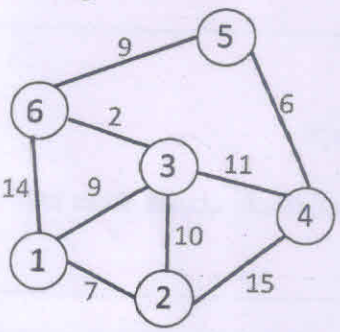
30|5|2022 (E)

SOMAIYA VIDYAVIHAR UNIVERSITY

Semester: January 2022 – May 2022 **Maximum Marks: 100** **Examination: ESE Examination** **Duration: 3:00hrs**		
Programme code: 75 **Programme: Minors in Computer Engg**	**Class:** SY	**Semester:** III **(SVU 2020)**
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department:** COMP	
Course Code: 116m75C301	**Name of the Course: Data Structures and Algorithms**	
Instructions: 1)Draw neat diagrams 2)Assume suitable data if necessary 3) All questions are compulsory.		

Question No.		Max. Marks
Q1	Explain the concept of Abstract Data Type. Write ADT for Complex number (a+ib) as the data type. OR Define data structure. Explain practical applications of stack, queue, trees and graphs.	10
Q2 (a)	Define linked list. Explain the following operations with their pre-status, post-effects, sequence of updating the node connections on a doubly linked list. You may support your explanations with the diagrams. a. Insert into Doubly Linked List b. Delete from Doubly Linked List OR Define circular linked list. Explain the following operations with their pre-status, post-effects, sequence of updating the node connections on a doubly linked list. You may support your explanations with the diagrams. a. Insert into circular Linked List b. Delete from circular Linked List	10
Q2 (b)	Convert the given infix expression into an equivalent postfix one using stack. Show output after processing every input character. Expression: power ([(r+t*y+p)/a+b-c],z)	10
Q. 2 C	State different types of queues. State and explain applications of each one of them in various domains.	10

Q3 (a)	a. Explain binary search tree and balanced binary search trees with a suitable example. b. Comment on significance of balanced binary search trees? Explain the test of checking if the BST is balanced. c. Create a balanced binary tree for the given input. You need not explain how the balancing was achieved. 30, 10, 5,25,75,34	2+3+5
Q3 (b)	Create a unique binary tree using inorder and postorder traversal sequence given below. Show the output step by step- Inorder- B D C F E G A H Postorder- D F G E C B H A OR Apply depth first approach of graph traversal to the given graph. Show step by step output with contents of all data structures involved in the process. **Starting vertex: 1**  	10
Q4 (a)	Consider the problem of storing data of ordered pairs of <subject, subject_teacher> for a 25 year old educational institute. The data might be further retrieved to know which faculty members have taught a particular subject over the years, which all different subjects have been taught by particular faculty member etc. Design a solution for this problem using DICTIONARY data structure.. Support your answer with sample examples of – data elements to be stored, how they are accessed-deleted, how different queries supported by the chosen data structure can be executed on the same, give sample output of those queries etc.	10
Q4 (b)	Hash the following numbers in a table of size 10. Resolve collisions if any, with linear and quadratic probing. State total number of collisions with each technique. 23, 55,0,73, 60,20,18, 100, 43,50	10
Q5 (a)	Compare and contrast searching techniques viz Linear Search, Binary Search, Hashed List Search. Support your claims with suitable example.	10
Q5 (b)	Input : 42,23,74,11,65,58,94,36,99,87 Sort the given numbers using insertion sort. Show the output after every iteration/pass. OR Sort the given numbers using bubble sort. Show the output after every iteration/pass.	10

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Semester: January 2022 – May 2022 **Maximum Marks: 100** **Examination: ESE Examination** **Duration: 3 Hrs**		
Programme code: 75 **Programme: Minor in Computer Engineering**	**Class:** SY	**Semester: IV (SVU 2020)**
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department:** COMP	
Course Code: 116m75C301	**Name of the Course: Database Management System**	
Instructions: 1)Draw neat diagrams 2)Assume suitable data if necessary		

Question No.		Max. Marks
Q1 (a)	i. Explain Data Independence and its types in detail ii. Explain Single-valued, Multi-valued and Derived attributes with the help of examples.	4 6
Q1 (b)	What are the different levels of abstraction in DBMS? Explain each of them with the help of Example.	10
Q2 (a)	Consider the following requirements for a simple database for the National Hockey League (NHL) : 1. The NHL has many teams. 2. Each team has a name, a city, a coach, a captain, and a set of players. 3. Each player belongs to only one team. 4. Each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records. 5. A team captain is also a player. 6. A game is played between two teams and has a date and a score. Construct an E-R diagram for the NHL database. List your assumptions and mention the cardinality mappings. OR Let E1 and E2 be two entities in an E/R diagram with simple single-valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one1 to-many and R2 is many-to-many. R1 and R2 do not have any attributes of their own. Calculate the minimum number of tables required to represent this situation in the relational model? And justify your answer.	12
Q2 (b)	Consider the following relational schema: Employee (empno, name, office, age) Books(isbn, title, authors, publisher) Borrowed(empno, isbn, date)	

	Write the following queries in relational algebra: i. Find the names of employees who have borrowed a book Published by McGraw-Hill? ii. For each publisher, find the names of employees and title of the book who have borrowed the books.	4 4
Q3 (a)	Write SQL statements for following: Student(Enrno, name, courseId, emailId, cellno, dept) Course(courseId, course_nm, duration) i. Add a column "city" in student table. ii. Find out list of students who have enrolled in "computer" course. iii. List name of all courses with their duration. iv. List email Id and cell no of all mechanical engineering students. OR Consider the following database schema and write nested queries in SQL for the given case: Supplier (id, name, city) Parts(pno, pname, pdescription) Supply(id, pno, cost) i. Find the names of the parts supplied by "RamRaj" ii. Find the number of the suppliers who supply "Nuts" iii. Find the cost of bolts being supplied by Nagpur suppliers.	12 (3 each) 4 4 4
Q3 (b)	Define the following terms and give examples (any Two) i. Cardinality of Relationship ii. Recursive Relationship iii. Specialization iv. Weak and Strong Entity	8 (4 each)
Q4 (a)	Explain different steps in high level query processing with diagram. OR Explain 1NF, 2NF and 3NF of Database with Example and Justify your answer.	8
Q4 (b)	Explain the following with example: i. Multilevel and Multiple key indexing. ii. Hash based Indexing and Tree based Indexing	12
Q5 (a)	Define transaction and explain desirable properties of transactions with suitable example.	10
Q5 (b)	Explain Concurrency control with locking methods.	10