

SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION
SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMAKURU
 (A Constituent College of SSAHE, Tumakuru)
BE., CIE-II, MAY 2024

22SS401: COMBINATORICS AND ADVANCED LINEAR ALGEBRA

SEMESTER: IV

Common to: CS/IS/DS/AI&ML

Time: 60 Minutes

Max. Marks: 30

	Answer all the questions	CO	PO	BL	M
1	Determine the co-efficient of x^{10} in the expression $\frac{x^3-5x}{(1-x)^3}$.	4	3	3	6
2	Determine the sequences for the exponential generating function (i) $6e^{5x} - 3e^{2x}$ (ii) $\frac{1}{1-x}$.	4	2	3	6
3	Using exponential generating function find the number of ways in which 4 of the letters in ENGINE be arranged.	4	3	3	6
4	Solve the following system of equations by LU-factorization method. $2x + 3y + z = 9, x + 2y + 3z = 6, 3x + y + 2z = 8.$	2	1	3	6
5	Define the vector space. Express $v = (3, 7, -4) \in R^3$ as a linear combination of $u_1 = (1, 2, 3), u_2 = (2, 3, 7), u_3 = (3, 5, 6)$.	2	4	3	6

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMAKURU

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22IS403: Object Oriented Programming

Date: 11/05/2024

CIE-2

Time: 1.00Hr

Max Marks: 30

Answer all the questions

- | | M | C | B |
|--|---|---|---|
| 1. Explain why String class is commonly used class in java.
Write a java program to demonstrate String methods equals(), length() and char At(). | 6 | 2 | 2 |
| 2. Illustrate dynamic method dispatch. With an example show how it is achieved. | 6 | 3 | 2 |
| 3. What is an abstract class? Illustrate how we can make use of abstract class and concrete methods written in abstract class with an example. | 6 | 3 | 2 |
| 4. Explain the concept of method overriding in Java with example. <i>plz</i> | 6 | 3 | 2 |
| 5. Consider the trunk calls of a telephone exchange. A trunk call can be ordinary, urgent or lightning. The charges depend on the duration and the type of the call. Write a program using the concept of polymorphism in Java to calculate the charges. | 6 | 3 | 3 |

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

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMAKURU

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22IS404 : Algorithm Design and Analysis

Marks : 30

Date: 11/05/2024

CIE - II

Time: 1.00 Hr

Answer all the questions.

- | | M | C | B |
|---|---|---|---|
| 1. Mention the properties of a good hashing function. Apply open hashing for the text "True wisdom comes to each of us" using hash function $H(X) = X \% 7$ and search a string "come". | 6 | 4 | 2 |
| 2. Write an algorithm to find maximum and minimum elements of an array using divide and conquer technique and derive its efficiency. $O(n)$ $2T(n/2) + 2$ | 6 | 3 | 2 |
| 3. Write an algorithm for Insertion Sort technique and trace the algorithm for following elements 58, 34, 73, 89, 32 to sort in ascending order. | 6 | 3 | 3 |
| 4. Construct a Heap tree for the text "CLEANIG" using Bottom up approach. Sort the same using heap sort showing each step of sorting. | 6 | 2 | 3 |
| 5. Construct an AVL tree for the following elements.
45, 89, 34, 567, 347, 876, 276 | 6 | 2 | 3 |

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SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMKUR
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22IS405: Introduction to Automata Theory and Computation

Date: 13/05/2024

CIE-2

Time: 1.00 Hr

Max Marks: 30

Answer all the questions .

- | | M | C | B |
|---|----------|----------|----------|
| 1. Convert the following Regular Expressions to FA. | | | |
| i) $0^*+1^*+2^*$ | 6 | 3 | 3 |
| ii) $10+(0+11)0^*1^*$ | | | |
| 2. Give CFG's for the following languages: | | | |
| i) $L = \{a^n b^m c^m d^n \mid n, m \geq 1\}$ | 6 | 2 | 3 |
| ii) $L = \{a^i b^j \mid i \neq j\}$ | | | |
| 3. Define the following formally: | | | |
| i) Language of a grammar | 6 | 1 | 1 |
| ii) Sentential form | | | |
| iii) Parse tree | | | |
| 4. Consider the following grammar: | | | |
| $E \rightarrow TE^1$ | | | |
| $E^1 \rightarrow +TE^1 \mid \varepsilon$ | | | |
| $T \rightarrow FT^1$ | 6 | 1 | 3 |
| $T^1 \rightarrow *FT^1 \mid \varepsilon$ | | | |
| $F \rightarrow (E) \mid id$ | | | |
| Give LMD, RMD and Parse tree for the string $id+id*id$. | | | |
| 5. Eliminate ε -productions from the following grammar: | | | |
| $S \rightarrow ABC \mid BaB$ | | | |
| $A \rightarrow aA \mid BaC \mid aaa$ | 6 | 3 | 3 |
| $B \rightarrow bBb \mid a \mid D$ | | | |
| $C \rightarrow CA \mid AC$ | | | |
| $D \rightarrow \varepsilon$ | | | |

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SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMKUR

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22IS402:Database Management System

Date:09/05/2024

CIE-2

Time:1.00Hr

Max Marks : 30

Answer all the questions

- | | M | C | B |
|--|---|---|---|
| 1. Discuss Insertion operation with an example which violates all types of constraints. | 6 | 1 | 2 |
| 2. Consider the following that keeps track of salespersons in a sales office
Salesperson (<u>SSN</u> , Name, St_yr, Dept_no)
TRIP(SSN,From_city,To_city, Departure_date,Rreturn_date, <u>Trip_id</u>)
EXPENSE (Trip_id, <u>Acc#</u> , Amount)
Write the SQL statements for the following
a. Create the above tables.
b. Give the details for trips that exceed \$5000 in expenses.
c. Print the SSN and the name of the salesman who made trips to San_Francisco.
d. Print the total trip expenses incurred by the salesman with the name='Raju'. | 6 | 3 | 3 |
| 3. Explain SIX clause Select statement with an example for each. | 6 | 2 | 2 |
| 4. For the following Relations identify the Queries in SQL
LIVES(Pname, Street , City)
WORKS(Pname, Cname, Salary)
LOCATION(<u>Cname</u> , City)
MANGES(Pname, Mgrname)
Where Pname is person name, Cname is company name and Mgrname is manager name.
a. Create the above tables.
b. Retrieve all the person names who live in Bangalore.
c. List the name and salary of all the persons who work for the company HP.
d. Retrieve the city of INFOSYS company.
e. Give the details of all the employees who live in Bangalore and works for IBM. | 6 | 3 | 3 |
| 5. Discuss Drop, Alter and View functions of SQL with syntax and example. | 6 | 3 | 2 |
- read and observe the given data*
Drop
Alter

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