Mahindra University Hyderabad

École Centrale School of Engineering
End-semester Examination (Regular)

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

Date: 02/06/2025 **Start Time: 10.00 AM**
Time Duration: 3 Hours **Max. Marks: 100**

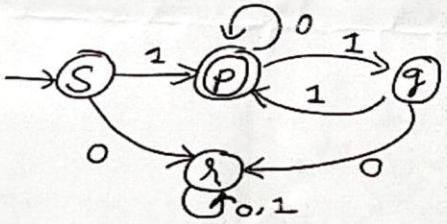
Instructions:

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.

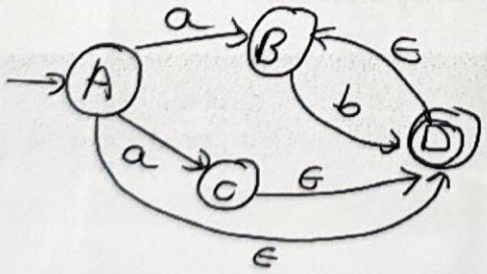
Q1. **[2*10=20M]**

1.1. Consider the determinstic finite state qutomata (DFA) A shown below. The DFA runs on the alphabet {0,1} and has the set of states {s, p ,r} with s being start state and p being the only final state. Write the minimal regular expression that correctly describes the langugae accepted by A.

A:



1.2. Convert the given $\in -NFA$ to its equivalent NFA then convert the NFA into its equivalent DFA.

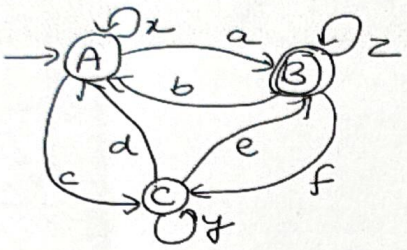


Q4.
4.1. Tra
T={a, b

Q2. **[2*10=20M]**

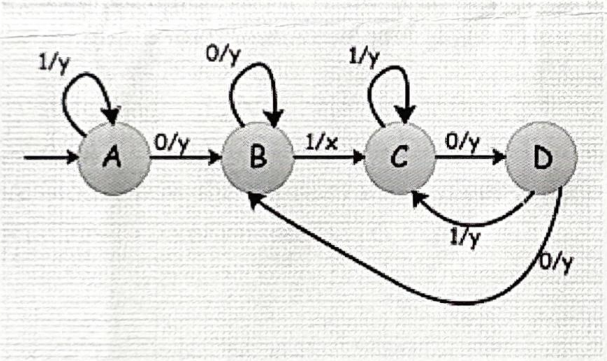
2.1 Let L be the language represented by the regular expression $\Sigma^*0011\Sigma^*$ where $\Sigma = \{0,1\}$. Draw the DFA with minimum number of states that recognizes complement of L?

2.2. For the DFA state diagram given below over the alphabet $\Sigma = \{a, b, c, d, e, f, x, z\}$, follow the process of creating a GNFA for the given DFA and then apply the "qrip" operations to arrive at a regular expression. Show the entire process of conversion step by step. The order of selection of qrip (states to be eliminated) is C, A, B.



Q3. **[2*10=20M]**

3.1. Convert the given mealy machine into moore machine. Also find out what is the output generated by this mealy machine on the give input string "10011010".



3.2. Convert the following moore machine to its equivalent mealy machine.

Present state	Next state a=0	Next state a=1	output
→ q_1	q_4	q_2	0
q_2	q_2	q_3	1
q_3	q_3	q_4	0
q_4	q_4	q_1	0

Q4. **[2*10=20M]**

4.1. Transform CFG into GNF. Bring the grammar G with V={ A, B, C}, A as start symbol, T={a, b} and productions P as following into GNF.

A -> BC

B -> CA | b

C -> BCB | a

4.2. Using Pumping Lemma, prove that the Language $L = \{a^i b^j c^k \mid j=i+k \}$ is not Context-free.

Q5. **[2*10=20M]**

5.1. Design a PDA over {x,y} which accepts strings defined by the language $L=\{x^n y^n xy \mid n>=0\}$. Show acceptance of xyxy.

5.2. Design a Turing Machine over the alphabet {0,1,a} that processes the string defined by L={a01a,a10a,a0101a}. Show both transition diagram and table for acceptance of a0101a.