

JAMIA HAMDARD
Department of Computer Science & Engineering
School of Engineering Sciences & Technology
New Delhi-110062

Examination: Odd Semester Examination 2024 (Backlog)

Paper Name: Formal Languages and Automata Theory

Paper Code: BTCSE 503 (Backlog)/ BTCSE503(Lateral)/ BTCSEAI 503 (Backlog)

Time: 3 Hours

Maximum Marks: 75

Note: This question paper has two sections : Section A and Section B. Assume missing data, if any.

Attempt (i) Section-A: All questions are compulsory.

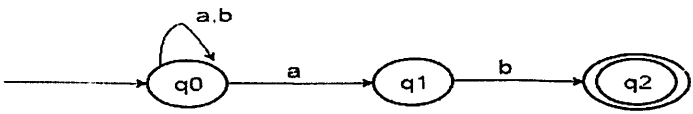
(ii) Section-B: Attempt any FOUR QUESTIONS.

Section –A (All questions are compulsory) 7×5=35 Marks

Q1 Consider the below finite automata and check the strings are accepted or not. Q0 is initial and Q3 is final state. <table border="1"> <thead> <tr> <th rowspan="2">States, Q</th><th colspan="2">Input Symbols</th></tr> <tr> <th>0</th><th>1</th></tr> </thead> <tbody> <tr> <td>Q0</td><td>Q1</td><td>Q2</td></tr> <tr> <td>Q1</td><td>Q0</td><td>Q1</td></tr> <tr> <td>Q2</td><td>Q1</td><td>Q3</td></tr> <tr> <td>Q3</td><td>Q3</td><td>Q0</td></tr> </tbody> </table> (i) 1110 (ii) 0001	States, Q	Input Symbols		0	1	Q0	Q1	Q2	Q1	Q0	Q1	Q2	Q1	Q3	Q3	Q3	Q0	CO3	BL 3
States, Q		Input Symbols																	
	0	1																	
Q0	Q1	Q2																	
Q1	Q0	Q1																	
Q2	Q1	Q3																	
Q3	Q3	Q0																	
Q2 Check if the given grammar is ambiguous or not for the string aabbccdd: S → AB / C A → aAb / ab B → cBd / cd C → aCd / aDd D → bDc / bc	CO2	BL 3																	
Q3 For the given Context Free Grammar, convert into CNF? S → aSb S → ab	CO2	BL2																	
Q4 Explain difference between recursive and recursive enumerable language?	CO1	BL1																	
Q5 Show that the string 010000 is generated by the PDA that is constructed by grammar: S → AB	CO3	BL 3																	

A → 0S/0 B → 1S/1		
Q6 What is Halting Problem?	CO 1	BL 1
Q7 Explain Chomsky Hierarchy of grammars ?	CO 2	BL 1

Section –B (Attempt any Four questions) 4×10=40 Marks

Q1 Design Turing machine that accepts even number of 0's and any number of 1's.	CO4	BL 5																		
Q2 For given Regular expression, design Finite automata- 11(010)*01+10*10	CO3	BL4																		
Q3 Write short note on Linear Bound Automata ? Construct PDA from the following Grammar : S → AB A → 0S/0 B → 1S/1 Also, show that the string 010000 is generated for PDA?	CO1 CO4	BL2 BL3																		
Q4 For the given NFA, design DFA . Show all steps.  Figure 1	CO2	BL 3																		
Q5 Construct minimum DFA equivalent to <table border="1" data-bbox="422 1299 847 1521"> <tr> <td></td><td>0</td><td>1</td></tr> <tr> <td>A</td><td>B</td><td>C</td></tr> <tr> <td>B</td><td>B</td><td>D</td></tr> <tr> <td>C</td><td>B</td><td>C</td></tr> <tr> <td>D</td><td>B</td><td>E</td></tr> <tr> <td>E</td><td>B</td><td>C</td></tr> </table> A is initial and E is final state.		0	1	A	B	C	B	B	D	C	B	C	D	B	E	E	B	C	CO4	BL 4
	0	1																		
A	B	C																		
B	B	D																		
C	B	C																		
D	B	E																		
E	B	C																		
Q6 Construct the string aabaa from the Leftmost and Rightmost derivation. S → aAS / aSS / \$ A → SbA / ba	CO3 CO4	BL5																		