

JK LAKSHMIPAT UNIVERSITY, JAIPUR
INSTITUTE OF ENGINEERING AND TECHNOLOGY
 End Term Examination (Backlog), September 2019
 B. Tech in Computer Science Engineering, Semester VI

Subject Code: CSE 504

Roll No.....

Subject Name: Theory of computation

Time: 3 hours

Max. Marks: 100

Instructions to students:

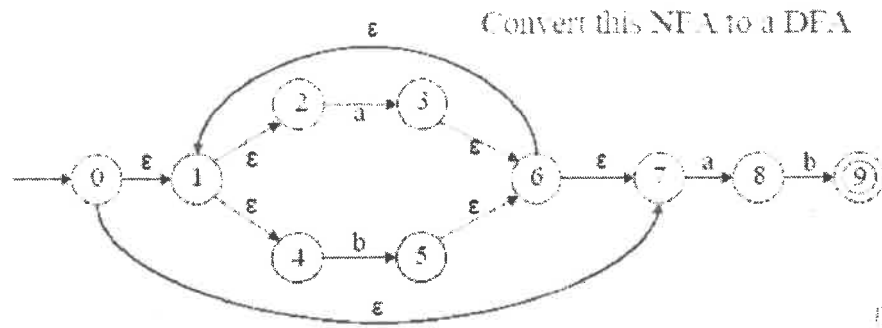
1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1	Draw a deterministic and non-deterministic finite automata which accept a string containing "the" anywhere in a string of {a-z}, e.g., "there" but not "those".	05
Q.2	Draw a deterministic and non-deterministic finite automata which accept a string containing "ing" at the end of a string in a string of {a-z}, e.g., "anything" but not "anywhere".	05
Q.3	Draw a deterministic and non-deterministic finite automata which either starts with 01 or end with 01 of a string containing 0, 1 in it, e.g., 01010100 but not 000111010.	05
Q.4	Consider the CFG with {S,A,B} as the non-terminal alphabet, {a,b} as the terminal alphabet, S as the start symbol and the following set of production rules $S \rightarrow aB$ $S \rightarrow bA$ $B \rightarrow b$ $A \rightarrow a$ $B \rightarrow bS$ $A \rightarrow aS$ $B \rightarrow aBB$ $A \rightarrow bAA$ Which strings is generated by the grammar?	10
Q.5	Let $M = (\{q_0, q_1\}, \{0, 1\}, \{z_0, x\}, \delta, q_0, z_0, \emptyset)$ be a pushdown automaton where δ is given by $\delta(q_0, 1, z_0) = \{(q_0, xz_0)\}$ $\delta(q_0, \epsilon, z_0) = \{(q_0, \epsilon)\}$ $\delta(q_0, 1, X) = \{(q_0, XX)\}$ $\delta(q_1, 1, X) = \{(q_1, \epsilon)\}$ $\delta(q_0, 0, X) = \{(q_1, X)\}$ $\delta(q_0, 0, z_0) = \{(q_0, z_0)\}$ 1. What is the language accepted by this PDA by empty stack? 2. Describe informally the working of the PDA	10
Q.6	Design a CFG for languages: $\{0^n 10^{2n} \mid n \geq 1\}$ The set of all strings over {0, 1} containing at least two 0's Identify the language generated by the following grammar	10
Q.7	$S \rightarrow AB$ $A \rightarrow aAb \mid \epsilon$ $B \rightarrow bB \mid b$	05
Q.8	Use pumping Lemma to prove The language $L = \{a^i b^j c^k \mid i \geq 0\}$ is regular or not.	10

Q.9

Example. Convert NFA to a DFA.

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Check whether the given grammar is ambiguous or not-

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 $S \rightarrow A / B$ $A \rightarrow aAb / ab$ $B \rightarrow abB / \epsilon$ Q.10 Construct a Turing Machine for language $L = \{0^n 1^n 2^n \mid n \geq 1\}$

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Q.11 State and prove ardens theorem. Construct a regular expression corresponding to the automata given below -

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