Mahindra University Hyderabad
École Centrale School of Engineering
Minor-I exam

SE23UCAM020

Program: B. Tech.   **Branch: CSE, AI, CAM, ECE, CM**   **Year: II**   **Semester: II**
Subject: Theory of Computation (CS2204)

Date: 25-02-2025   Start Time: 2:00 PM
Time Duration: 1.5 Hours   Max. Marks: 50

Instructions:

1) **All parts of a question should be answered consecutively.**
2) **Any question attempted using pencil will not be considered for the evaluation.**
3) **Mobile phones and computers of any kind should not be brought inside the exam hall.**
4) **Use of any unfair means will result in severe disciplinary action.**

Q1.   **[2*2.5=5 Marks]**

    a) Let R ={(0, 0), (0, 4), (1, 1), (1, 3), (2, 2), (3, 1), (3, 3), (4, 0), (4, 4)} on a set A={0, 1, 2, 3, 4}. Find whether R is an equivalnce relation? If yes find all the equivalence classes of R. Also generate a relation R1 from a relation R such that relation R1 is a partial order.

    b) Find the reflexive transitive closure R^* of the relation R={(a, b), (a, c), (a, d),(d, c), (d, e)}? Draw a directed graph representing R^*.

Q2. Construct a minimal deterministic finite automata that accepts all possible strings of zeros and ones which doesnot contain 011 as a substring. (Design the following DFA using the concept that regular language are closed under complement).   **[10Marks]**
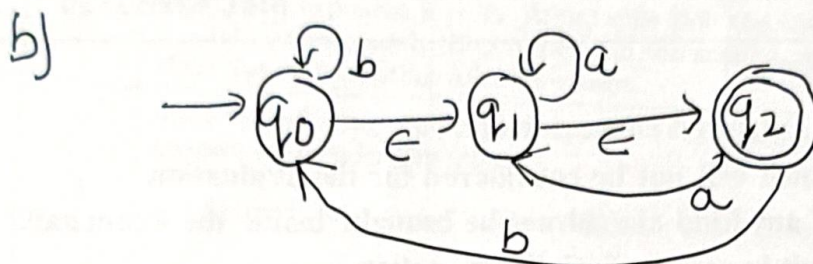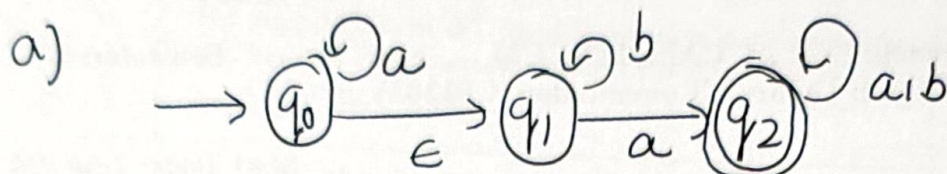
Q3. Consider the given DFA with multiple final states and design the corresponding minimized DFA.   **[5 Marks]**
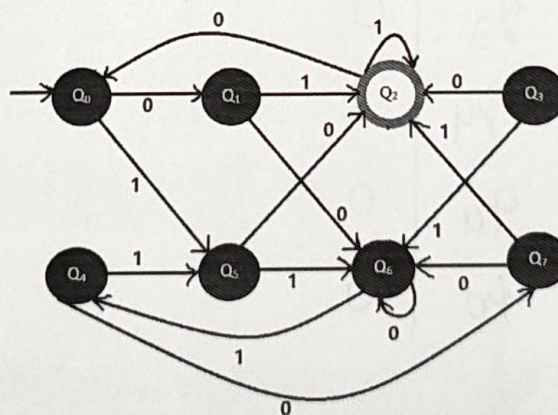
Q4. Consider the given non-deterministic finite automata (NFA) with $\in-moves$ convert
its equivalent NFA and then convert the constructed NFA into DFA.   [2*5=10Mar

a)

b)

Q5. Construct a mealy machine that gives 2's complement of any binary input. (Assume that the
last carry bit is neglected). Also convert the constructed mealy machine to its equivalent moore
machine.   [10Marks]

Q6. For the following moore machine the input alphabet is $\Sigma = \{a, b\}$ and the output alphabet is
$\Delta = \{0,1\}$. Run the following given input sequences on a moore machine and find the respective
outputs. Also convert the given moore machine to its equivalent mealy machine.   [10Marks]

States	a	b	output
→ q_0	q_1	q_2	0
q_1	q_2	q_3	0
q_2	q_3	q_4	1
q_3	q_4	q_4	0
q_4	q_0	q_0	0

Given input sequences are:
i)   aabab
ii)   abbb
iii)   ababb