5.6.2023 (E)

SOMAIYA VIDYAVIHAR UNIVERSITY

Semester: January 2023 – May 2023		
Maximum Marks: 100	**Examination: ESE Examination** (RT)	**Duration:3 Hrs.**
Programme code: 01 **Programme:** B. Tech Computer Engineering	**Class:** SY	**Semester: III (SVU 2020)**
Name of the Constituent College: K. J. Somaiya College of Engineering	**Name of the department:** Computer Engineering	
Course Code: 116U01C301	**Name of the Course:** Integral transform and Vector Calculus.	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory **3) Assume suitable data wherever necessary**		

Que. No.	Question	Max. Marks
Q1	Solve any **Four** of the following	**20**
i)	Find $L(e^{-3t}\sin^2 t)$	05
ii)	Find $L^{-1}\left(\frac{6s-4}{s^2-4s+20}\right)$	05
iii)	Find half range sine series for $f(x) = x(\pi - x)$ on $(0, \pi)$.	05
iv)	Find Z-Transform of $\cos \alpha k$ for $k \geq 0$	05
v)	Prove that $(\bar{a} \times \bar{b}) \times (\bar{a} \times \bar{c}) = [(\bar{a} \times \bar{b}) \cdot \bar{c}]\bar{a}$	05
vi)	Evaluate $\int_A^B (x^2 - y^2 + x)dx - (2xy + y)dy$ along the parabola $y^2 = x$ from $A(0,0)$ to $B(1,1)$.	05
Q2 A	Solve the following	**10**
i)	Evaluate using Laplace transform $\int_0^\infty \frac{\cos at - \cos bt}{t} dt$.	05
ii)	Find$L^{-1}[tan^{-1}(as)]$.	05
	OR	
Q2 A	Find Fourier series for $f(x) = x^2$ in $(0,2\pi)$. Hence deduce that $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} + \cdots$.	10
Q 2 B	Solve any **One** of the following	**10**
i)	Solve using Laplace transform $(D^2 + 2D + 5)y = e^{-t}\sin t$, when $y(0) = 0, y'(0) = 1$.	10
ii)	Find the Fourier series for $f(x) = \lvert\sin x\rvert$ in$(-\pi, \pi)$.	10

