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END SEMESTER EXAMINATION, JULY 2023**MCA****2ND SEMESTER**

COURSE CODE: MCA125

COURSE TITLE: THEORY OF AUTOMATA

[Time allotted: Three hours]**[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**Section (A)****Q. 1.** Attempt **all** questions. All carry equal marks.**(2 x 10 = 20)**

In which layer POP works?

- Define an ambiguous CFG.
- Distinguish between DPDA and NPDA
- Define unrestricted grammar
- Define regular expression
- Give a description about FA with empty moves.
- Write about relations on sets.
- Define unit production
- List any 5 identity rules for regular sets.
- List any 2 techniques for Turing Machine Construction
- Define Grammar? What are the tuples?

Section (B)**Q. 2.** Attempt **any 5** questions. All carry equal marks**(7 x 5 = 35)**

- Design a DFA for the following language $L = \{ 0^m 1^n \mid m \geq 0 \text{ and } n \geq 1 \}$
- State Arden's theorem.
- Explain P and NP problems?
- Construct a Turing machine for Language $L = a^n b^n$, where $n > 0$
- What is the difference between CFG and Regular Language?
- Consider the below finite automata and check the strings are accepted or not

States (Q)	Input Alphabtes	
	0	1
$\rightarrow q_0$	q_1	q_3
q_1	q_0	q_2
(q_2)	q_3	q_1
q_3	q_2	q_0

(i) 1110 (ii) 0001 (iii) 1010

g. Construct DFA for the given NFA.

	Next state	
	0	1
$\rightarrow q_0$	q_0, q_1	q_0
q_1	q_2	q_1
q_2	q_3	q_3
(q_3)	-	q_2

Section (C)

Attempt **any 3** questions. All carry equal marks.

(15 x 3 = 45)

Q.3. a. Convert the following grammar to Greibach Normal Form $G = (\{A_1, A_2, A_3\}, \{a, b\}, P, S)$ Where P consists of the following :

$A_1 \rightarrow A_2 A_3$
 $A_2 \rightarrow A_3 A_1 | b$
 $A_3 \rightarrow A_1 A_2 | a$

b. Explain Decision Properties of Context-Free Languages.

Q.4. a. What are the various variations of TM? How to achieve complex tasks using TM.

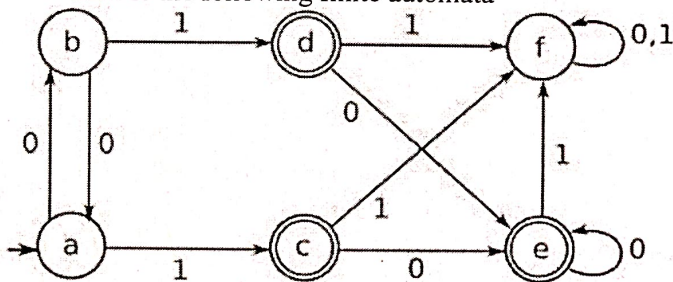
b. Explain about Ambiguity in Grammars.

Q.5. a. Convert PDA to CFG:

$S \rightarrow 0BB$
 $B \rightarrow 0S \mid 1S \mid 0$

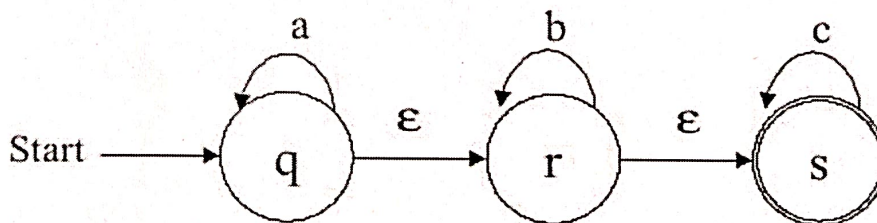
b. Distinguish between class P and class NP Problems

Q.6. a. Minimize the following finite automata



b. Explain about the Decidability and Undecidability Problems.

Q.7. a. Convert the following NFA with ϵ moves to DFA without ϵ moves.



b. Discuss in brief about NP Hard problems

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END SEMESTER EXAMINATION, JULY - 2023

PROGRAM: MCA SECOND SEMSTER

COURSE CODE: MCA123

COURSE TITLE: OOP using Java

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(2 x 10 = 20)

- a. Define runtime polymorphism.
- b. What is encapsulation?
- c. Here are two proposed alternatives to be used in a method to return false if the object reference 'obj' has the null value. Which statement will work?

