2023-2024
- Seeking approval for syllabus and course delivery plan of Design thinking and innovation – a common course for all programs of the engineering streams.
- Venture Creation SSBA4003 - NEN Ignite course to be offered as Professional Elective for the 5 Semester students
- In each semester minimum one subject is made as lab heavy subject
- SCSA3019 Augmented Reality and Virtual Reality subject is made as PBLA subject
- Approval for S11BLH11 Programming in C for revised syllabus
- SCSA4003 Business Analytics introduced in a new curriculum
- Seeking approval for SCSA3016 Data Science syllabus.

Minutes

The BOS meeting was convened on 10th May, 2023 to frame the new curriculum and syllabi of School of Computing for the Regulations 2023.

The Dean, Dr.T.Sasikala greeted and welcomed all the Board of Studies members. The HODs of CSE and IT and the faculty members of the School of Computing attended the meeting and interacted with the expert members.

Dr.T.Sasikala, the Dean, gave a brief overview of the school's history and the many courses available. The Dean went on to outline the syllabus revision process by listing the many processes that were taken in developing the new syllabus.

- The HOD presented the curriculum and syllabus designed for the new regulations 2023.
- The new syllabus for all the core and elective courses had been prepared for B.Tech programme and placed before the panel for their approval.
- Suggestions were received from the experts during the BOS meeting held on 8th December, 2022 and their valuable suggestions were considered while framing the syllabus.

- The contents of the syllabus for each subject was discussed in detail and taking into consideration the relevance to the latest technologies.
- Dr.T.G.Sambanthan commended the inclusion of lab-intensive courses in all semesters and gave advice course delivery plan of Design thinking and innovation.
- The members reviewed the plan for lab heavy S11BLH11 Programming in C and voted to move forward with the lab heavy courses.
- Mr.Ajay suggested that industry experts be brought in and that special sessions be held to incorporate functional programming in SCSA3019 Augmented Reality and Virtual Reality.
- Dr.Sankaran welcomed the revised curriculum's incorporation and suggested SCSA4003 Business Analytics & SCSA3016 Data Science as a new course .
- Dr. T.T.Mirnalinee suggested Venture Creation SSBA4003 as Elective to improve students Entrepreneur skills
- A collective suggestion from the Alumni was to include new courses that would help students improve project based learning. The department had planned to include Augmented and Virtual Reality as a project based learning course. The members reviewed the plan and approved to proceed with the course.
- The BOS Experts appreciated the content as well as the depth of the syllabi in the curriculum.

Convener: Dr. T.Sasikala, Dean School of Computing

External Members:

Academic Expert

- Dr.T.G.Sambanthan, Professor & Head, Department of Computer Science & Engineering NITTTR, Chennai. *Sambanthan*
- Dr. T.T.Mirnalinee, Professor and Head, Department of Computer Science and Engineering, SSN College of Engineering, Chennai *Mirnalinee*

Industry Experts

- Dr.V.Sankaran, Program Manager, Engineering and R&D Services, HCL Technologies *Vandana*
- Mr. Ajay Kumar, CTO, Cognibot Robotics, Chennai. *Ajay Kumar*

Alumni

- Mr.Johnson S, Project Test Manager, TCS , Chennai. *Johnson*
- Mr.Ashish Chopra, Senior BDE, Freshworks, Chennai. *Ashish*

Internal Members:

- Dr.B.Bharathi, Dean, Academics. *Bharathi*
- Dr.L. Lakshmanan, HoD, Department of CSE *Lakshmanan*
- Dr.S.Vigneshwari, HoD - Specialization, Department of CSE *Vigneshwari*
- Dr. R.Subashini , HoD, Department of IT *R.Subashini*
- Dr.S.Revathy, Professor, Department of IT *Revathy*
- Dr.P.Jeyanthi, Professor, Department of IT *Jeyanthi*
- Dr.L.MaryGladence, , Professor, Department of IT *MaryGladence*

Sasikala
Dean -SOC

SCSA1104	PROBLEM SOLVING TECHNIQUES WITH C AND C++	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To learn the fundamentals of PST and methodologies which are essential for building good C/C++ programs.
- To demonstrate a thorough understanding of modular programming by designing programs which require the use of programmer-defined functions.
- To impart the knowledge about pointers which is the backbone of effective memory handling.
- To demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.

UNIT 1 INTRODUCTION TO COMPUTER PROBLEM SOLVING

9 Hrs.

Algorithms - Building blocks of algorithms (statements, control flow, functions) -Notation (pseudo code, flow chart) - Algorithmic problem solving for socio economic conditions in global perspectives - Simple strategies for developing algorithms (iteration, recursion) - Efficiency of algorithms.

UNIT 2 BASICS OF C PROGRAMMING

9 Hrs.

Introduction to C: Features of C - Structure of C program-Data Types-'C' Tokens-Input/output statements-Control Statement, Functions:- Types of Functions -Recursion. Algorithms: Reversing the digits of a number - Generation of Fibonacci sequence- Factorial Computation.

UNIT 3 ARRAYS, STRINGS AND STRUCTURES

9 Hrs.

Arrays: Single and Multidimensional Arrays-- Array as Function Arguments, Strings: String Handling Functions, Structure: Nested Structures - Array of Structures - Structure as Function Argument-Function that Returns Structure, Union.

Algorithms: Sum of array elements- **Removal of duplicates from an array-Finding the Kth smallest element**

UNIT 4 POINTERS AND FILE PROCESSING

9 Hrs.

Pointers: Introduction, Arrays Using Pointers - Structures Using Pointers - Functions Using Pointer, Dynamic Memory Allocation, **Storage Classes, File Handling in 'C'**

Algorithms: Swap elements using Call by Reference - Sorting Arrays using pointers- Finding sum of array elements using Dynamic Memory Allocation.

UNIT 5 OBJECT ORIENTED PROGRAMMING CONCEPTS

9 Hrs.

Introduction-Procedure vs. object-oriented programming-Concepts: Classes and Objects-Operator & Function Overloading-Inheritance, Polymorphism and Virtual Functions.

Max.45Hrs.

COURSE OUTCOMES:

CO1: On completion of the course the student will be able to

CO2: CO1: Develop solutions for the given problem.

CO3: CO2: Design and Implement applications using arrays and strings.

CO4: CO3: Develop and Implement applications using memory allocation and File concepts.

CO5: CO4: Use proper class protection to provide security.

CO6: CO5: Describe the reusability of code through Inheritance.

CO7: CO6: Demonstrate the use of virtual functions to implement polymorphism.