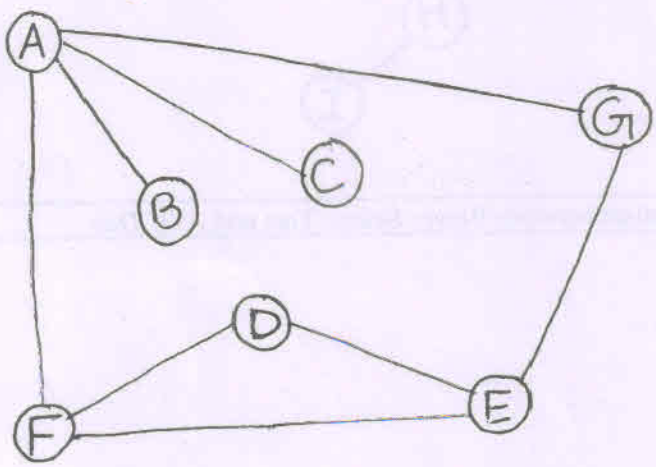
Q3	Solve any **Two** of the following	**20**
i)	(a) Find the Fourier expansion of $f(x) = \begin{cases} -c, & -a < x < 0 \\ c, & 0 < x < a \end{cases}$ In the range$(-a, a)$.	05
	(b) Find Fourier Cosine Transform of $f(x) = \begin{cases} x, & 0 < x < a \\ 0, & a < x \end{cases}$	05
ii)	Show that $\bar{F} = (ye^{xy}\cos z)i + (xe^{xy}\cos z)j - (e^{xy}\sin z)k$ is irrotational and find the scalar potential for $\bar{F}$ and evaluate $\int \bar{F} \cdot d\bar{r}$ along the curve joining the points $(0,0,0)$ and $(-1,2,\pi)$	10
iii)	Evaluate by Green's Theorem $\int_C (e^{-x}\sin y\, dx + e^{-x}\cos y\, dy)$ where C is the rectangle whose vertices are $(0,0), (\pi,0), (\pi,\pi/2), (0,\pi/2)$	10
Q4	Solve any **Two** of the following	**20**
i)	(a) Find $Z^{-1}\left[\frac{1}{(z-3)(z-2)}\right]$ for $\lvert z\rvert > 3$	05
	(b) Prove that $\nabla \cdot \left(logr\, \frac{\bar{r}}{r}\right) = \frac{1}{r}[1 + 2logr]$	05
ii)	If $\phi = x^3 + y^3 + z^3 - 3xyz$ then find (i) $\bar{r}.\nabla\phi$, (ii) $div\,\bar{F}$ *and* (iii) $curl\,\bar{F}$ Where $\bar{F} = \nabla\phi$.	10
iii)	Use Gauss's Divergence theorem to evaluate $\iint \bar{N}.\bar{F}\, ds$,where $\bar{F} = 2xi + xyj + zk$ over the region bounded by the cylinder $x^2 + y^2 = 4, z = 0, z = 6$.	10
Q5	Solve any **Four** of the following	**20**
i)	Using Laplace transform evaluate the integral $\int_0^\infty e^{-2t}(1 + t + t^2)H(t-3)\, dt$	05
ii)	Using convolution theorem find $L^{-1}\left(\frac{s^2}{(s^2+1)(s^2+4)}\right)$	05
iii)	Obtain the complex form of Fourier Series for $f(x) = e^{4x}$ in$(-4,4)$.	05
iv)	Find $Z^{-1}\left[\frac{z}{z-a}\right]$ for $\lvert z\rvert > \lvert a\rvert$	05
v)	Find the angle between the surface $x^2 + y^2 + z^2 - xy = 1$ and $x^2y + y^2z + z = 1$ at (1,1,0)	05
vi)	Find the directional derivative of $\varphi = xy^2 + yz^2$ at $(2,-1,1)$ in the direction normal to the surface $x^2y + y^2x + yz^2$ at(1,1,1).	05

SOMAIYA VIDYAVIHAR UNIVERSITY

07.06.2023(E)

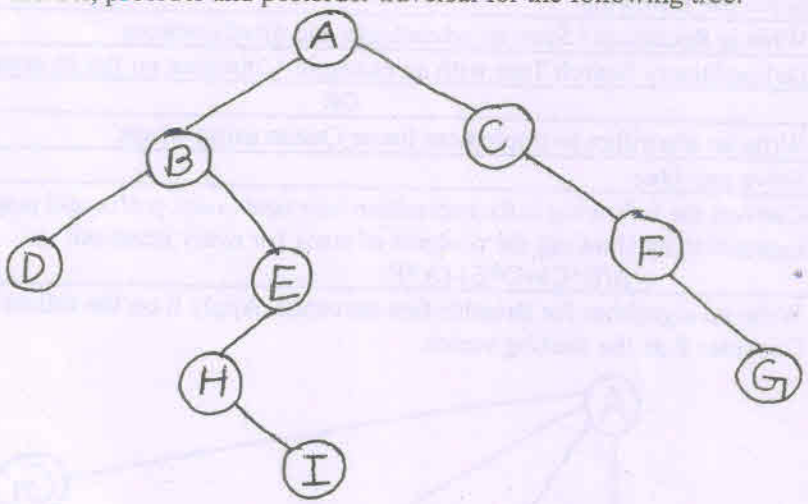
Semester: January 2023 –May 2023 Maximum Marks: 100 Examination: ESE Examination-KT Duration:3 Hrs.		
Programme code: 04 / 01 Programme: B. Tech	Class: SY	Semester: III (SVU 2020)
Name of the Constituent College: K. J. Somaiya College of Engineering	Name of the department: IT / COMP	
Course Code: 116U04C302	Name of the Course: Data Structures	
Instructions: 1)Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question	Max. Marks
Q1	Solve any **Four**	**20**
i)	What is Data Structure and list down its types.	5
ii)	Explain Abstract Data Type with example.	5
iii)	Compare Linear and Non- Linear Data Structure.	5
iv)	Explain Singly Linked List. Explain its types with suitable examples.	5
v)	Explain Tree Data Structure. List down its types with suitable diagram	5
vi)	Compare Stack and Queue Data Structure	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	**10**
i)	What is Recursion? State its advantages and disadvantages	5
ii)	Define Binary Search Tree with an example. Comment on the its complexity	5
	OR	
Q2 A	Write an algorithm to implement linear Queue using arrays.	10
Q 2 B	Solve any **One**	**10**
i)	Convert the following infix expression into equivalent prefix and postfix expression by showing the contents of stack for every iteration: ((A/B^C)+D*E)-(A*F)	10
ii)	Write an algorithm for Breadth-first-traversal. Apply it on the following graph. Consider E as the starting vertex. 	10

