Q. P. Code: 22956

(3 hours) [80 marks]

N.B. (1) Question No 1 is compulsory.

(2) Attempt any three questions from remaining questions.

(3)Assume suitable data if necessary.

(4)Figure to right indicate full marks.

Q.1	a) What are linear and non-linear data structures.	2
	b) What is expression tree .Give examples.	3
	c) Define Graph. List its type with examples.	3
	d) Define Doubly-Ended queue and list the variants of Doubly Ended Queue.	3
	e) What do you mean by asymptotic notations? Explain with the help of example	3
	f) What is the depth, height and degree of a Binary tree.	3
	g) What is recursive function? Explain how it works using proper example.	3
Q.2	a)Write a program for implementing STACKS using Arrays.	10
	b)Write a program for INSERTION sort and comment on its complexity.	10
Q.3	a) Write a program to convert INFIX expression to POSTFIX Expression.	10
	b) Write a program for Implementing QUEUE using linked list.	10
Q.4	a)Write the algorithm for deletion of a node in a Binary Search Tree. Consider all cases.	10
	b)Explain Linear Search and Binary Search with an example.	10
Q.5	a) Write an algorithm for insertion and traversal in a circular linked list.	10
	b) Define AVL Tree? Create an AVL tree using the following sequence	10
	1,2,3,4,5,6,7,8,9,10 (Mention type of rotation for each case.)	
Q.6	Write short note on (**any four**)	20
	a) Graph traversal algorithms	
	b) Priority Queue.	
	c)Red- Black Trees.	
	d)B- Tree	
	e) Euclid's Algorithm	

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QP CODE : 40341

(3 Hours) **Marks : 80**

Note: Q. 1 is **compulsory**.

Attempt any **THREE** questions from **Q. 2 to Q. 6**

Q. 1	**a**	Differentiate between method overloading and overriding.	**[5]**
	b	Illustrate with an example use of arraycopy() method.	**[5]**
	c	Discuss the limitations of String class in JAVA. Differentiate between Sting and StringBuffer class.	**[5]**
	d	Write a program to calculate GCD of two numbers. Take input from command line arguments. (GCD: Greatest Common Divisor)	**[5]**
Q. 2	**a**	Explain Inheritance. Discuss different types of Inheritance in JAVA. Why JAVA does not support Multiple Inheritance?	**[10]**
	b	What is multithreading? Explain different ways to create thread in JAVA. Write a program to display 1 to 10 numbers by creating a thread.	**[10]**
Q. 3	**a**	Differentiate between application program and Applet. Explain applet lifecycle with neat diagram.	**[10]**
	b	Explain the steps to create package in JAVA by adding class or an interface. Write a program to create package MYPACK to add Employee class and display Employee details: Employee_ID, Employee_Name and Employee_Salary.	**[10]**
Q. 4	**a**	Explain exception handling mechanism with the help of **try**, **catch**, **throw**, **throws** and **finally**.	**[10]**
	b	Differentiate between interface and abstract class.	**[5]**
	c	Why JAVA is platform Independent? Explain JVM.	**[5]**
Q. 5	**a**	Write a program to create class Product with Product ID, Product Name, Quantity and Price. Also write methods to take input for product details, to display product details and to sort product details in ascending order of their price. Write a program to read and display sorted list of 10 products.	**[10]**
	b	Differentiate between Array and Vector. Explain any five methods of Vector class.	**[10]**
Q. 6	**a**	Explain use of super keyword in JAVA.	**[5]**
	b	Discuss Final keyword with respect to variable, method and class in JAVA.	**[5]**
	c	Explain logical operators in JAVA.	**[5]**
	d	What is constructor? Explain different types of constructor.	**[5]**

Time: 3 Hours **Marks: 80**

Note : 1. Question one is compulsory.
2. Answer any three from the remaining.