TEXT / REFERENCE BOOKS

1. Dromey.R.G, "How to Solve it by Computer", Prentice-Hall of India, 8th Indian Reprint, 2008.
2. Aho.A.V.,Hopcroft.J.E and Ullman.J.D, "The Design and Analysis of Computer Algorithms", Pearson
3. education, 2004.Deitel and Deitel, C how to Program, 7th Edition, Pearson Education, 2013.
4. Brian W.Kernighan and Dennis M.Ritchie, The C Programming Language, Pearson Education, 2015.
5. Bhawe, Object Oriented Programming with C++, Pearson Education, 2004.
6. John R Hubbard, "Programming with C++", Schaums Outline Series, McGraw Hill, 2nd edition, 2009.
7. Bjarne Stroustrup, Programming: Principles and Practice using C++, 1st Edition, Addison Wesley Publications, 2008.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

Part A: 10 questions carrying 2 marks each - No choice

20 marks

Part B: 2 questions from each unit of internal choice, each carrying 16 marks

80 marks



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S11BLH11	PROGRAMMING IN C	L	T	P	EL	Credits	Total Marks
		2	0	4	0	4	100

COURSE OBJECTIVES

- To understand the concepts of variables, operators, control structures and arrays.
- To gain knowledge on Functions, Structures and Union in C.
- To explore the concepts of pointers and files to create real world applications using CDevise programs using Loops, Control structures and Array in C.

UNIT 1 BITS AND BYTES IN COMPUTING

12 Hrs.

Computers: Hardware – Software – Processor – Memory – I/O devices – Interface – Programming Languages – Evolution from COBOL, FORTRAN to C, Python – Need Algorithms: Role in problem solving – Analysis – Design – Flowcharts: Role in problem solving – Symbols – Design – Pseudocode: Role in problem solving – Design – Program: Role in problem solving – Design

Practice:

1. Describe a simple real world problem in your domain of interest and describe it in the form of problem statement, input, output and provide its solution in terms of algorithm, flowchart, pseudo code and program.

UNIT 2 C: MATH BEHIND CODING

12 Hrs.

C: Structure of program – Character set – Tokens – Keywords – Identifiers – Constants – Variables – Datatypes – Strings – Operators and its types – Functions – Header Files Algorithmic Strategies: Iteration and Recursion – Efficiency – Role of Time and Space consumption while building an algorithm – Complexities

Practice:

1. Describe a simple real world problem in your domain of interest and provide a computing and non- computing solution for the same. Calculate the time and space consumed in both solutions. Compare and contrast the pros and cons in both solutions.
2. Write an algorithm, flowchart, pseudo code followed by a simple C code to do find the Factorial and Fibonacci series using both iteration and recursion.
3. Get the number of days taken to cultivate both rice and wheat in turns in an agricultural land from the user. Write a C program to convert the days and display as years, months and days using simple operators.
4. You have a circular plot for building playground and a rectangular plot for building an apartment. Get the input from the user for both plots and write a C program to calculate the area and perimeter of both plots.

UNIT 3 C: MAGIC BEHIND INSTANT OUTPUTS

12 Hrs.

Advanced Coding Concepts: Decision Making using Branching Statements and its types – Decision Making using Looping Statements and its types – Switch Statements – Break – Continue – Goto – Jump Statements

Case Study: Fun with Code - Printing Alphabets / Flags of Countries / Flying Alphabet Screensaver Practice:

1. Describe a problem statement in your domain of interest whose solution involves repetition of same steps and provide code as solution involving for, while and do while loops.
2. Describe a problem statement in your domain of interest whose solution involves decision making and provide code as solution involving if-else, nested if-else and ladder if-else.
3. Develop a simple scientific calculator using Switch case statement.

A Cartesian co-ordinate system has four quadrants. Write a C program to find the quadrant of the co-ordinate points given by the user using both if-else if-else and nested if-else control structure.

4. Given a rose flower to you, dismantle the petals of the flower from inside, if you notice - it follows the sequence of Fibonacci. Now, try to arrange the word "PIZZA" in several ways without repeating and calculate number of ways it can be done using factorial concept. Write a C program to find both Fibonacci and factorial by getting the mentioned input.
5. Product of two large prime numbers is used as encryption key in encryption algorithms. Write a C program to display all the prime numbers between 1 to 100 and give the first two largest numbers as the output.

UNIT 4 STORING GROUP OF HOMOGENOUS ELEMENTS: ARRAYS 12 Hrs.

Diving into Arrays: Definition – Syntax – Types – Representation: Row & Colum Order – Dynamic Arrays Idea behind Functions:

Declaration – Definition – Types – Calling – Arguments – Prototypes – Call by Value – Call by Reference – Pointers – Amalgamation of

Pointers: with Arrays & Strings

Case Study: Fun with Code – Simple Game Development using Arrays and Functions Practice:

1. Describe a problem statement in your domain of interest where you need to work with group of same type of data. Provide a solution in terms of C program to store and manage the data effectively.
2. You're playing UNO cards, suddenly a person is getting rev card. Write a C program to reverse the round by storing the number of players in array.
3. Write a C program for Vehicle Regulation System where odd number ending vehicles can use the road on odd days and even number ending vehicles can use the road on even days using two separate arrays to store and display the odd and even numbers.
4. Write a C program to do the following applications in array:
 - (i). Get set of +ve and -ve integers from user, replace -ve integers by 0 in the array.
 - (ii). Reverse the floating point numbers stored in the array.
 - (iii). Return the smallest value and largest value position in the array.
 - (iv). Search the number '5' in array and replace it with '10'
5. Write C program to do the following string handling applications.
 - (i). Get favourite actor and actress name, concatenate it and display
 - (ii). Display your name in uppercase, lowercase and as fname and lname.
 - (iii). Count the frequency of "the" in any sentence and delete it from sentence.
 - (iv). Check whether the given string is a palindrome or not.
6. Write C program to do the following string handling applications.
 - (i). Get favourite actor and actress name, concatenate it and display
 - (ii). Display your name in uppercase, lowercase and as fname and lname.
 - (iii). Count the frequency of "the" in any sentence and delete it from sentence.
 - (iv). Check whether the given string is a palindrome or not.
7. Write a C program for counting the total number of duplicate elements in an array, print all the unique elements in the same array as two different functions.
8. Write a C program to sort the elements in an array in both ascending and descending order using two different functions.
9. Write a C program to find the largest and smallest number in an array using recursion and to convert the output into a binary number.
10. Write a C program to swap two numbers using two functions, one using pointers and the other one without using pointers.

UNIT 5 STORING GROUP OF HETROGENOUS ELEMENTS: STRUCTURE 12 Hrs.

Outset of Structure and Union: Structure Definition & Declaration – Structures Fusion with: Arrays – Pointers – Functions – Union Initiation, Definition & Declaration – Memory Allocation: Static and Dynamic Working with Files: File Handling Functions – Read – Write – Other Operations – Different File Types Case Study: Report on using File Functions to create Score Board for any game, importing it to program Practice:

1. Describe a problem statement in your domain of interest where you need to work with group of different type of data. Provide a solution in terms of C program to store and manage the data effectively.
2. Write a C program to get the details of the student (roll no, name, date of birth, state, 10th percentage and 12th percentage) using Structure. Calculate the age of the student and display the eligibility status for his admission.
Eligibility criteria: more than 60 percent in 10th and 12th, age>=17, state==TN.
3. Write a menu driven C program for library management system with ten entries:
 - (i). Add Book (ii). Add Author (iii). Add Category (iv). Book Cos
 - (v). Display - Book by Author, Book by Category, Book under cost
4. Write a C program to create an employee Union with employee details (id, name, salary) Accept the details of 'n' employees, rearrange the data in ascending order of employee name, id and salary as three different functions and display it.

