


Name: Enrolment No:	
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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Formal Languages & Automata Theory

Semester: III

Program: B.Tech CSE (Hons.) All Branches

Time : 03 hrs.

Course Code: CSEG 2035P

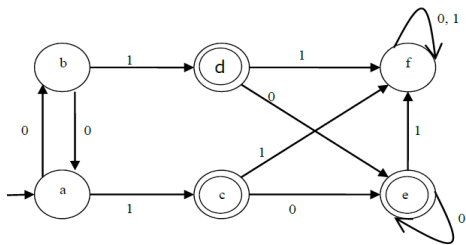
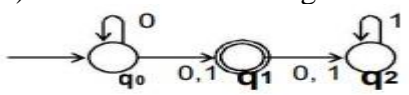
Max. Marks: 100

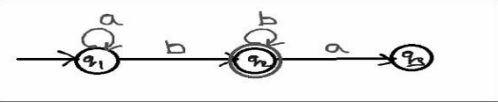
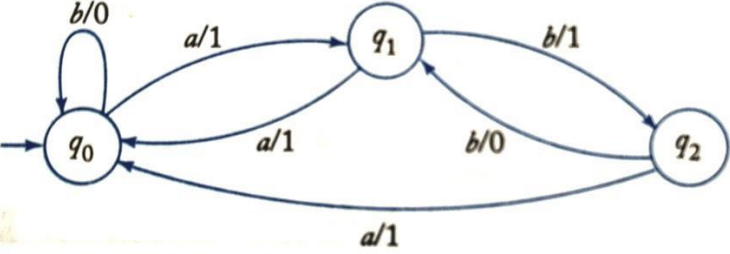
Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.	Question	Marks	CO
Q 1	Prove that the complement of a regular language is also regular.	4	CO2
Q 2	Construct a DFA for the language over $\{0, 1\}^*$ such that it contains "000" as a substring.	4	CO1
Q 3	Construct a ϵ -NFA for the following regular expression. $(0+1)^*(00+11)(0+1)^*$	4	CO2
Q 4	State the pumping lemma for regular languages. Discuss the applications of regular expression?	4	CO2
Q 5	State the relations among regular expression, deterministic finite automata, non-deterministic finite automaton and finite automaton with epsilon transition.	4	CO1

SECTION B
(4Qx10M= 40 Marks)

Q 6	<p>a) Minimize the DFA shown in the following diagram.</p> <div style="text-align: center;">  </div> <p>b) Convert the following NFA into an equivalent DFA.</p> <div style="text-align: center;">  </div>	10	CO1
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Q 7	Construct a regular expression for the given finite automata using state elimination method. <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">  </div>	10	CO2
Q 8	Convert the following grammar into an equivalent one with no unit productions and no useless symbols $S \rightarrow ABA$, $A \rightarrow aAA aBC bB$, $B \rightarrow A bB Cb$, $C \rightarrow CC Cc$	10	CO3
Q 9	Convert the Mealy machine into equivalent Moore machine. <div style="text-align: center; margin: 10px auto;">  </div>	10	CO1
SECTION-C (2Qx20M=40 Marks)			
Q 10	a) Design a PDA automata which accepts $L = \{0^n 1^n \mid n \geq 1\}$. b) Design a PDA for the grammar: $S \rightarrow aABC$ $A \rightarrow aB a$ $B \rightarrow bA b$ $C \rightarrow a$	20	CO3
Q 11	a) Design a Turing Machine that recognizes the language consisting of all strings of 0's whose length is a power of 2 i.e. $L = \{0^{2^m} \mid m \geq 0\}$. b) Write short notes on the following: i) Recursive and Recursive enumerable language ii) Decidable and undecidable language	20	CO4