Q. 1 a List all functional dependencies satisfied by the relation **5**

A	B	C
A1	B1	C1
A1	B1	C2
A2	B1	C1
A2	B1	C3

b Write a stored Procedure to add two numbers **5**

c Define Terms : Primary Key and Foreign Key **5**

d Explain Generalization and Specialization. **5**

Q. 2 a Explain ACID properties in detail with example **10**

b Discuss the need of Normalization with example **10**

Q. 3 a Explain the advantages of database approach over traditional file processing and differentiate between databases and file system. **10**

b Explain following relational algebra operations with proper examples. **10**

I. Project
II. Natural Join
III. Set Interaction
IV. Select

Q. 4 a Consider Insurance Database given below and answer the following queries in SQL. **10**

Person (driver_id, name, address)
Car (license_no, model, year)
Accident (report_no, accident_date, location)
Owns (driver_id, license_no)
Participated (driver_id, license_no, report_no, damage_amount)

1) Find Total number of people who owned car those are involved in accidents in 2018.
2) Add new accident record in to database.
3) Delete 'honda city' belonging to 'Kevin Peter'
4) Find the number of accidents in which car belonging to ' Mark dales' were involved.

b Construct an ER diagram for Car Insurance Company. **10**

Q. 5 a Draw and Explain Database System Architecture **10**

b Explain steps in Query Processing and Optimization **10**

Q. 6 Write a Short Note on: **5**

a Shadow Paging Technique

b Database Failure Classification **5**

c Views in SQL **5**

d Data independence in database system **5**

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Time: 3 Hours **Total Marks: 80**

N.B: 1. Question No 1 is compulsory
2. Answer any three from the remaining.

1. Attempt any four from the following. (20M)
   (a) Define selectivity.
   (b) Explain Fidelity.
   (c) Explain ASK System.
   (d)Compare FDM and TDM.
   (e) What is bit rate and baud rate.

2. (a) Explain the block diagram of analog and digital communication system? if information rate is maximum which type of modulation technique can be used? (10M)
   (b) What is probability of error and bandwidth requirement for BPSK? (10 M)

3. (a) State and prove the sampling theorem for low pass and limited signal. Explain aliasing error. (10M)
   (b) Explain the working of foster seelay discriminator with neat circuit diagram and phasor diagram. (10 M)

4. (a) Explain the delta modulator transmitter and receiver with neat block diagrams. (10M)
   (b)State and prove the following properties of Fourier transform. (10 M)
   i) Time Shifting
   ii) Convolution in time domain.

5. (a) Find the mathematical expression of FM signal. (10M)
   (b) Explain generation and demodulation of PPM. (10M)

6. Answer **any four** (20 M)
   (a) White Noise
   (b) pre-emphesis and de- emphesis.
   (c) Explain wired communication channel.
   (d) Explain QPSK.
   (e) Intersymbol Interference.

(3 Hours) **[Total Marks: 80**

N.B.: (1) Question No. **1** is **compulsory.**
(2) Solve any **three** questions out of remaining **five.**
(3) Figures to **right** indicate **full** marks.
(4) Assume suitable **data** where **necessary.**

1	Solve		
	a	Define α,β,γ for BJT.	(5)
	b	Explain Serial Input Serial Output Shift Register	(5)
	c	Compare inverting and Non Inverting amplifier	(5)
	d	State and Prove De Morgan's Theorem.	(5)
2	a	With the help of neat circuit diagram explain the construction. Operation and V-I characteristics of Schottkey diode	(10)
	b	Derive expression for the stability factor S of the voltage divider bias circuit. Comment on the result.	(10)
3	a	Explain frequency response of OP-AMP.	(10)
	b	Draw JK FF using NAND gates only and explain race around condition. Convert JK FF to T FF.	(10)
4	a	Explain the essential features of VHDL and write a VHDL program for full adder using dataflow style.	(10)
	b	Convert 13.078125 into binary, octal and Hexadecimal.	(10)
5	a	Implement following using only 8:1 MUX and few gates $F=\sum m(0,1,3,4,5,7,9,10,12,13,15)$	(10)
	b	Why Zener diode is used as a regulator? Explain with suitable diagrams.	(5)
	c	Compare FET with BJT.	(5)
6	a	Draw circuit diagram & explain the operation of astable multivibrator using IC555 with proper waveforms.	(10)
	b	Prove that (A+B)(A+C)=A+BC using Boolean algebra.	(5)
	c	Implement the following Boolean function using 3:8 decoder and external gates $F(A,B,C)=\sum(2,4,5.7)$	(5)

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