Complex Practice Problems

1. Design a C program by creating your own header file for any function of your choice and display the

- output by calling the header file.
2. Create TIC-TAC-TOE game using C Language.
 3. Given a situation, you are going to ATM to withdraw money. Write a C program, get the money requested from the user as input and display the number of possible bank notes for the requested money.
Note: Give input as number ending in 0's or 5's.
 4. Develop a C program for managing Car Rental process with various modules for registration as new user, login, get id proof, keep track of cars available and cars given for rental.
 5. Create SUDOKU game using C Language.

Max. 60 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1** - Interpret the difference between components of problem solving such as algorithm, flowchart, pseudo code and source code.
CO2 - Build simple solution for any given problem statement using various components of problem solving techniques and measure its efficiency in terms of time and space.
CO3 - Infer and examine the roots and foundation of C programming's key concepts like Datatypes, Operators.
CO4 -Devise and correlate the use of different core concepts such as Arrays and Functions in C language.
CO5 - Formulate real time solutions through programs using Structure and Union in C language.
CO6 - Design and Develop various Application Oriented Program for solving real time societal problems.

TEXT / REFERENCE BOOKS

1. Yashavant Kanetkar, "Let us C", BPB Publications, Fourteenth Edition, 2019.
2. R.G.Dromey, "How to Solve it by Computer", Pearson Education, 2008..
3. Balagurusamy, "Programming in ANSI C", McGrawHill Publications, Eighth Edition, 2019.
4. Greg Perry, Dean Miller "C Programming Absolute Beginner's Guide", Third Edition, 2013.



Added Content

SCSA1319	DESIGN THINKING AND INNOVATIONS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To introduce the idea of Human-centered design and design thinking.
- To understand the concept of empathy and its technique.
- To understand observation phase and insight concepts in design thinking.
- To leverage the use of prototype in design thinking
- To design business models using the design thinking innovations.

UNIT 1 HUMAN-CENTERED DESIGN

9 Hrs.

Introduction to Human-centered Design – Applications of Human-centered Design – Design Process – Mindsets of Human-centered designer – Principles and process of Design Thinking – Planning a Design Thinking Project

UNIT 2 INTERVIEWING & EMPATHY-BUILDING TECHNIQUES

9 Hrs.

Introduction to Empathy – Practicing Empathy – Empathy vs. Sympathy – Methods for Empathetic design – Tips for Interviews – Empathy Interviews – Understanding and defining the problem

UNIT 3 MAKING SENSE OF OBSERVATIONS & INSIGHTS

9 Hrs.

Observation Phase – Tips for observing – Insights definition – Problems with Insights – Case study: Insight problems in the history of aviation – Creativity process, principles and techniques – Evaluation of ideas

UNIT 4 DEVELOPING AND TESTING PROTOTYPES

9 Hrs.

Role of Prototype in design thinking – Types of prototyping – Guidelines for prototyping – Lean Startup Method for Prototype Development – Visualization and presentation techniques – Testing prototypes: Feedbacks and Maximize learning

UNIT 5 DEFINING & TESTING BUSINESS MODELS & BUSINESS CASES

9 Hrs.

Business Model Definition – Design thinking to design business model – Innovation in Business Model – Pursuing innovation in business – Business model innovations cases – Kano Model – Desirability Testing

Max.45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Understand and apply human-centered design process and planning of design thinking project

CO2: Use empathetic design in the interview process

CO3: Identify need for observations and insights problems and come up with creative ideas in design thinking

CO4: Understand, build and test the prototypes

CO5: Use design thinking concepts to build successful business models.

CO6: Implement innovation techniques in business models.



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SCSBDPROJ	DESIGN THINKING AND INNOVATIONS	L	T	P	EL	Credits	Total Marks
		1	0	2	0	2	100

COURSE OBJECTIVES

- To apply knowledge in Real time problem solving.
- To foster innovation in design of products, processes or systems.
- To develop creative thinking in finding viable solutions to Engineering /Non Engineering problems.

Activity 1: Design thinking introduction

- Phases of design thinking- a study approach
- Group Discussion on Ideation- Users perspective Formation of team – Thinking skills- Brain storming

Activity 2: Problem identification (phase I)

- Selecting user requirements
- Survey on various user's applications
- Specific Problem selection to proceed with the work – Team presentation on identified problems and various possible solutions.

Activity 3: Problem identification (Phase II)

- Study of an application and its importance to end user.
- Various models of an applications
- Finalize the identified problem

Activity 4: Design ideation and various stages

- Sketch design diagram
- Architecture or full diagrammatic study

Activity 5: Review and upgradation

- Review of the ideation (one to one interaction)
- Feedback
- Upgradation plan

Activity 6: Implementation (Phase I)

- Build the prototype using available resources
- Record Module diagrams

Activity 7: Implementation (Phase II)

- Display and review of the prototype.
- Record its functionality and its Usage-Technical manual

Activity 8: Testing

- To test the product design with real time environment
- Record Process-user manual

Activity 9: IPR-Activity I

- To study various IPR activities
- To prepare for IPR Process
- To file an IPR

Activity 10: Start-ups Formation

- To exhibit the product to public: feedback approach
- To prepare full documentation
- Start-ups registration/apply patent/publish paper/submit model/prototype/Apply for seed/submit as research proposal

COURSE OUTCOMES

On successful completion of the course, the students will be able to

- C01** - Solve real world problems by applying knowledge across domains
- C02** - Develop various design products, processes or technologies for sustainable and socially relevant applications.
- C03** - Demonstrate knowledge of resource utilization/budgets to Implement appropriate methodologies.
- C04** - Execute tasks by application of engineering standards/ requirements/ design criteria, within timelines.
- C05** - Conduct extended investigation that results in the translation of idea to product / production of a research thesis/developing a proof of concept.
- C06** - Communicate well organized technical and scientific findings effectively in written and oral forms, following ethical and professional norms.

TEXT / REFERENCE BOOKS

1. Mueller-Roterberg, Christian. "Handbook of Design Thinking." Hochschule Ruhr West (2018).
2. Design Kit by IDEO.org. "The field guide to human centered design." (2015), ISBN: 978-0-9914063-1-9.
3. <https://www.interaction-design.org/literature/article/design-thinking-getting-started-with-empathy>
4. <https://www.interaction-design.org/literature/article/stage-4-in-the-design-thinking-process-prototype>
5. <https://www.interaction-design.org/literature/article/test-your-prototypes-how-to-gather-feedback-and-maximise-learning>
6. <https://uxplanet.org/what-are-insights-aaf2d1b3b9c>
7. <https://labs.sogeti.com/using-design-thinking-to-design-business-models/>
8. <https://www.northeastern.edu/graduate/blog/implementing-business-model-innovation/>

COURSE ASSESSMENT METHODS

Direct Methods	Design innovation Reviews Report Submission IPR Registration
Indirect Methods	Course Exit Survey

Assessment Method	Rubrics	Marks allotted	Assessment Type
Review 1	1	30	CAE
Internal Guide	2	10	CAE
IPR Process and Registration	5	10	ESE
Total – Internal		50	
Final Review	3	30	ESE
Report Submission	4	20	ESE
Total –External		50	



Added Content

SCSA3019	AUGMENTED AND VIRTUAL REALITY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To make students know the basic concept and framework of virtual reality.
- To teach students the principles and multidisciplinary features of virtual reality.
- To teach students the technology for multimodal user interaction and perception in VR, in particular the visual, audial and haptic interface and behavior.
- To teach students the technology for managing large scale VR environment in real time.
- To provide students with an introduction to the VR system framework and development tools.

