

IV SEMESTER B.TECH. (COMPUTER SCIENCE AND ENGINEERING) END SEMESTER MAKEUP EXAMINATIONS, MAYJUNE 2018

Reg.

SUBJECT: FORMAL LANGUAGES AND AUTOMATA THEORY

[CSE2201]

REVISED CREDIT SYSTEM (12/6/2018)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.
- **1A.** Find the grammar that generate the set of all strings over $\Sigma = \{a, b\}$ with no more than 3 a's. Also, show the derivation of string '*babbaab*'.
- **1B.** Convert the NFA given in Fig.1B to its equivalent DFA.



- **1C.** What language does the grammar with productions $S \rightarrow Aa$, $A \rightarrow B$, $B \rightarrow Aa$ generate?
- **2A.** Using Pumping lemma show that the language $L = \{a^n : n \ge 2, is a prime number\}$ is not regular.
- **2B.** Find the regular expression for the language accepted by the automata given in Fig.2B.



2C. Construct a right linear grammar for the language $L=\{a^nb^m:n\geq 2, m\geq 3\}$.

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3A.	When do you say that a grammar is context free? What are the types of derivation methods used to derive some sentences from a CFG? Explain each type of derivation with suitable example.	3
3B.	Is the grammar with productions $S \rightarrow AB/aaB$, $A \rightarrow a/Aa$, $B \rightarrow b$ ambiguous? Justify your answer.	3
3C.	Convert the grammar with the productions $S \rightarrow aA/aBB$, $A \rightarrow aaA/\lambda$, $B \rightarrow bB/bbC$, $C \rightarrow B$ to its equivalent Chomsky Normal Form (CNF).	4
4A.	Construct an NPDA that accepts the language generated by the grammar with productions: $S \rightarrow aABB/aAA$, $A \rightarrow aBB/a$, $B \rightarrow bBB/A$.	4
4B.	Explain Off_Line Turing machine with suitable diagram.	3
4C.	Show that the language L={ $a^nb^n : n \ge 0$, n is not a multiple of 5 } over $\Sigma = \{a, b\}$ is context free.	3
5A.	Design a Turing machine that accepts all palindrome strings of any length over $\Sigma = \{a, b\}.$	4
5B.	Define context-sensitive grammar. Find a context sensitive grammar to generate the language L={ $a^nb^nc^n : n \ge 1$ } and derive $a^3b^3c^3$.	4
5C.	Explain Turing machine halting problem	2