- (a) if (obj == null) return false;
- (b) if (obj.equals(null)) return false;

- d. Define final? Could we make a main method as final?
- e. Define String Class.
- f. Define Throws and throw.
- g. What is Applet?
- h. What will happen when you attempt to compile and run the following code?

```
public class Bs{
    int i = 10; int j; char z= 1; boolean b;
    public static void main(String argv[])
    {
        Bs b = new Bs(); b.bmethod();
    }

    public void bmethod()
    {
        System.out.println(j); System.out.println(b);
    }
}
```

- i. What is thread? can you distinguished between thread and process?
- j. Define Connection class?

Section (B)

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- a. Explain socket programming with example?
- b. What is polymorphism, how do we implement it in java?
- c. Write a program to implement the concept of jagged array.
- d. Define this and super with example?
- e. Write a program to implement MYSQL-JDBC connectivity.
- f. What is Event Handling in java? List out the available event classes and listener interfaces with suitable example.
- g. Explain features of JAVA?

Section (C)

Attempt **any 3** questions.

(15 x 3 = 45)

- Q.3. a. Explain streams in JAVA with example.
b. Write a program to write into the file.
- Q.4. Define Swing and also write a program to design the LOGIN page with event handling.
- Q.5. a. Define a package, and give the list of steps used to create a package in Java. Explain with a code.
b. Write a Java program to do multiplication of two input matrices with a user defined method with parameter.
- Q.6. a. Explain Inter Thread Communication and write a code to achieve it.
b. Explain Layout managers with program code.
- Q.7. Write on the following:
i. Abstraction
ii. Inheritance
iii. Exception Handling

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END SEMESTER EXAMINATION JULY 2023

MCA SEMESTER II

COURSE CODE: MCA122

COURSE TITLE: DATA STRUCTURE USING 'C'

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

Section (A)

Q1. Attempt **all** questions. All carry equal marks.

(2 x 10 = 20)

- a. Differentiate NULL and VOID.
- b. What is garbage collection and compaction?
- c. What is Time-space trade off?
- d. What are the operations performed in list?
- e. The polynomial equation can be represented with linked list as ...?
- f. Write the routine to pop an element from a stack.
- g. In an almost complete binary tree with 13 nodes, the number of leaves will be:
 - i) 5
 - ii) 6
 - iii) 7
 - iv) 8
- h. What is the time complexity for checking if an undirected graph with E edges and V vertices is Bipartite, given its adjacency matrix?
 - i) $O(E)$
 - ii) $O(V)$
 - iii) $O(E * E)$
 - iv) $O(V * V)$
- i. What do you mean by recursion?
- j. What are some examples of divide and conquer algorithms?

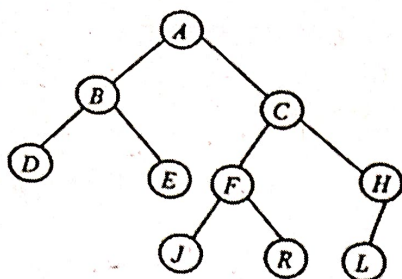
Section (B)

Q2. Attempt **any 5** questions. All carry equal marks

(7 x 5 = 35)

- a. Why do we use an asymptotic notation in the study of algorithm? Describe commonly used asymptotic notation and give their significance.

b. For the following binary tree, answer the following:



- Which nodes are leaf nodes?
- What is the height of the tree?
- What is pre-order traversal?
- What is post-order traversal?
- Which are descendants of node C?

c. What is dequeue? Give an option between a linear array and circular array, which one will you choose to implement an array. Justify your answer.

d. Consider the following list: a [1,10] = {310, 285, 179, 625, 351, 423, 861, 254, 450, 520}, sort the above list using Merg sort. Show all intermediate steps.

e. Write the insertion sort algorithm with worst case complexity.

f. Explain binary search algorithm by suitable example. Discuss the complexity of binary search algorithm. Let $x = 4$ be the element to be searched.

3	4	5	6	7	8	9
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g. Explain the following terms:

- Use of header and tail node in linked list
- Direct access file
- Five application of tree data structure

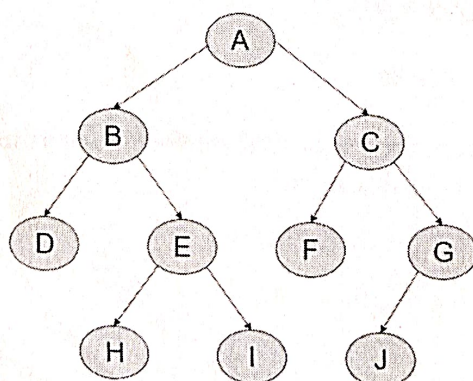
Section (C)

Attempt any 3 questions. All carry equal marks.