UNIT 1 INTRODUCTION OF VIRTUAL REALITY

9 Hrs.

Fundamental Concept and Components of Virtual Reality- Primary Features and Present Development on Virtual Reality - VR systems - VR as a discipline-Basic features of VR systems-Architecture of VR systems-VR hardware -VR input hardware: tracking systems, motion capture systems, data gloves-VR output hardware: visual displays.

UNIT 2 I/O INTERFACE AND TECHNIQUES IN VR

9 Hrs.

Multiple Modals of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual / Auditory / Haptic Devices. Interactive Techniques in Virtual Reality: Body Track, Hand Gesture, 3D Manus, Object Grasp.

UNIT 3 VISUAL COMPUTATION IN VIRTUAL REALITY

9 Hrs.

Fundamentals of Computer Graphics-Software and Hardware Technology on Stereoscopic Display-Advanced Techniques in CG: Management of Large Scale Environments & Real Time Rendering -Development Tools and Frameworks in Virtual Reality: Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtoolsetc

UNIT 4 INTRODUCTION OF AUGMENTED REALITY

9 Hrs.

System Structure of Augmented Reality-Key Technology in AR-- AR software development - AR software. Camera parameters and camera calibration. Marker-based augmented reality. Pattern recognition. AR Toolkit

UNIT 5 APPLICATION OF VR IN DIGITAL ENTERTAINMENT

9 Hrs.

VR Technology in Film & TV Production.VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR.3D user interfaces - Why 3D user interfaces. Major user tasks in VE. Interaction techniques for selection, manipulation and navigation.3DUI evaluation.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Design and implement the VR system.

CO2 - Implement the Augmented Reality software.

CO3 - Analyze and design the framework in VR using various software development tools in VR.

CO4 - Design the multi modal user interface.

CO5 - Describe the principles and features of VR and AR.

CO6 - Recognize the technologies used to manage the large scale VR environment in real time.

TEXT / REFERENCE BOOKS

1. Sherman, William R. and Alan B. Craig. Understanding Virtual Reality – Interface, Application, and Design, Morgan Kaufmann, 2002.
2. Fei GAO. Design and Development of Virtual Reality Application System, Tsinghua Press, March 2012.
3. Guangran LIU. Virtual Reality Technology, Tsinghua Press, Jan. 2011.
4. Burdea, G. C. and P. Coffet. Virtual Reality Technology, 2nd Edition. Wiley-IEEE Press, 2003/2006.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks : 100

PART A : 10 Questions of 2 marks each-No choice

PART B : 2 Questions from each unit with internal choice, each carrying 16

Exam Duration : 3 Hrs.

20 Marks

80Marks



New Course

S41BPB41	VENTURE CREATION	L	T	P	EL	Credits	Total Marks
		2	0	0	3	3	100

COURSE OBJECTIVES

- To develop an entrepreneurial mindset, understand the concept of entrepreneurship and identify personal strengths and weaknesses
- To understand the design thinking process and apply design thinking to real-world problems
- To identify problems and opportunities and develop ideas for new ventures by assessing market potential
- To develop a value proposition, business model canvas, build MVP to create sustainable differentiation for the venture with a well-structured business plan, unit economics, go-to-market strategies and funding plan for managing business growth
- To build an idea pitch and deliver it with confidence to potential stakeholders

UNIT 1 INTRODUCTION TO ENTREPRENEURSHIP 9 Hrs.

Defining Entrepreneurship, evolution the concept & Emerging Trends in Entrepreneurship (Domain specific), Understanding the unique opportunities-Why be an Entrepreneur? Entrepreneurship in Indian Scenario & Its role in economic development-Success stories of Entrepreneur (Domain specific)- Entrepreneurial style assessment tool-Developing the Entrepreneurial mindset- Attributes & skills, recognizing your sweet spot for starting up-Principles of Effectuation-Myths about Entrepreneurship- Types of Entrepreneurs-Entrepreneur vs Intrapreneur-Role of Entrepreneurial Teams.

UNIT 2 DESIGN THINKING AND OPPORTUNITY DISCOVERY 9 Hrs.

Introduction to Design Thinking for startups -Design Thinking principles & process-Define the problem using Design thinking principles and validate Problem-Generation of ideas, Idea generation techniques and evaluating creative ideas-Identify problem worth solving-Sharpen your Problem Pitch.

UNIT 3 CUSTOMER, MARKETS AND CREATING A SUSTAINABLE DIFFERENTIATION 9 Hrs.

Differentiate between a customer and a consumer -Who is your customer and what is your segment - Customer Job, Pains, and Gains using Value proposition Canvas -Build solution using Value Proposition Canvas -Market Estimation-TAM,SAM,SOM-Competitive analysis - Minimum viable product
- what is MVP -Build - Measure - Learn, differentiate between solution Demo & MVP -How to validate MVP- Achieve a Product – Market fit.

UNIT 4 BUSINESS MODEL, BUSINESS PLANNING AND GO TO MARKET STRATEGIES 9 Hrs.

Introduction to Business model-Business plan -Lean approach 9 block lean canvas model-Financial feasibility: Costs, revenue streams- Pricing-Financial Projections- Key Financial Metrics using financial template- Managing growth & targeting scale- Unit economics-Selecting the Right Channel-Introduction to Digital Marketing and tools-Branding strategy.

UNIT 5 FUNDING STRATEGY 9 Hrs.

Sources of funds: Debt &Equity -Map the Start-up Lifecycle to Funding Options-Build an Investor ready pitch deck.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able

- CO1 - To define entrepreneurship and explain emerging trends in entrepreneurship
- CO2 - To identify and evaluate business opportunities and assess market potential
- CO3 - To conduct customer discovery, market research, build a lean canvas, develop a business plan and marketing strategies
- CO4 - To identify sources of funding and develop a funding strategy, understand basic legal requirement for starting and running a business
- CO5 - To build an idea pitch and deliver it with confidence to various stakeholders

TEXT / REFERENCE BOOKS

1. Hisrich, R. D., Peters, M. P., & Shepherd, D. A. Entrepreneurship (10th ed.). McGraw-Hill Education. (2017).
2. Ries, E. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business. (2011).
3. Blank, S. G., & Dorf, B. The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company. K&S Ranch. (2012).
4. Roy, R. Indian Entrepreneurship: Theory and Practice. New Delhi: Oxford University Press. (2017).
5. Chandan, J. S., & Rana, S. S. Entrepreneurship Development and Management. New Delhi: McGraw Hill Education. (2019).