Que. No.	Question	Max. Marks
Q3	Solve any **Two**	**20**
i)	Explain Dictionary Data Structure and state operations performed on it. State its applications	10
ii)	Define Set Data Structure with suitable example. Write algorithms for its operations: Insertion, Union, Intersection.	10
iii)	Explain how Hash table is used to implement Dictionary Data Structure	10

Que. No.	Question	Max. Marks
Q4	Solve any **Two**	**20**
i)	Explain Bubble Sort with example. Write algorithm for bubble sort.	10
ii)	Write an algorithm to search an element in an array using Binary Search Technique	10
iii)	Explain Hash List Search with an example. Comment on its complexity.	10

Que. No.	Question	Max. Marks
Q5	(Write notes / Short question type) on any **four**	**20**
i)	Define Graph. Explain different methods to represent the graph with example	5
ii)	Write algorithm for Depth-first-Search Traversal.	5
iii)	What is a Circular Queue? State its advantages over Linear Queue	5
iv)	How Stack can be implemented using Linked List.	5
v)	Give the inorder, preorder and postorder traversal for the following tree: 	5
vi)	Differentiate between Binary Search Tree and AVL Tree	5

SOMAIYA VIDYAVIHAR UNIVERSITY

09.06.2023(E)

Semester: August 2022 – December 2022		
Maximum Marks:100	Examination: ESE Examination – KT	Duration: 3hrs
Programme code: 116U01 Programme: BTech Computer Engineering	Class: SY	Semester: III (SVU 2020)
Name of the Constituent College: K. J. Somaiya College of Engineering	Name of the department: COMPUTERS	
Course Code: 116U01C303	Name of the Course: Computer Organization and Architecture	
Instructions: 1)Draw neat diagrams 2)Assume suitable data if necessary		

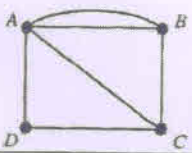
Question No.		Max. Marks
Q1 (a)	Explain page replacement algorithms, and find out page faults for the following string using LRU 2 3 2 1 5 2 4 5 3 2 5 2 (Assume cache size of 3 pages).	10
Q1 (b)	Explain Flynn's classification of the parallel computer.	10
Q2 (a)	Draw 5 state instructional pipelining. OR a) Differentiate between SRAM and DRAM units. b) Hardwired control unit and Microprogrammed control unit.	10
Q2 (b)	With a neat sketch explain the design of the control unit of a basic computer	10
Q3 (a)	Using Restoring Division algorithm perform 448 / 17. OR Explain the flowchart algorithm for floating-point addition and subtraction.	10
Q3 (b)	Write the format of the microinstruction and micro-operations for the control memory.	10
Q4 (a)	What is the cache coherence problem? Explain various protocols to handle it. OR Explain cache memory organization with Associative mapping. Explain how it improves memory access time.	10

Q4 (b)	Explain DMA-based data transfer techniques for I/O devices.	10
Q5 (a)	What is virtual memory? Explain the role of paging & segmentation in virtual memory.	10
Q5 (b)	Write a short note (5 marks each) Solve any two a) Booth's multiplication flowchart b) Applications of micro programming c) PCI bus features. d) IEEE 754 floating point formats	10

14/6/2023 (E)

