SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION
SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMAKURU
(A Constituent College of SSAHE, Tumakuru)
BE., CIE-III, JUNE 2024
22SS401: COMBINATORICS AND ADVANCED LINEAR ALGEBRA

SEMESTER: IV **Common to: CS/IS/DS/AI&ML**

Time: 60 Minutes **Max. Marks: 20**

	Answer all the questions	CO	PO	BL	M
1	Show that the transformation $T: V_2(R) \to V_2(R)$ defined by $T(x,y) = (x+y, x-y)$ is a linear transformation.	3	1	2	5
2	Explain Linear transformation. Let $T: R^3 \to R^2$ be a linear transformation which $T(1,0,0) = (2,-1), T(0,1,0) = (3,1), T(0,0,1) = (-1,2)$. Find $T(-3,4,2)$.	4	4	2	5
3	Explain matrix representation of the linear transformation. Find the linear transformation for the matrix $A = \begin{bmatrix} -1 & 0 \\ 2 & 0 \\ 1 & 3 \end{bmatrix}$ with respect to $B_1 = \{(1,0,0), (0,1,0), (0,0,1)\}$ and $B_2 = \{(1,0), (0,1)\}$.	3	1	2	5
4	Explain Range and Null space. Find the range, null space, rank, nullity in the case of the $T: V_3(R) \to V_2(R)$ defined by $T(x,y,z) = (y-x, y-z)$. Also verify the rank, nullity theorem.	3	1	2	5

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMAKURU

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22IS402: Database Management System

Date:04/06/2024

CIE-3

Time:1.00Hr

Answer all the questions

Max Marks: **20**

		M	C	B
1.	Explain how a transaction moves through its execution states with a state transition diagram.	**5**	**1**	**2**
2.	Describe the ACID properties of a transaction	**5**	**1**	**2**
3.	Define a Normal form. Explain the first Normal form (1NF) with an example.	**5**	**4**	**2**
4.	Discuss the informal design guidelines for a relation schema.	**5**	**4**	**2**

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

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22IS403: Object Oriented Programming

Date:04/06/2024 **CIE-3** Time:1.00Hr

Answer all the questions Max Marks: 20

		M	C	B
1.	Define package. Describe the access modifiers and their visibility for class members in Java.	5	3	2
2.	Design a simple Java program to demonstrate different combinations of access control modifiers for: same package subclass, same package non sub class.	5	3	3
3.	What is Interface? Write a Java program for the implementation of multiple inheritance using interfaces to calculate the area of rectangle and triangle.	5	3	3
4.	Explain the concept of default interface methods in detail.	5	3	2

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

Date: 5/06/2024 CIE - 3 Marks : 20

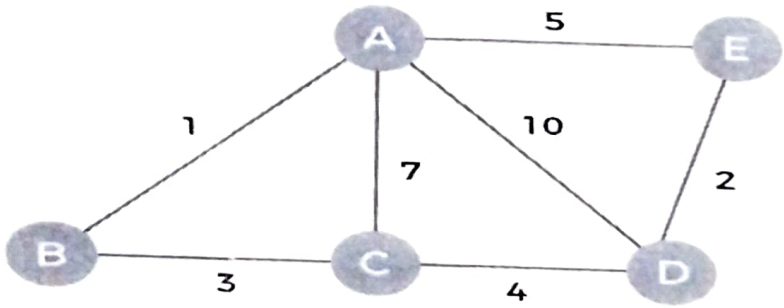
Time: 1.00 Hr

Answer all the questions.

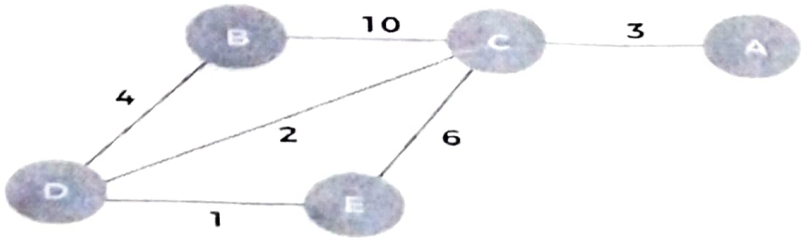
		M	C	B
1	Apply Floyd's algorithm for the following matrix to find all pair shortest paths.	4	4	3

	A	B	C	D
A	0	5	8	9
B	∞	0	3	4
C	∞	∞	0	1
D	∞	∞	∞	0

2	Apply Dijkstra's algorithm for the following graph by considering node A as source.	5	4	3



3	Apply Prims and Kruskals algorithm to find minimum spanning tree for the given graph.	6	4	3



4	Solve the knapsack problem using dynamic programming for the knapsack capacity m= 8, n= 4, w= [2 3 4 5] p=[1 2 5 6].	5	3	3

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SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMKUR

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IS4TH5: Introduction to Automata Theory and Computation

Date: 05/06/2024 **CIE 3** Time:1.00 Hr

Max Marks: 20

Answer all the questions.

		M	C	B
1.	Convert the following grammar into CNF: $S \rightarrow aA \mid aB$ $A \rightarrow aaA \mid B \mid \varepsilon$ $B \rightarrow b \mid bB$ $D \rightarrow B$	5	3	3
2.	Design a Push Down Automata (PDA) to accept the language: $L = \{a^{n+1} b \mid n >= 1\}$.	5	2	3
3.	Define the following: i) Pushdown Automata i) Instantaneous Description ii) Language of PDA by Final State	5	1	1
4.	Design PDA for the $L = \{a^n b^m c^{n+m} \mid n>=1, m>=1\}$	5	2	3

NOTE: M is Marks, C is CO and B is Blooms level.