**SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION**
**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMAKURU**
**(A Constituent College of SSAHE, Tumakuru)**
**BE., CIE-I, APRIL 2024**
**22SS401: COMBINATORICS AND ADVANCED LINEAR ALGEBRA**
**SEMESTER: IV, Common to: CS/IS/DS/AI&ML**

**Time: 60 Minute** **Max. Marks: 30**

| | **Answer all the questions** | CO | PO | BL | M |
|---|---|---|---|---|---|
| 1 | In a sample of 100 logic chips, 23 have a defect D1, 26 have a defect D2, 30 have a defect D3, 7 have defects D1 & D2, 8 have defects D1 & D3, 10 have defects D2 & D3 and 3 have all the three defects. Find the number of chips having (i) atleast one defect (ii) no defect. | 1 | 1, 2 | 1 | 6 |
| 2 | i) Suppose 4 letters are to be placed in addressed envelope. Find the number of ways such that no letter is placed in the right envelope.<br>ii) Explain Derangements. Evaluate $d_5$, $d_6$, $d_7$, $d_8$. | 1 | 1, 2 | 2 | 6 |
| 3 | An apple, a banana, a mango and an orange are to be distributed to four boys $B_1$, $B_2$, $B_3$, $B_4$. The boys $B_1$ and $B_2$ do not wish to have apple, the boy $B_3$ does not want banana or mango, and $B_4$ refuses orange. In how many ways the distribution can be made so that no boy is displeased? | 3 | 3, 4 | 4 | 6 |
| 4 | Find the sequence generated by the following functions<br>i) $3x^3 + e^{2x}$ ii) $\frac{x^5}{1-3x}$ | 1 | 1, 2 | 1 | 6 |
| 5 | Find the generating function for each of the following sequences<br>i) 0,1,-2,3,-4,... ii) $1^2, 2^2, 3^2, 4^2, \ldots$ | 1 | 1, 2 | 1 | 6 |

# SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMKUR

(A constituent college of Sri Siddhartha Academy of Higher Education, Tumakuru )

**22IS402:** Database Management System

Date:01/04/2024

**CIE-1**

Time:1.00Hr

**Answer all the questions**

Max Marks: **30**

| | | M | C | B |
|---|---|---|---|---|
| **1.** | Define Database and Database Management System. Explain the key characteristics of the database approach versus the file processing approach. | **6** | **1** | **2** |
| **2.** | Describe the three-schema architecture. Why do we need mappings between schema levels? | **6** | **2** | **2** |
| **3.** | Discuss the different types of user friendly interfaces and the types of user who typically use each. | **6** | **2** | **2** |
| **4.** | Differentiate between<br>i. Simple v/s Composite attributes<br>ii. Stored v/s derived attributes<br>iii. Single v/s Multivalued attributes | **6** | **2** | **3** |
| **5.** | Design an E-R diagram for a movie database. Assume your own entities (minimum 4), attributes and relationships. | **6** | **1** | **3** |

NOTE: M is marks, C is CO and B is Blooms level

# SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMAKURU

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## 22IS403: Object Oriented Programming

Date:02/04/2024 **CIE - 1** Time:1.00Hr

Max. Marks: 30

**Answer all the questions**

| | | M | C | B |
|---|---|---|---|---|
| 1. | Explain the three principles of Object Oriented Programming? | 6 | 1 | 2 |
| 2. | Write the general form of a class definition. Create an employee class to compute the salary of an employee by adding his Basic pay, HRA and DA. Illustrate object declaration and invoking members of the class. | 6 | 2 | 3 |
| 3. | What is constructor? Write a program to illustrate constructor with and without parameter passing. | 6 | 2 | 3 |
| 4. | Explain how to resolve any namespace collision that might occur between instance variable and local variable in java with a sample program. | 6 | 2 | 2 |
| 5. | Describe access modifiers in java. Write a program to demonstrate the difference between public and private access modifiers. | 6 | 2 | 3 |

**NOTE: M is marks, C is CO and B is Blooms level**

# SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMAKURU

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## 22IS404 : Algorithm Design and Analysis

Marks : 30

Date: 02/04/2024 **CIE - I** Time: 1.00 Hr

**Answer all the questions.**

| | | M | C | B |
|---|---|---|---|---|
| 1 | Highlight the properties of a good algorithm. Explain the steps involved in the design and analysis of an algorithm with a neat diagram. | 6 | 1 | 2 |
| 2 | Explain the asymptotic notations used to denote worst and average case time complexity. Derive efficiency of 100n+5 for O, Ω and θ. | 6 | 1 | 3 |
| 3 | What is Brute Force approach? A text has to be searched in a sentence containing 20 words. Write an algorithm for this problem and show its working by considering an example for success and unsuccessful search. | 6 | 3 | 3 |
| 4 | Write the general plan for analyzing time efficiency of recursive algorithms. Derive the time efficiency to compute factorial of a given positive integer along with its algorithm. | 6 | 3 | 3 |
| 5 | Write an algorithm which is most efficient for sorting. Apply the same for following characters and trace its working. 92 ,235 ,678, 564, 78, 55 | 6 | 2 | 3 |

NOTE: M is marks, C is CO and B is Blooms level

**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMKUR**

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**22IS405:** Introduction to Automata Theory and Computation

Date: 03/04/2024 **CIE-1** Time:1.00 Hr

Max Marks: 30

**Answer all the questions**

| | | M | C | B |
|---|---|---|---|---|
| 1. | Define a DFA. Obtain a DFA to accept the following language: L= $\{(01)^i 1^{2j}$ where $i \geq 1, j \geq 1\}$ on $\sum = \{0,1\}$ | 6 | 2 | 1,3 |
| 2. | Obtain NFA to accept strings of a's and b's ending with ab or ba. From this NFA obtain an equivalent DFA using subset construction. | 6 | 2 | 3,2 |
| 3. | Define the following:<br>i) Language of a DFA<br>ii) Extended Transition Function of NFA<br>iii) Epsilon-Closure | 6 | 1 | 1 |
| 4. | Consider the following ϵ-NFA. Compute the ϵ-closure of each state and give all strings of length three or less accepted by the automata. | 6 | 2 | 2 |
| 5. | Give recursive definition of Regular Expressions. Construct Regular Expressions for the following languages:<br>i) The set of all strings containing at least one a and one b on $\Sigma = \{a, b, c\}$<br>ii) $L = \{ w : \lvert w \rvert \bmod 3 \neq 0 \}$ | 6 | 2 | 1,3 |

| δ | ϵ | a | b | c |
|---|---|---|---|---|
| →p | φ | P | q | r |
| q | P | q | r | Φ |
| *r | q | r | φ | p |

NOTE: M: Marks, C: CO and B: Bloom's level