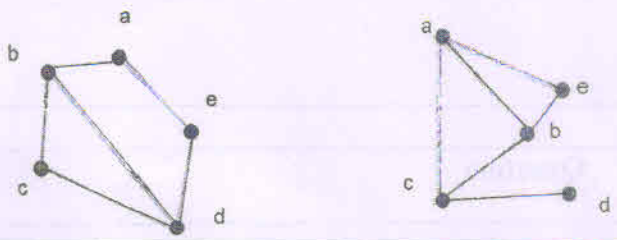
SOMAIYA VIDYAVIHAR UNIVERSITY

Semester: August 2022 – December 2022		
Maximum Marks: 100 **Examination: ESE Examination** KT May 23 **Duration:3 Hrs.**		
Programme code: 01 **Programme: B.TECH Computer Engineering**	**Class: SY**	**Semester: III(SVU 2020)**
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department: COMP**	
Course Code: 116U01C305	**Name of the Course: Discrete Mathematics**	
Instructions: 1)Draw neat diagrams 2) All questions are compulsory **3) Assume suitable data wherever necessary**		

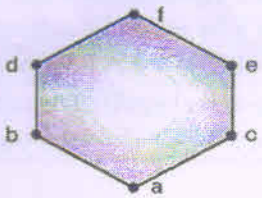
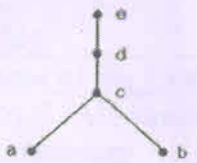
Que. No.	Question	Max. Marks
Q1	Solve any **Four**	**20**
i)	What is power set? How many elements are there in any power set in general? Find the power set of the set A{α, β, γ}	5
ii)	Define tautology and contradiction Determine whether P∨ ¬P is a tautology or contradiction.	5
iii)	Define an equivalence relation. Let A={1,2,3,4} and let R={(1,1), (1,2),(2,1),(2,2),(3,4),(4,3),(3,3),(4,4)} Is R an equivalence relation?	5
iv)	Draw Hasse diagram for the following relations on set A={1, 2, 3, 4, 12} R={(1, 1), (2, 2), (3, 3), (4, 4), (12, 12), (1, 2), (4, 12), (1, 3), (1, 4), (1, 12), (2, 4), (2, 12), (3,12)}	5
v)	Consider the above function f (x) = 2x – 3. Find a formula for the composition functions (i) f^2 = f o f and (ii) f^3 = f o f o f.	5
vi)	Define Hamiltonian path and circuit in a graph. Write a Hamiltonian path and a circuit for the graph shown below: 	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	**10**
i)	Prove that for any positive integer number n, $n^3 + 2n$ is divisible by 3, for all $n \geq 1$. (use mathematical induction)	5
ii)	Find the DNF of : $(p \vee q) \rightarrow \neg r$ (Using laws of logic **or** using truth table).	5
	OR	
Q2 A	Suppose that 100 of the 120 mathematics students at a college take at least one of the languages French, German and Russian. Also suppose 65 study French, 45 study German, 42 study Russian, 20 study French and German ,25 study French and Russian ,15 study German and Russian . (a) Find the number of students studying all three languages (b) Find correct number of students in each of the 8 regions of Venn diagram. (here F, G, R denotes the sets of the students who study all three languages)	10

	(c) Determine the number k of students who study (i) exactly one language (ii) exactly two languages	
Q 2 B	Solve any **One**	**10**
i)	What is Warshall's algorithm? Let A = {1, 2, 3, 4} and let R = {(1, 2), (2, 3), (3, 4), (2, 1)}. Find transitive closure of R using Warshall's algorithm.	10
ii)	Let A = {a, b, c, d} and R be a relation on A whose matrix is $M_R = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ (i)Prove that R is partial order. (ii)Draw Hasse diagram of R.	10