6. Sinek, S. Start with Why: How Great Leaders Inspire Everyone to Take Action. Portfolio. (2011).
7. Choudhary, R., & Mehta, N. From Zero to One: How to Build a Successful Startup in India. Notion Press. (2019).
8. Osterwalder, A., & Pigneur, Y. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons. (2010).
9. Mitra, P., & Banerjee, A. Startup Minds: The Entrepreneur's Journey from Idea to Success. SAGE Publications India. (2019).
10. Thiel, P. Zero to One: Notes on Startups, or How to Build the Future. Crown Business. (2014).
11. Zappos, T. Delivering Happiness: A Path to Profits, Passion, and Purpose. Business Plus. (2010).

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100

Exam Duration : 3 Hrs.

PART A :10 Questions of 2 marks each-No choice

20 Marks

PART B :2 Questions from each unit with internal choice, each carrying 16 marks

80 Marks



New Course

		L	T	P	Credits	Total Marks
SCSA4003	BUSINESS ANALYTICS	3	0	0	3	100

COURSE OBJECTIVES

- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support manager in decision making.
- To understand the different basic concept/ fundamentals of business statistics.
- To become familiar with the processes needed to develop, report, and analyze business data.

UNIT1 OVER VIEW OF BUSINESS ANALYTICS 9Hrs.

Definitions and Examples in Business Intelligence - Need, Features and Use of Business Intelligence (BI) -BI Components- Data Warehouse- Business Performance Management. User Interface Business Analytics: Introduction to Business Analytics (BA) – Need- Components (Business Context, Technology, Data Science)-Types (Descriptive, Predictive and Prescriptive)-Business Intelligence versus Business Analytics

UNIT2 TYPES OF DIGITAL DATA 9Hrs.

Definition, Sources, Storage and Characteristics of data - Structured, Unstructured and Semi Structured Data - Importance of data quality-Dealing with missing or incomplete data- Data Classification. Data Warehouse: Definition, characteristics, framework- Data lake - Business Reporting, Visual Analytics: Definition, concepts - Different types of charts and graphs- Emergence of data visualization and visual analytics

UNIT3 INTRODUCTION TO DATA MINING 9Hrs.

Data Mining: Concepts and applications - Data mining process - Text & Web Analytics: Text analytics and text mining overview- Text mining applications- Web mining overview- Social media analytics- Sentiment analysis overview- Big Data Analytics: Definition and characteristics of big data- Fundamentals of big data analytics

UNIT4 TRANSACTION PROCESSING 9Hrs.

Data Mining Tasks, OLAP and Multidimensional data analysis, Basic concept of Association Analysis and Cluster Analysis- Transaction processing v/s Analytic Processing- OLTP v/s OLAP- OLAP Operations- Data models for OLTP (ER model) and OLAP (Star & Snowflake Schema)

UNIT5 BUSINESS PERFORMANCE MANAGEMENT 9Hrs.

Business performance management cycle - KPI, Dashboard - Analytics in Business Support Functions: Sales & Marketing Analytics - HR Analytics - Financial Analytics - Production and operations analytics- Analytics in Industries: Telecom, Retail, Health care, Financial Services- Decision Making under Uncertainty

Case study: prepare a detailed report on applications of analytics in different industries.

Max. 45Hrs.

COURSE OUTCOMES

CO1 : Comprehend Knowledge of basic concept /fundamentals of business statistics, business intelligence

8

CO2 : Evaluating basic concepts of digital data and data warehouse

CO3 : To apply analytics methodologies on various real time data

CO4 :To create data schema and transaction processing methodology for a given real time dataset.

CO5: Analyze various types of analytics on data from various domains.

CO6: To perform practical application by taking managerial decision and evaluating the Concept of Business Analytics

TEXT/REFERENCE BOOKS

1. Shmueli, Patel, and Bruce: Wiley, Data Mining for Business Intelligence, Concepts, Techniques and Applications, Wiley, 2010
2. Fisher and Raman, The New Science of Retailing, : Harvard Business Press, 2012
3. Ramesh Sharda, Dursun Delen, Efraim Turban Business Intelligence: A Managerial Perspective on Analytics Pearson 3rd edition, 2017
4. R.N. Prasad and Seema Acharya Fundamentals of Business Analytics Wiley 2016
5. U. Dinesh Kumar Business Analytics – The Science of Data Driven Decision Making Wiley 2017
6. Anil Maheshwari Data Analytics McGraw Hill 2017
7. Jesper Thorlund & Gert H.N. Laursen Business Analytics for Managers: Taking Business Intelligence beyond Wiley Latest
8. Sahil Raj, Business Analytics Cengage, 7th edition Wayne L. Winston. ISBN-13: 9789353502553.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks : 100

Exam Duration : 3 Hrs.

PART A : 10 Questions of 2 marks each-No choice

20 Marks

PART B : 2 Questions from each unit with internal choice, each carrying 16

80 Marks



New Course

SCSA3016	DATASCIENCE	L	TP	Credits	Total Marks
		3	0 0	3	100

COURSE OBJECTIVES

- To understand the mathematical foundations required for data science.
- To describe a flow process for data science problems.
- To introduce basic data science algorithms and data visualization.
- To learn machine tools and techniques.
- To learn the ideas and tools for data visualization.

UNIT1 LINEAR ALGEBRA

9Hrs.

Algebraic view—vectors 2D, 3D and D, matrices, product of matrix & vector, rank, null space, solution of over determined set of equations and pseudo-inverse. Geometric view-vectors, distance, projections, eigenvalue decomposition, Equations of line, plane, hyperplane, circle, sphere, Hypersphere.

UNIT2 PROBABILITY AND STATISTICS

9Hrs.

Introduction to probability and statistics, Population and sample, Normal and Gaussian distributions, Probability Density Function, Descriptive statistics, notion of probability, distributions, mean, variance, covariance, covariance matrix, understanding univariate and multivariate normal distributions, introduction to hypothesis testing, confidence interval for estimates.

UNIT3 EXPLORATORY DATA ANALYSIS AND THE DATA SCIENCE PROCESS 9Hrs.

Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA - Philosophy of EDA-The Data Science Process-Data Visualization-Basic principles, ideas and tools for data visualization
-Examples of exciting projects-Data Visualization using Tableau.

UNIT4 MACHINE LEARNING TOOLS, TECHNIQUES AND APPLICATIONS

9Hrs.

Supervised Learning, Unsupervised Learning, Reinforcement Learning, Dimensionality Reduction, Principal Component Analysis, Classification and Regression models, Tree and Bayesian network models, Neural Networks, Testing, Evaluation and Validation of Models.

UNIT5 INTRODUCTION TO PYTHON

9Hrs.

Data structures- Functions- Numpy- Matplotlib- Pandas- problems based on computational complexity-Simple cases studies based on python (Binary search, common elements in list), Hash tables, Dictionary.