(15 x 3 = 45)

Q3.

a. For the given graph, draw the DFS and BFS? Execute along with algorithm.



b. Execute the routine of BFS.

Q4.

- a. Construct AVL Tree for the following sequence of numbers -
50, 20, 60, 10, 8, 15, 32, 46, 11, 48
- b. Write the sequence of steps to execute insertion sort.

Q5.

- a. The pre-fix equivalent of the expression $(3+5)*7/(8*9+(10*11)\%12)$ is ?
- b. An array X [-15.....10, 15.....40] requires one byte of storage. If beginning location is 1500 determine the location of X [15][20]. Calculate using Row-Major and column major both. Differentiate between static and dynamic memory allocation.

Q6.

- a. What is sparse matrix? Describe a data structure for the efficient storage of a sparse matrix. Secondly write a recursive algorithm to compute the nth Fabonacci number.
- b. Define Hash Functation and its implimentation in detail.

Q7.

- a. What is priority queue? Describe the one-way list representation of priority queue
- b. Explain the procedure and pseudo code of insert a new node in singly linked list in beginning, at the end of the list and middle

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END SEMESTER EXAMINATION, JULY – 2023

PROGRAM: MCA SECOND / B.TECH EIGHT SEMSTER

COURSE CODE: MCE 122/ ECS 484

COURSE TITLE: INTRODUCTION TO CYBER SECURITY

[Time allotted: Three hours]

Note: Attempt all Sections & Questions.

[Max. Marks: 100]

Q. 1. Attempt all questions.

Section (A)

(2 x 10 = 20)

- What is Replayng?
- What is Cyber Squatting?
- What is Cyber Pornography?
- Write two attacks that violate the security goal integrity.
- Define NMAP tool
- Define access control.
- What is traffic padding?
- Define Network Security.
- What is virus and how it is different from worm?
- Differentiate between firewall and IDS

Q. 2. Attempt any 5 questions.

Section (B)

(7 x 5 = 35)

- How the cybercrime classified? Explain with example.
- Elaborate Cyber crime play a vital role against person, property and govt. to protect all valuable information and rights?
- How Tunneling takes place in VPN? Explain the advantage of VPN
- Explain Intellectual Property Rights.
- How do viruses get disseminated? Explain with diagram.
- Explain phishing, smsing and vishing
- Explain how an Email can be traced for forensic purpose.

Attempt any 3 questions.

Section (C)

(15 x 3 = 45)

- Q.3
- Explain principles and applications of cyber security
 - Discuss motivations behind the cyber crime.
- Q.4.
- What is cyber stalking? Discuss laws and procedures to protect against cyber stalking.
 - Explain the challenges in Computer forensics.
- Q.5.
- Explain the following terms related to cyber crimes:
- Forgery and Fraud
 - Social Engineering
 - Ethical hacking
 - Defamation
 - Plagiarism
- Q.6.
- What is Cyber Terrorism? Describe the factors contributing to the existence of cyber terrorism?
 - Bring out some economic consequences of cyber terrorism.
- Q.7.
- Explain security goals with example.
 - Discuss firewall, its characteristics and also how to configure the rules.

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END SEMESTER EXAMINATION, JULY 2023
MCA II SEMESTER/ B.TECH CSE IV SEMESTER

COURSE CODE: MCA121/ CCS24

COURSE TITLE: DATA BASE MANAGEMENT SYSTEMS

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(2 x 10 = 20)

- a. List the advantages of DBMS?
- b. What is a candidate key?
- c. Define Instance and Domain?
- d. Write difference between Count and Count (*) function.
- e. Name any three aggregate functions supported by SQL.
- f. Define Atomicity in transaction.
- g. Differentiate physical and logical independence. .
- h. Discuss how can you change the data in the table?
- i. Define weak and strong entity sets?
- j. What is a non-serial schedule?

Section (B)

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- a. Compare and Contrast file Systems with database systems?
- b. Design ER diagram for three entities named Doctor, Patient & Test, their attributes and relationship among them.
- c. What is a Transaction? Discuss the ACID property with example.
- d. What are Triggers & their types? Why they are required? Give syntax to create it.
- e. Explain Conflict Serializability with an example? How database can be recovered from transaction failure?
- f. What is Normalization? Why we required it? Show with the help of examples the concept of Anomalies in database
- g. List the candidate keys schema $R = (A, B, C, D, E)$.
 $A \rightarrow BC$
 $CD \rightarrow E$
 $B \rightarrow D$
 $E \rightarrow A$