Que. No.	Question	Max. Marks
Q3	Solve any **Two**	**20**
i)	State the pigeonhole principle and the extended pigeonhole principle. What is the minimum number of students required in a discrete structures class to be sure that at least six will receive the same grade, if there are five possible grades A, B, C, D, E .	10
ii)	What is a Lattice? Show that the set of all divisors of 70 forms a lattice.	10
iii)	Define an edge with respect to a graph. State Handshaking Lemma with its equation. How many nodes are necessary to construct a graph with exactly 6 edges in which each node is of degree 2.	10
Que. No.	Question	Max. Marks
Q4	Solve any Two	20
i)	Write the definition of a graph. What are isomorphic graphs? Determine whether the below mentioned graphs are isomorphic. 	10
ii)	Obtain the addition modulo 6 group, table of Z6. Let H = {[0]6, [3]6}.Find the left and right cosets in group Z6. Is H normal subgroup of Z6?	10
iii)	Define Hamming distance. How many errors can be detected and corrected in Hamming code if d is the minimum distance between the code words? Consider the (2, 4) encoding function. How many errors will be detect ? e (00) = 0000 e(10)=0110 e (01) = 1011 e (11) = 1100	10

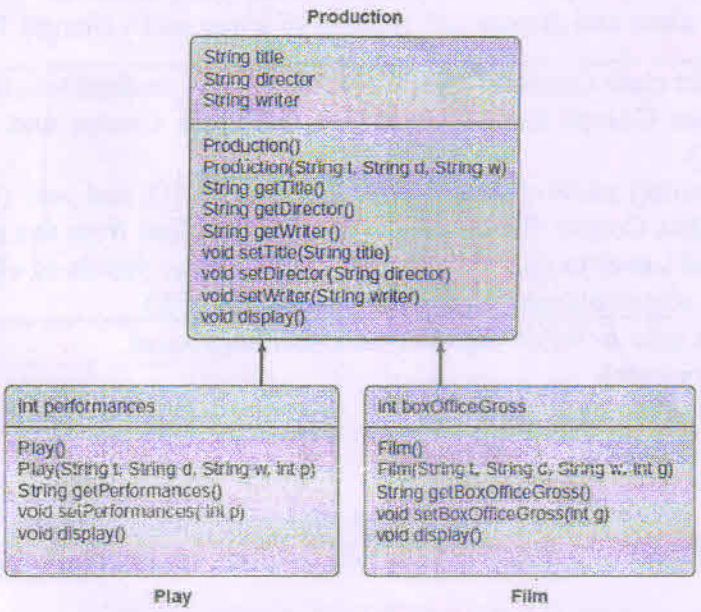
Que. No.	Question	Max. Marks
Q5	Solve any **four**	**20**
i)	Write the following two propositions in symbols:	5

	Let p(x,y) denote the predicate 'y = x + 1'. (i)'For every number x there is a number y such that y = x + 1.' (ii)'There is a number y such that, for every number x, y= x + 1.'	
ii)	Construct the truth table for the following compound proposition ~ P ∧ (P →Q)	5
iii)	Identify the greatest and the least element in the following structures:  Figure 1  Figure 2	5
iv)	Let A = { 0, – 1, 1 } and B = { 0, 1} Let f : A → B where f(a) = |a| . Is f onto?	5
v)	What is multigraph, subgraph and spanning subgraph?	5
vi)	Define a group and an abelian group. Is a set of all non zero real numbers a group with respect to multiplication?	5

12-6-2023(E)

SOMAIYA VIDYAVIHAR UNIVERSITY

Semester: August 2022 – December 2022 **Maximum Marks: 100** MAY-2023 **Examination: ESE Examination (KT)** **Duration:3 hrs**		
Programme code: **Programme: Computer Engineering**	**Class: SY**	**Semester: III(SVU 2020)**
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department:** **COMP**	
Course Code: 116U01C304	**Name of the Course: Object Oriented Programming Methodology**	
Instructions: 1)Draw neat diagrams 2)Assume suitable data if necessary		

Question No.		Max. Marks
Q1 (a)	Explain different types of constructors with the help of a program. **OR** Explain method overloading and constructor overloading with the help of examples (two different examples to be given).	10
Q1 (b)	Write a java program for the following class diagram.  Display the details of each class by invoking the display method in a separate Derive class. Make use of super keyword. (Note:- Don't modify names of any attribute or member or any class.)	10
Q2 (a)	Write a program that asks the user to enter seconds as integer. The program should compute and display the number of hours, number of minutes and number of seconds in that seconds. Use the concept of constructor. **For example** if a user enters 4205 seconds as an input called totSeconds. The answer should be Hours : 1 Minutes : 10 Seconds : 5	10

