Time: 3 Hours **Marks: 80**

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

1. Attempt all questions. (20M)
   (a) Compare Twisted Pair, Co axial and Fiber optic communication channel.
   (b) State and prove convolution property of the Fourier Transform.
   (c) Define Image Signal and explain Image signal rejection ration.
   (d) What is aliasing? How to eliminate it?

2. (a) Derive Friss formula. (5M)
   (b) Derive the Fourier transform of Unit Step and Delta Function? (5 M)
   (c) Derive the expression for FM. (10M)

3. (a) Explain how to generate DSBSC AM with neat diagram. (10M)
   (b) Explain the working of Foster seeley discriminator with neat circuit diagram and phasor diagram. (10M)

4. (a) Define Sampling and explain how to generate and demodulate PAM with neat diagram? (10M)
   (b) Explain Delta modulation with neat diagram. (10M)

5. (a) Explain BASK Generation and detection with neat diagram. (10 M)
   (b) Explain and draw any five types of Line codes. (10 M)

6. Write a short note on any four from the following (20M)
   a) Wireless Communication Channel
   b) State and prove time shifting property of Fourier Transform.
   c) Pulse width modulation generation.
   d) QPSK
   e) Quantization process.

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

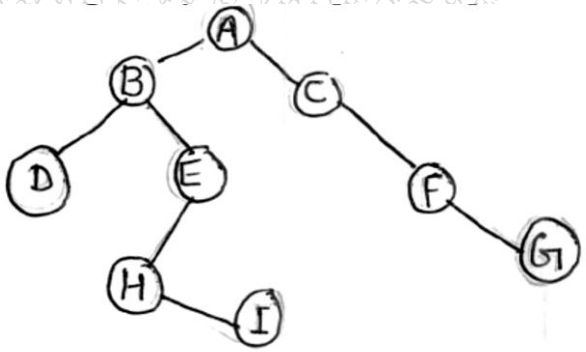
N.B : (1) Question No. 1 is compulsory
(2) Attempt any three questions out of remaining five.

1. (a) Explain with example. (I) Degree of tree (II) Height of tree (III) Complete Binary tree 03
(b) Define Algorithm and write its properties. 03
(c) Define Stack ADT. List it's applications. 03
(d) Define Graph. List the types of graph with example. 03
(e) Define Recursion with example. 03
(f) W rite an algorithm to count no. Of nodes in Singly Linked List. 02
(g) Explain linear and non-linear data structures.

2 (a) Define Binary Search Tree. Create BST for the data: 16,27,9,11,36,54,81,63,72 Write an algorithm to implement Insertion in BST. 10
(b) Write an algorithm for Merge sort. Comment on it's Complexity. 10

3. (a) Write a program to convert INFIX expression into POSTFIX expression. 10
(b) What is Linked List? Write an algorithm to insert a node after a node in a Linked list. 10

4. (a) Define Minimum Spanning trees with example. Explain Prim's algorithm to compute minimum spanning tree. 10
(b) Traverse the following binary tree into preorder, postorder and inorder . 10



5. (a) Write a program to implement Priority queue using arrays. 10
(b) What is Collision? Explain different Collision Resolution Techniques with example. 10

6. (a) Explain BFS and DFS algorithm with examples. 10
(b) Explain Quick sort with an example. Write an algorithm for it and comment on it's complexity. 10

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(3 Hours) **Marks : 80**

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:

a Shadow Paging Technique **5**

b Database Failure Classification **5**

c Views in SQL **5**

d Data independence in database system **5**

Q. P. Code : 26235

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

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

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

Q. 1 **a** Explain Applet life cycle methods. **[5]**

b Write a program to display Fibonacci series up to first n terms. Take input from command line arguments. **[5]**

c Explain Wrapper class in JAVA. **[5]**

d Explain System.arraycopy() method with example. **[5]**

Q. 2 **a** Explain the steps to create package in JAVA to add class and interface with example. **[10]**

b Differentiate between method overloading and overriding. Write a program to override **volume()** method of **Shape** class into its subclasses **Cube** and **Cylinder. Shape** is an abstract class. **[10]**

Q. 3 **a** Explain different types of relationships among the entities. **[10]**

Define the relationships among the objects of given sentences:

1) Teacher is an Employee.
2) Teacher teaches OOPM subject to students.
3) John hires a car.
4) Drawer is a part of table.

b Explain different ways to create Thread in JAVA. Write a program to display following pattern using threads. **[10]**

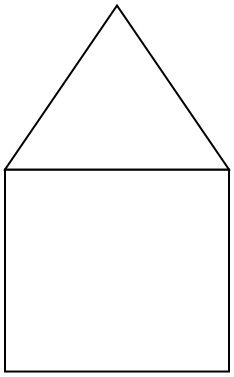
$@$@$@$@$@$@$@$@$@

Q. 4 **a** Explain bitwise operators in JAVA. **[5]**

b Discuss **static** data members and methods in JAVA. **[5]**

c Explain any two methods of **String** class. **[5]**

d Write an applet program to display **[5]**



Q. 5 **a** Explain exception handling mechanism with the help of **try**, **catch**, **throw**, **throws** and **finally**. **[7]**

b The manufacturing industry wants to maintain record of its products. If any new product is build then it is added to the list. Also if any product is scraped it can be deleted from the list. Write a program to perform above operations and display list of products. **[8]**

c Write a program to check whether given string is palindrome or not. **[5]**

Q. 6 **a** Explain inheritance and its types in JAVA. **[10]**

b Write a program to display sum of column elements of a matrix. **[10]**

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(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.**

Q1. Solve **any four** 20

a) Prove that NAND and NOR gate are universal gate.
b) Convert following decimal number to Binary ,Octal, Hexadecimal and Gray code
i) $(256)_{10}$ ii) $(45)_{10}$
c) Draw and explain circuit diagram of a differentiator using Op-amp.
d) Covert S-R flip flop to D flip flop.
e) Derive the relation between α and β

Q2. a) Explain Voltage Divider Biasing Circuit with its stability factor. 10
b) Implement following using only one 8:1 Multiplexer and few gates.
$F(A,B,C,D)= \sum m(0,1,2,3,5,7,9,11,12,15)$ 10

Q3. a) Draw circuit diagram and explain the operation of Astable Multivibrator using IC555. 10
b) Design 4-bit binary to Excess-3 code conversion. 10

Q4. a) Minimize the following four variable logic function using K-map and design by using only NAND gates 10
$f(A,B,C,D)=\sum m (0,1,2,3,4,7,8,9,11,12,15)$
b) What are the different methods used to improve CMRR in Differential Amplifier. Explain one in brief. 10

Q5. a) Design a Mod 12 asynchronous counter using J-K-Flip Flop. 10
b) With the help of neat diagram explain functioning of Universal Shift register. 10

Q6 Write short notes on **any four** 20

a) Design XOR gate using only NOR gates.
b) Explain working of a Current Mirror Circuit.
c) Write VHDL program for half adder.
d) Explain Encode and Decoder.
e) Explain working of Zener diode with VI characteristics.

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