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.** a. Consider the following tables following -
Employee (Emp_no, Name, Emp_city)
Company (Emp_no, Company_name, Salary)
i. Write a SQL query to display Employee name and company name. (10)
ii. Write a SQL query to display employee name, employee city, company name and salary of all the employees whose salary > 10000
iii. Write a query to display all the employees working in 'XYZ' company.
b. What is the difference between WHERE and Having Clause? (5)
- Q. 4.** a. Define the concepts of data independence and how it can be achieved in a Database? (7)
b. Differentiate between Cartesian product and natural join operations used in relational algebra. Explain with an example. (8)
- Q. 5.** a. Write in details about concept & types of keys in DBMS. (8)
b. Differentiate between SQL commands DROP TABLE and DROP VIEW. Explain with an example. (7)
- Q. 6.** a. Check whether the given schedule S is conflict serializable or not. If yes, then determine all the possible serialized schedules
R1(A), R1(B), W1(A), R2(B), W2(A), R3(C), R3(B), R3(D), W2(B), W1(C), W3(D) (10)
b. What is database recovery? Why backups are important? (5)
- Q. 7.** a. What is Functional Dependency? Explain trivial and non-trivial functional dependency with example (7)
b. What is Dirty read problem in Database? Describe Locking techniques in Concurrency Control in Database. (8)

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END SEMESTER EXAMINATION, EVEN SEM, JULY 2023

MCA SEMESTER II / B.TECH CSE SEMESTER VI

COURSE CODE: MCA124/ ECS363

COURSE TITLE: OPERATING SYSTEM

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

Q1. Attempt all questions. All carry equal marks.

Section (A)

(2 x 10 = 20)

- Define seek time and latency time
- What is the main function of the memory-management unit?
- What do you mean by cooperating process?
- Explain the need of system protection. Give two examples.
- Define context switching and swapping.
- Explain Batch Operating system with example.
- What is the role of scheduler and dispatcher?
- What is Critical section Problem?
- Write about monolithic kernel.
- Briefly Explain Paging concept.

Section (B)

Q2. Attempt any 5 questions. All carry equal marks

(7 x 5 = 35)

- A hard disk having 2000 cylinders, numbered from 0 to 1999, the drive is currently serving the request at cylinder 143 and the previous request was at 125. The status of queue is as follows: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. What is the total distance (in cylinders) that the disk arm moves to satisfy the entire pending request for each of the following disk scheduling algorithms- C-LOOK, SCAN?
- A process references 5 pages A, B, C, D, E in the following order A, B, C, D, A, E, B, C, E, D Assuming that the replacement algorithm is LRU and FIFO, find out the number of page faults during the sequence of references, starting with an empty main memory with 3 frames.
- A counting semaphore S is initialized to 10. Then, 6 P operations and 4 V operations are performed on S. What is the final value of S? What is File and explain the access methods for files, also make a short note on linked file allocation methods.
- What is system call? Explain in detail the system call sequence to copy the contents of one file to another. Memory partitions of 100kb, 500 kb, 200 kb, 300kb, 600 kb is available how would best, worst, first fit algorithm to place processes 212, 417, 112, 426 in order. Which is the best algorithm?
- Briefly explain the various kinds of program threats and system threats.
- What is system call? Explain in detail the system call sequence to copy the contents of one file to another
- Write short note on:
 - Critical section
 - Semaphore
 - Demand segmentation

Attempt any 3 questions. All carry equal marks.

Section (C)

(15 x 3 = 45)

Q3.

- a. Consider the following process:

Process	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

What is the average waiting and turnaround time for these process with?

- (i) FCFS Scheduling
(ii) Preemptive SJF Scheduling

- b. List the major difference between thread and process.

Q4.

- a. Consider the following sanpshot of a system:

Process	Allocated			Maximum			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	2	2	3	3	6	8	7	7	10
P2	2	0	3	4	3	3			
P3	1	2	4	3	4	4			

Answer the following questions using the banker's algorithm:

- What is the content of the matrix need?
- Is the system in a safe state?

- b. Differentiate between preemptive and non-preemptive scheduling

Q5.

- a. Write a short note on the following:

- (i) VMware server virtualization
(ii) Thrashing

- b. A computer system has 36 bit virtual address space, with a page size of 8K and each pagetable entry of 4 bytres. What will be number of pages in virtual address space? What is the maximum size of addressable physical memory.

Q6.

- a. Explain Multilevel queue and multi level feedback queue scheduling with suitable example.
b. What is the signifiange of MMU for logical and physical address, also differentiate logical address and physical address on the basis of following paramentrs like address space, visibility, generation, access, editable.

Q7.

- a. Explain the difference between full virtualization and para virtualization, and provide example of each
b. Explain the file system Architecture in detail.

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