	These calculations can be done in a method name: conversion1() which will also display the result as Hour,minutes and seconds. Note - Use any class (Scanner/BufferedReader class) for input through console as hour/min/seconds/totSeconds.	
Q2 (b)	What are the different access specifiers in Java? Explain with help of the program. **OR** Describe static and dynamic binding with the help of the program.	10
Q3 (a)	Create an array of objects to store book_id, name, price. The program should provide following functionalities: 1. To add books according to the descending order of their price. 2. To delete any book details based on the book_id. 3. To display book details according to the descending order of their price.	10
Q3 (b)	Explain composition and aggregation relationships with the help of an example. Write a program for the same.	10
Q4 (a)	In a garden, trees are maintained. A tree has following set of attributes: - Tree code, height, base and amount spent on the tree so far. Define Tree class, its constructor, display ( ) and update ( ) that updates tree information. Define derive class Mango tree that has additional yield attribute. Define Garden class and display information of a tree and a Mango Tree.	10
Q4 (b)	Write an abstract class Course with an abstract method studentDetails(). Create 2 classes Comps and IT which inherits class Course and implements studentDetails(). The studentDetails() method should print the name, UID, and year (FE, SE, TE) of students of that Course. These details have to be taken from the user. Write a program that asks user to choose a course and print the details of all students in that course in a sorted manner as per the year(FE,SE,TE)	10
Q5 (a)	Write a detailed note in following exception handling terms. 1. Try-catch 2. Finally 3. Catch multiple exception 4. Throwing exception **OR** Write with the help of suitable a example. Explain multithreading in terms of following :- 1. Creating threads, extending Thread class 2. Lifecycle of thread.	10
Q5 (b)	What is the use of a User-defined Package? Explain the creation of a user-defined package with a suitable example.	10

OR

Q.4(b)(i) What is difference between Abstract class and an Interface(5M)

(ii) what are the types of inheritance. Explain with example. (5M)

16.6.2023 (E)

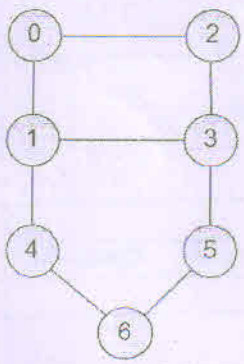
SOMAIYA VIDYAVIHAR UNIVERSITY

Semester: January 2023 –May 2023		
Maximum Marks: 100 Examination: ESE Examination		Duration:3 Hrs.
Programme code: 54 Programme: Minor in Computer Engineering	Class: S Y B.Tech	Semester: III (SVU 2020)
Name of the Constituent College: K. J. Somaiya College of Engineering	Name of the department: Computer	
Course Code:116M54C301	Name of the Course: Data Structure and Algorithms	
Instructions: 1)Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question	Max. Marks
Q1	Solve any **Four**	**20**
i)	Write the ADT for rational numbers	5
ii)	Discuss the advantages of linked lists over arrays	5
iii)	Write a Pseudo/algorithm to count the number of nodes in a binary tree	5
iv)	Discuss the application of Map and Dictionary ADT	5
v)	Write a Pseudo/algorithm that uses insertion sort technique to sort an array of structures. The sorting should be done on the basis of one structure member	5
vi)	Explain linear and non-linear data structures with examples	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	**10**
i)	Write a Pseudo/algorithm to implement basic queue using array. The Pseudo/algorithm should perform the following operations- a. Creation of data structure b. Insertion	5
ii)	Write a Pseudo/algorithm to implement single linked list The Pseudo/algorithm should perform the following operations- a. Creation of data structure b. Insertion	5
	OR	
Q2 A	Illustrate 2 graph representation techniques with example.	10
Q 2 B	Solve any **One**	**10**
i)	Differentiate between binary tree and binary search tree. Define inorder, preorder, postorder in one line Create a unique binary tree from preorder and inorder traversal as- Inorder- G L R O I A H T M S Preorder- A L G O R I T H M S Show step by step creation of the binary tree.	10
ii)	Given a string of arithmetic expressions, identify an appropriate data structure to check whether the opening and closing parenthesis are well formed. Justify your suggestion. Write an algorithm for this operation.	10