Max.45Hrs

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1-Explain the basic terms of Linear Algebra and Statistical Inference.
- CO2-Describe the Data Science process and its components interaction.
- CO3-Apply EDA and the Data Science process in a case study.
- CO4-Classify Data Science problems.
- CO5-Analyse and correlate the results to the solutions.
- CO6-Simulate Data Visualization in exciting projects.

TEXT / REFERENCE BOOKS

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.
2. Introduction To Linear Algebra-By Gilbert Strang, Wellesley-Cambridge Press, 5th Edition. 2016.
3. Applied Statistics And Probability For Engineers-By Douglas Montgomery. 2016.
4. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. (free online)
5. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.
6. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd Edition. ISBN 0123814790. 2011.
7. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, 2nd Edition. ISBN 0387952845. 2009. (free online)
8. LEARN PYTHON 3 THE HARD WAY, 3rd Edition, Zed A. Shaw
9. Python for Data Analysis O'Reilly, Wes Mc Kinney

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 10 Questions of 2 marks each—No choice

20 Marks

PART B: 2 Questions from each unit of internal choice, each carrying 16 marks

80 Marks



New Course

SCHOOL OF COMPUTING

Academic Year 2023-2024

EVEN SEMESTER

Board of Studies Meeting

Date: 10.12.2023

Time: 9.30 AM

Venue: Board Room, St Paul's Block

Agenda:

- Approval for Regulations 2023 curriculum and Syllabus.
- Revising of S11BLH21 Programming in Python as lab heavy subject
- Revising SCSB1201 Data Structure and SCSB2201 Data structure Lab syllabus

Minutes

The BOS meeting was convened on 10th December, 2023 to frame the new curriculum and syllabi of School of Computing for the Regulations 2023.

The Dean, Dr.T.Sasikala greeted and welcomed all the Board of Studies members. The HODs of CSE and IT and the faculty members of the School of Computing attended the meeting and interacted with the expert members.

Dr.T.Sasikala, the Dean, gave a brief overview of the school's history and the many courses available. The Dean went on to outline the syllabus revision process by listing the many processes that were taken in developing the new syllabus.

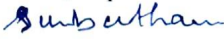
- The HOD presented the curriculum and syllabus designed for the new regulations 2023.
- The contents of the syllabus for each subject was discussed in detail and taking into consideration the relevance to the latest technologies.
- Dr.T.G.Sambanthan commended the inclusion of lab-intensive courses in all semesters and gave advice to assign S11BLH21 Programming in Python as lab heavy subject. Members reviewed the plan for lab heavy and voted to move forward with the lab heavy courses.
- Mr.Ajay suggested SCSB1201 Data Structure and SCSB2201 Data structure Lab syllabus and revised according to his suggestions.
- Dr.Sankaran welcomed the revised curriculum's incorporation of various electives.
- A collective suggestion from the Alumni was to include new courses that would help students improve project based learning. The members reviewed the plan and approved to proceed with the course.
- The BOS Experts appreciated the content as well as the depth of the syllabi in the curriculum.

Convener: Dr. T.Sasikala, Dean School of Computing



External Members:

Academic Expert

- Dr.T.G.Sambanthan, Professor & Head, Department of Computer Science & Engineering NITTTR, Chennai. 
- Dr. T.T.Mirnalinee, Professor and Head, Department of Computer Science and Engineering, SSN College of Engineering, Chennai. 

Industry Experts

- Dr.V.Sankaran, Program Manager, Engineering and R&D Services, HCL Technologies 
- Mr. Ajay Kumar, CTO, Cognibot Robotics, Chennai. 

Alumni

- Mr.Johnson S, Project Test Manager, TCS , Chennai. 
- Mr.Ashish Chopra, Senior BDE, Freshworks, Chennai. 

Internal Members:

- Dr.B.Bharathi, Dean, Academics. 
- Dr.L. Lakshmanan, HoD, Department of CSE. 
- Dr.S.Vigneshwari, HoD - Specialization, Department of CSE 
- Dr. R.Subashini , HoD, Department of IT 
- Dr.S.Revathy, Professor, Department of IT 
- Dr.P.Jeyanthi, Professor, Department of IT 
- Dr.L.MaryGladence, , Professor, Department of IT 



Dean -Soc

SCSA1204	PYTHONPROGRAMMING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To understand why Python is a useful scripting language for developers.
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To build and package Python modules for reusability.
- To understand how to read and write files in Python.
- To learn how to use exception handling in Python applications for error handling.
- To design and program Python applications.

UNIT 1 INTRODUCTION

9Hrs.

History of Python- Introduction to the IDLE interpreter (shell) - Data Types - Built-in function - Conditional statements - Iterative statements- Input/output functions - Compound Data Types - Nested compound statements- Introduction to Object Oriented Concepts.

UNIT 2 FILES AND EXCEPTIONS HANDLING, MODULES, PACKAGES

9Hrs.

File Operations –Iterators - Exception handling - Regular Expressions- Creating Modules-Import Statement- Introduction to PIP-Installing Packages via PIP-Using Python Packages.

UNIT 3 GUI PROGRAMMING

9 Hrs.

GUI Programming in Python - Introduction to GUI library - Layout management - Events and bindings - Fonts – Colours - Canvas - Widgets (frame, label, button, check box, entry, listbox, message, radiobutton, text, spinbox).

UNIT 4 DATABASE AND NETWORK

9Hrs.

Database (using NoSQL): Connector Module –Cursor – Statements - Exceptions in database. Network connectivity: Socket module - Client – Server – Email – URLAccess.

UNIT 5 CASE STUDY

9Hrs.

Web Programming using Python Image Processing – Facebook Analysis – Twitter Analysis.

Max. 45 Hrs.

COURSEOUTCOMES

- CO1: Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.
CO2: Do the decision making and write functions in Python.
CO3: ExplainhowtodesignGUIApplicationsinPythonandevaluatedifferentdatabaseoperations.
CO4: Design and develop Client Server network applications using Python.
CO5: Ability to design real life situational problems and think creatively about solutions of them.
CO6: Apply the best features of mathematics, engineering and natural sciences to program real life problems.

TEXT /REFERENCE BOOKS

1. Y. Daniel Liang, “Introduction to Programming Using Python”, Pearson,2013.
2. Python Notes for Professionals by Stack Overflow Documentation (<https://books.goalkicker.com/PythonBook/>)
3. Dr. Charles R. Severance, “ Python for Everybody- Exploring Data Using Python 3”, 2016.
4. Paul Gries, Jennifer Campbell, Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Pragmatic Bookshelf, 2nd Edition,2014.
5. Magnus Lie Hetland, “Beginning Python: From Novice to Professional”,Apress.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

Part A: 10 questions carrying 2 marks each – No choice

20 marks

Part B: 2 questions from each unit of internal choice, each carrying 16 marks

80 marks



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S11BLH21	PROGRAMMING IN PYTHON	L	T	P	EL	Credits	Total Marks
		3	0	2	1	4	100

COURSE OBJECTIVES

- To learn about data structures lists, tuples, and dictionaries in Python.
- To build packages with Python modules for reusability and handle user/custom exceptions.
- To create real world GUI applications, establish Database connectivity and Networking.

