

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-I Semester (CSE/IT/ECE/CE/BT/BI)

COURSE CODE (CREDITS): 18B11CI513 (3)

MAX. MARKS: 25

COURSE NAME: Formal Languages and Automata Theory

COURSE INSTRUCTORS: RKI, DHA, SGL, VKS

MAX. TIME: 1 Hour 30 Minutes

Note: (a) All questions are compulsory

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q1. Assume L_1, L_2 and L_3 are regular language.

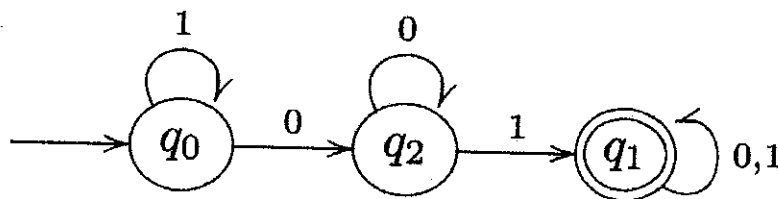
(i) Proof $(L_1 \cap L_2) \cup L_3$ is regular language.

[3] [CO3]

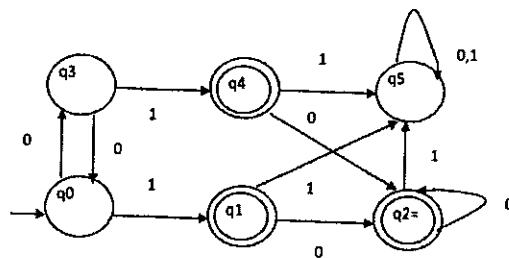
(ii) Proof $(L_1 \cap L_2) \cup L_3 \neq L_1 \cap (L_2 \cup L_3)$.

[2] [CO3]

Q2. (i) Convert the below FSA to regular expression.



(ii) Perform the DFA minimization on given finite automata



[2+3] [CO3]

Q3. Proof $L = \{a^n b^n c^n \mid n \geq 0\}$ is non regular by pumping lemma. Why pumping lemma is a contradiction proof?

[4+1] [CO3]

Q4. (i) Explain the role of context free grammar in programming language with an example.

(ii) Provide the context free grammar for $L = \{a^n b^n W W^r \mid n \geq 0 \text{ and } W \in \Sigma^* \text{ and } \Sigma = \{a, b\}\}$

(iii) $E \rightarrow E+E \mid E*E \mid E/E \mid F$

$F \rightarrow a|b$

Proof the above grammar is ambiguous .

[1+2+2] [CO4]

Q5. Simplify the below given grammar.

$S \rightarrow AB$, $A \rightarrow a/\text{Null}$, $B \rightarrow b/C$, $C \rightarrow D$, $D \rightarrow A$, $E \rightarrow c/\text{null}$, assume S is starting variable.

Derive the language generated by the above grammar?

[4+1] [CO4]