Que. No.	Question	Max. Marks
Q3	Solve any Two	20
i)	Construct AVL tree for the elements given below in the sequence 10, 20, 30, 25, 40, 50, 35, 33, 37, 60,38 Delete 20 and 35 from the created data structure. Note: Show AVL tree after completion of each and every task.	10
ii)	Hash the following numbers in the table of size 10. Resolve collisions if any, with linear probing and quadratic probing. State the number of collisions with each technique. 23, 55, 0, 73, 60, 20, 18, 100, 43, 50	10
iii)	Given a map of a district where cities are represented by nodes and roads by edges, identify an appropriate data structure to solve a problem of finding weather a city exists in the given district. Justify your suggestion. Write an algorithm for this operation.	10

Que. No.	Question	Max. Marks
Q4	Solve any Two	20
i)	Suggest a suitable data structure to represent polynomial with 1 variable. Write a program to add two such polynomials.	10
ii)	Sort the given numbers using bubble sort. Show output of each pass during the sorting process. 25, 47, 58, 12, 95, 37, 92, 86, 33, 10	10
iii)	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: 0** 	10

Que. No.	Question	Max. Marks
Q5	(Write notes / Short question type) on any four	20
i)	Explain with suitable example the process of deleting a binary search tree node which has one child. Consider all the cases	5
ii)	Evaluate the following postfix expression using stack. Show the steps 53+62/*35*+	5
iii)	Explain any three map ADT operations	5
iv)	If you are to maintain a To-Do list using queue or a linked list, which one of	5

	these data structures would you prefer and why? Justify your answer with suitable examples. (Give at least three valid reasons.)	
v)	Discuss the different methods to represent the graph with an example	5
vi)	Discuss about the practical application of Tree data structures	5

16-6-2023(E)

SOMAIYA VIDYAVIHAR UNIVERSITY

Semester: August 2022 – December 2022		
Maximum Marks: 100 **Examination: ESE Examination** May 2023 **Duration:3 Hrs.**		
Programme code: : 75 **Programme: Minor in Computer Engineering**	**Class:** SY	**Semester:III(SVU 2020)**
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the Department: Computer Engineering**	
Course Code: 116m75C301	**Name of the Course: Database Management System**	
Instructions: 1)Draw neat diagrams 2) All questions are compulsory **3) Assume suitable data wherever necessary**		

Que. No.	Question	Max. Marks
Q1	Solve any **Four**	**20**
i)	list different users of DBMS	5
ii)	Give example for Weak and Strong Entity	5
iii)	Explain primary, foreign key and candidate key with an example	5
iv)	Define 1NF, 2NF and 3NF	5
v)	Which are the Desirable properties of Transaction explain any 2 properties.	5
vi)	Explain Hashing with example	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	**10**
i)	Explain types of data independence	5
ii)	List all the steps used for mapping EER Model to Relational Model	5
	OR	
Q2 A	Explain the DBMS architecture with diagram	10
Q 2 B	Solve any **One**	**10**
i)	Explain the Characteristics of databases	10
ii)	Draw Enhanced -Entity-Relationship (EER)- Model to represent Generalization. Specialization and Recursive relation w.r.t Employee database	10

Que. No.	Question	Max. Marks
Q3	Solve any **Two**	**20**
i)	write SQL queries to perform union operation and aggregate functions on Railway database	10
ii)	Explain Relational algebra operations :-Selection , Projection and Set operations w.r.t Railway database	10
iii)	Why Indexing is used, Explain multilevel indices, secondary indices with example	10