UNIT 1 INTRODUCTION TO PYTHON

12 Hrs.

History of Python- Introduction to the IDLE interpreter (shell) - Data Types - Built-in function – Conditional statements

- Iterative statements- Input/output functions - Python Database Communication

-data analysis and visualization using python

Practice:

- Implement built-in functions and trace the type of data items.
- Implement concepts of Conditional and Iterative Statements.
- Use the built-in csv module to read and write from a CSV file in Python.
- Perform data analysis and visualization on a given dataset using Python libraries like pandas, numpy, matplotlib and display charts, graphs, and plots.

UNIT 2 OBJECT ORIENTED CONCEPTS

12 Hrs.

Class – Objects – Constructors – Polymorphism – Encapsulation -Inheritance -Data Abstraction- Method Overloading-

Method Overriding-Database Access-Data Hiding-Import Class.

Practice:

- Execute concepts on Polymorphism, Encapsulation.
- Implement Data Abstraction and Inheritance.
- Differentiate Method Overloading and Overriding.
- Create a class called "Person" with attributes "name" and "age." Make the "age" attribute private and implement a getter method to access it.
- Create a module called "math_operations.py" with a class called "Calculator." Import the "Calculator" class into another script and use its methods to perform mathematical operations.

UNIT 3 FILES AND EXCEPTIONS HANDLING, MODULES, PACKAGES

12 Hrs.

File Operations –Iterators - Exception handling - Regular Expressions- Functions and modules-Import Statement Introduction to

PIP-Installing Packages via PIP-Using Python Packages.

Practice:

- Create a text file called "numbers.txt" and write the numbers from 1 to 10 in words, each on a separate line.
- Implement a custom iterator that generates a sequence of Fibonacci numbers and print the first 10 numbers.
- Create a try-except block to catch a FileNotFoundError and print a message when a file is not found.
- Write a Python program that handles a ZeroDivisionError and prints a custom error message to the console.
- Create a module called "greetings.py" with a function called "hello" that prints "Hello, World!" Import the module into another script and use the "hello" function.
- Install the "numpy" package using PIP.Import the package and create a NumPy array with random va

UNIT 4 GUI PROGRAMMING

12 Hrs.

GUI Programming in Python - Introduction to GUI library - Layout management - Events and bindings - Fonts – Colors - Canvas - Widgets (frame, label, button, check box, entry, list box, message, radio button, text, spin box).

Practice:

- Design a GUI form with a vertical box layout that includes labels and entry fields for user registration information.
- Create a GUI window with a grid layout that contains buttons representing a 3x3 game board.
- Create a canvas in your GUI program and draw simple shapes such as rectangles, circles, and lines.
- Create a GUI form program that includes various widgets and implement event handling Concepts also add Create a drop-down menu that allows users to select different font styles for text display.

UNIT 5 DATABASE AND NETWORK

12 Hrs.

Database (using NoSQL): Connector Module –Cursor – Statements - Exceptions in database. Network connectivity: Socket module - Client – Server –Email – URL Access.

Practice:

- Connect to the NoSQL database using a Python connector module, such as "pymongo" for MongoDB or "cassandra-driver" for Cassandra.
- Use a cursor to iterate over the records in a collection/table and print specific fields/attributes.
- Implement error handling for specific scenarios, such as duplicate key violation or record not found, in the NoSQL database.
- Implement either a TCP/IP or UDP client-server application using the socket module for sending and receiving messages.
- Write a program using the smtplib module to send an email from a specified email address to another recipient.

Max. 60 Hrs.

COURSE OUTCOMES

On Completion of the course the student will able to

C01 - Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.

C02 - Do the decision making and write functions in Python.

C03 - Explain how to design GUI Applications in Python and evaluate different database operations.

C04 - Design and develop Client Server network applications using Python.

C05 - Ability to design real life situational problems and think creatively about solutions of them.

C06 - Apply the best features of mathematics, engineering and natural sciences to program real life problems.

TEXT / REFERENCE BOOKS

1. R. Nageswara Rao , “Core Python Programming”, Dreamtech Press, Third Edition, 2021
2. Y. Daniel Liang, “Introduction to Programming Using Python”, Pearson, 2013.
3. Python Notes for Professionals by Stack Overflow Documentation (<https://books.goalkicker.com/PythonBook/>).
4. Dr. Charles R. Severance, “Python for Everybody- Exploring Data Using Python 3”, 2016.
5. Paul Gries, Jennifer Campbell, Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Pragmatic Bookshelf, 2nd Edition, 2014.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

Part A: 10 questions carrying 2 marks each – No choice

20 marks

Part B: 2 questions from each unit of internal choice, each carrying 16 marks

80 marks



Added Content

SCSA1203	DATA STRUCTURES	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To impart the basic concepts of data structures and algorithms
- To be familiar with writing recursive methods.
- To understand concepts about searching and sorting techniques.
- To implement basic concepts about stacks.
- To apply the concepts of queues and its types..

UNIT-1 INTRODUCTION TO ALGORITHMS

9 Hrs

Introduction Data Structures - Need - classification - operations - Abstract data types (ADT)- Array - characteristics - types - storage representations. Array Order Reversal-Array Counting or Histogram-Finding the maximum Number in a Set, Recursion-Towers of Hanoi-Fibonacci series-Factorial.

UNIT-2 LINKED LISTS

9 Hrs

Introduction - Singly linked list - Representation of a linked list in memory - Operations on a singly linked list - Merging two singly linked lists into one list - Reversing a singly linked list - Applications of singly linked list to represent polynomial - Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list - Circular Doubly Linked List

UNIT-3 STACKS

9 Hrs

Basic Stack Operations - Representation of a Stack using Arrays - Algorithm for Stack Operations - Stack Applications: Reversing list - Factorial Calculation - Infix to postfix Transformation - Evaluating Arithmetic Expressions.

UNIT-4 QUEUES

9 Hrs

Basic Queue Operations - Representation of a Queue using array - Applications of Queues - Round robin Algorithm - Enqueue - Dequeue - Circular Queues - Priority Queues.

UNIT-5 SEARCHING AND SORTING TECHNIQUES

9 Hrs.

Basic concepts - List Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort - Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

Max.45Hours

COURSE OUTCOMES:

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

- CO1: Understand the concept of recursive algorithms.
- CO2: Demonstrate the different types of data structures.
- CO3: Able to understand the operations on linear data structures.
- CO4: Summarize searching and sorting techniques.
- CO5: Choose appropriate data structure as applied to specified problem definition.
- CO6: Understand and implement the applications of linear data structures

TEXT / REFERENCE BOOKS:

1. Jean-Paul Tremblay, Paul G. Sorenson, 'An Introduction to Data Structures with Application', TMH, 2017.
2. Richard F, Gilberg, Forouzan, "Data Structures", Cengage, 2004, 2nd Edition.
3. Larry R. Nyhoff, ADTs, Data Structures, and Problem Solving with C++, Prentice Hall Editin, 2004.
4. Thomas H. Cormen, Charles E. Leiserson, "Introduction to Algorithms", 3rd Edition, 2010.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

Part A: 10 questions carrying 2 marks each – No choice

20 marks

Part B: 2 questions from each unit of internal choice, each carrying 16 marks

80 marks



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SCSB1201	DATA STRUCTURES	L	T	P	EL	Credits	Total Marks
		3	1	0	0	3	100

COURSE OBJECTIVES

- To understand concepts about linked list, searching and sorting techniques.
- To implement basic concepts about stacks and queues.
- To develop the ability to solve problems by choosing and applying the right data structures.