Que. No.	Question	Max. Marks
Q4	Solve any Two	20
i)	For the relational schema R(A,B,C,D,E,F) having functional dependencies i). A->BC, CD->E, B->D, E->AF. List the candidate keys of R ii)If the above schema r(A,B,C,D,E,F) is decomposed into r1(A,B,C) r2(A,D,E,F). Show that this decomposition is a lossless decomposition assuming same set of functional dependencies holds	10
ii)	Consider the three transactions T1, T2, T3 and the schedules S. 1. State whether schedule is conflict ***serializable*** or not. 2. If a schedule is conflict serializable, write down the equivalent conflict serializable schedule T1: r1(X); r1(Z); w1(X); T2: r2(Z); r2(Y); w2(Z); w2(Y); T3: r3(X); r3(Y); w3(Y); S: r1(X); r2(Z); r1(Z); r3(X); r3(Y); w1(X); w3(Y); r2(Y); w2(Z); w2(Y);	10
iii)	Explain Two-Phase Lock-based and Timestamp-based Concurrency Control method	10

Que. No.	Question	Max. Marks
Q5	(Write notes / Short question type) on any **four**	**20**
i)	Compare File system and Database approach	5
ii)	Advantages of the Relational Model	5
iii)	Views in SQL with example	5
iv)	Transaction states with Diagram	5
v)	Need for Normalization of database	5
vi)	Steps involved in query processing with diagram	5

SOMAIYA VIDYAVIHAR UNIVERSITY

16-6-2023 (E)

Semester: May 2023 – June 2023		
Maximum Marks: 100 Examination: ESE Examination		Duration:3 Hrs.
Programme code: 55 Programme: Cyber Security & Forensics (Honors).	Class: S.Y.B.Tech	Semester: III (SVU 2020)
Name of the Constituent College: K. J. Somaiya College of Engineering	Name of the department: Computer Engineering	
Course Code: 116h55C301	Name of the Course: Applied Cryptography.	
Instructions: 1) Draw neat diagrams. 2) All questions are compulsory. 3) Assume suitable data wherever necessary.		

Que. No.	Question	Max. Marks
Q1	Solve *any* **Four**	20
i)	Stepwise decrypt the message FRPSXWHU as it was encrypted with a shift cipher with k=3.	5
ii)	Mention the weaknesses of DES algorithm.	5
iii)	Briefly discuss ... Cryptographic Obfuscation	5
iv)	What are Cryptographic Hash Functions?	5
v)	Write the applications of digital signatures.	5
vi)	Can quantum cryptography be broken? Justify your answer with supporting example.	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	10
i)	Write five relevant points of difference between block cipher & stream cipher.	5
ii)	Encrypt the following message "communication" with "computer" as the encryption key using playfair cipher.	5
	OR	
Q2 A	Define cryptanalysis. What are the different cryptanalytic attacks?	10
Q 2 B	Solve *any* **One**	10
i)	Explain the four operations in each round of AES algorithm. Is AES faster than DES? Explain.	10
ii)	Explain DES, detailing the feistal structure and S-block design.	10

Que. No.	Question	Max. Marks
Q3	Solve *any* **Two**	20
i)	A and B wish to use RSA to communicate securely. A chooses public key as (7,119) and B chooses public key as (13,221). Calculate A's private keys. A wishes to send message m=10 to B. What will be the ciphertext? With what key will A encrypt the message "m" if A needs to authenticate itself B.	10
ii)	Explain Diffie-Hellman key exchange algorithm with suitable example. Also explain the problem of man-in-the-middle attack in it.	10
iii)	What are public keys cryptosystems? Does a PKI perform encryption? Explain your answer.	10

Que. No.	Question	Max. Marks
Q4	Solve *any* **Two**	20
i)	Explain Kerberos protocol that supports authentication in distributed systems.	10
ii)	What characteristics are required in secure hash function? Explain the operation of secure hash algorithm on 512 bit block.	10
iii)	What do you understand by Message Authentication Code? What are the requirements of MAC?	10

Que. No.	Question	Max. Marks
Q5	Write Short notes on *any* four	20
i)	Security Mechanisms. (Any two)	5
ii)	Difference between Confusion & Diffusion.	5
iii)	Security Goals	5
iv)	X.509 certificates.	5
v)	Zero knowledge proofs.	5
vi)	Digital Certificate.	5