UNIT 1 INTRODUCTION

9 Hrs.

Introduction to Data Structures - Need - Classification-Arrays - Singly linked list - Representation of a linked list in memory - Operations on a singly linked list - Merging two singly linked lists into one list - Reversing a singly linked list -Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list.

UNIT 2 STACK AND QUEUE

9 Hrs.

Basic Stack Operations - Representation of a Stack using Arrays - Algorithm for Stack Operations - Infix to postfix Transformation - Evaluating Arithmetic Expressions.Basic Queue Operations - Representation of a Queue using array - Enqueue - Dequeue - Circular Queues - Priority Queues.

UNIT 3 TREES

9 Hrs.

Trees- Binary Trees-Properties of Binary trees, Implementation using Array and Linked list - Recursive and Non-Recursive Binary Tree traversals - Binary Search Tree - Insertion and Deletion

UNIT 4 GRAPHS

9 Hrs.

Graph- Representation using Array and Linked List - Types of graphs - Graph traversals - BFS and DFS -Minimum Spanning Tree - Kruskal's, Prim's Algorithm - Shortest path using Dijkstra's, Bellman Ford and Floyd Warshall Algorithm.

UNIT 5 SEARCHING AND SORTING TECHNIQUES

9 Hrs.

Basic concepts - List Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort - Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

Max.45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Interpret the concepts of data structures and choose the appropriate data structure to the problem definition.

CO2 -Design and implement the applications of linear data structures.

CO3 -Apply Algorithm for solving problems like sorting, searching.

CO4 - Design and implement the various non-linear data structures and perform the intended operations.

CO5 -Demonstrate the representation and traversal techniques of graphs and their applications

CO6 -Ability to apply and implement learned algorithm, data structures to solve problems.

TEXT / REFERENCE BOOKS

1. Jean-Paul Tremblay, Paul G. Sorenson, 'An Introduction to Data Structures with Application', TMH, 2017.
2. Richard F. Gilberg, Forouzan, "Data Structures", Cengage, 2004, 2nd Edition.
3. Larry R. Nyhoff, ADTs, Data Structures, and Problem Solving with C++, Pearson Education, 2009.
4. Thomas H. Cormen, Charles E. Leiserson, "Introduction to Algorithms", MIT Press, 4th Edition, 2022.
5. Goodrich MT, Tamassia R, Goldwasser MH. Data structures and Algorithms in Python. John Wiley & Sons Ltd; 2013.

**Max. Marks: 100
Hrs.**

Exam Duration:3

Part A: 10 questions carrying 2 marks each – No choice

20 marks

Part B: 2 questions from each unit of internal choice, each carrying 16 marks

80marks



Added Content

SCSA2201	DATA STRUCTURES LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES:

- To implement linear and non-linear data structures.
- To understand the different operations of search trees.
- To implement graph traversal algorithms.
- To get familiarized to sorting algorithms.
- To implement linear search and binary Search.

LIST OF EXPERIMENTS:

1. Program to insert and delete an element in an array.
2. Program to implement operations on a Singly linked list.
3. Program to implement operations on a doubly linked list.
4. Program to sort the elements using insertion sort.
5. Program to sort the elements using quick sort.
6. Program to sort the elements using merge sort.
7. Program to implement a Stack using an array and Linked list.
8. Program to implement Queue using an array and Linked list.
9. Program to implement Circular Queue.
10. Program to convert an infix expression to postfix expression.
11. Program to implement display elements of a queue according to their priority

COURSE OUTCOMES:

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

- CO1: Remembering the concept of data structures through ADT including List, Stack and Queues
CO2: Understand basic concepts about stacks, queues, lists, trees and graphs
CO3: Able to apply and implement various tree traversal algorithms and ensure their correctness
CO4: Ability to analyze algorithms and develop algorithms through step by step approach in solving problems with the help of fundamental data structures.
CO5: Compare and contrast Array based and Link based applications of typical data structures such As Stacks and Queues.
CO6: Design applications and justify use of specific linear data structures for various applications



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SCSB2201	DATA STRUCTURES LAB	L	T	P	EL	Credits	Total marks
		0	0	4	0	2	100

SUGGESTED LIST OF EXPERIMENTS

1. In a marketplace, there are multiple places that sell pineapple at different size and cost. Implement a program to find the place that sells quality pineapple with largest size and minimum cost by getting the size and cost in array.
2. To use undo operation in a Microsoft Word, the machine needs to remember the list of states and operations made. To implement this in real time write a detailed program with set of insertion and deletion operation functions.
3. Spotify app uses playlist where the song can be changed in both directions to play the next and previous songs in the list. To implement this concept in real time write a detailed program with set of insertion and deletion operation functions.
4. Implement the problem of Towers of Hanoi – a critically acclaimed mathematical implementation with the use of Stack data structure. Implement all of its operation.
5. To manage the queuing system of ticket counter in SKY cinemas implement the queue data structure with all of its corresponding operations.
6. To organize a traffic light management system based on number of vehicles on each side, implement a circular queue data structure algorithm along with its respective operations.
7. Get a complex expression from the user in human's understandable BODMAS format and convert the same expression into machine readable form.
8. To sort the contact names in your phone in ascending order based on the first name using insertion sort algorithm.
9. To sort the students in the class according to their heights for group photo in descending using quick sort algorithm.
10. To sort the chocolates in the supermarket based on its cost and size in ascending order using merge sort algorithm.
11. Implement the Linear Search and Binary Search methods in two programmes to discover any given element inside the provided range of numbers, and compare the results to determine which algorithm is faster and/or uses less space.
12. Write a programme to visit every restaurant along the route when travelling from Chennai to Pondicherry through creating a binary tree for the purpose.
13. Write a program
 - a. To find the nearest restaurants from your location by implementing Breadth First Search traversal algorithm.
 - b. Implement the Depth First Search traversal algorithm to find the cycles in any given graph.
14. By applying the minimal spanning tree technique, you can implement an intercom system to connect all the departments in your college with the least amount of wiring.
15. Implement any shortest path algorithm to discover the shortest route between Chennai and Hyderabad.

COURSE OUTCOMES

On completion of the course, student will be able to

- C01- Implement programs using array and linked list data structures by mapping it to daily pursuits.
- C02 - Formulate programs for algorithms based on stack and queue data structure and its application.
- C03 - Demonstrate the process of sorting that happens in daily activity by implementing various sorting algorithms.
- C04 - Compare and Contrast the difference in time and space complexity for Linear and Binary search algorithm.
- C05- Develop graph and tree traversal algorithms for real time application.
- C06- Design shortest path finding algorithms for real time societal problems



Added Content

