Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
III SEMESTER B.S. (ENGG.)
END - SEMESTER THEORY EXAMINATIONS APRIL - 2018
DATE: 09 MAY 2018
TIME: 9:30 AM TO 12:30 PM

FORMAL LANGUAGES AND AUTOMATA THEORY [CS 233]

Marks: 100   **Duration: 180 mins.**

Answer 5 out of 8 questions.

1)
A) Give any five differences between finite automata and pushdown automata. (5)

B) Construct a deterministic finite automata to accept strings of a's and b's (7)
    which do not end with the string abb.

C) Find regular grammar for the following languages on {a,b} , L={w : (na(w) - (8)
    nb(w)) mod 3 = 1}

2)
A) Obtain the PDA to accept the language L(M)={wCw^R|w€(a+d+m)*} where (12)
    w^R is the reverse of w. Show the steps to trace the string madamCmadam.

B) Construct an NFA for a regular expression ab((a*+b*+c*))*c. (8)

3)
A) Convert the below given grammar to Chomsky Normal Form(CNF) by (10)
    specifying each step clearly.
    S → ASB ,   A → aAS|a|ϵ,   B → SbS|A|bb

B) When do you say that grammar a context free grammar? What are the types (10)
    of derivation methods are used to derive some sentences from such a
    grammars? Explain each type of derivation with a suitable example.

4)
A) Give an algorithm to minimize the number of states in DFA. (6)

B) Minimize the number of states in a below given DFA. (10)
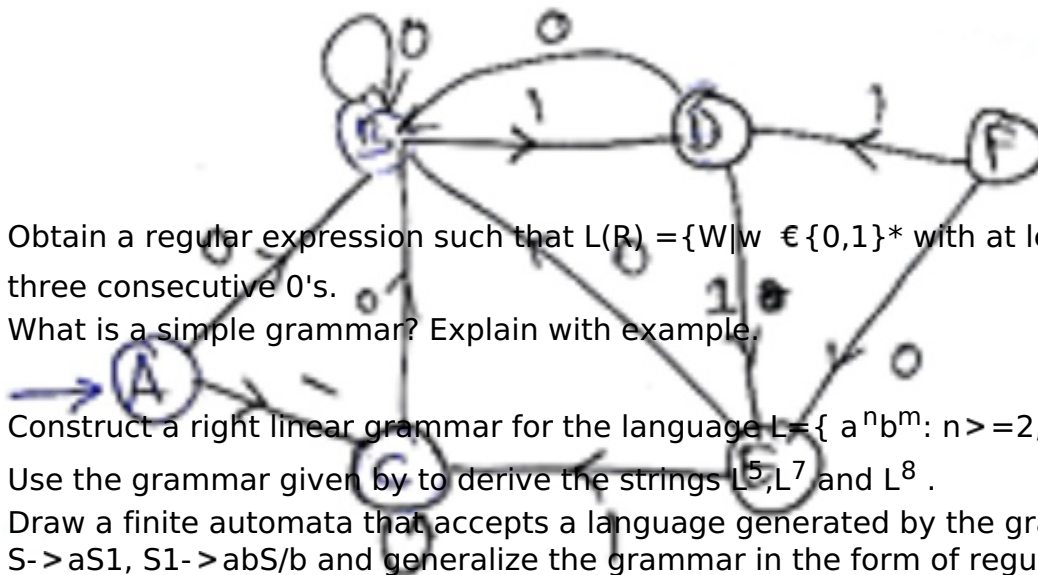
C)   Obtain a regular expression such that $L(R) = \{W | w \in \{0,1\}^*$ with at least three consecutive 0's.   (4)

5)

A)

B)   What is a simple grammar? Explain with example.   (5)

Construct a right linear grammar for the language $L = \{a^n b^m : n >= 2, m >= 3\}$.   (9)

Use the grammar given by to derive the strings L^5, L^7 and L^8 .

C)   Draw a finite automata that accepts a language generated by the grammar: S->aS1, S1->abS/b and generalize the grammar in the form of regular Language.   (6)

6)

A)   What is a grammar? How do u represent it? When do you say that two grammars are equivalent? Give two different the grammar to generate the same language $L = \{a^n b^n : n >= 0\}$ and show by derivation that they are equivalent.   (10)

B)   Obtain an Non deterministic finite automata (NFA) to accept strings of a's and b's ending with ab or ba. Give the transition table for the NFA drawn by you and trace the input for aaaabbbbbbba and ababaaa .   (10)

7)

A)   when do you say the grammar is unrestricted grammar? Give an example for such a grammar?   (4)

B)   Draw a DFA to accepted decimal strings divisible by 3.   (6)

C)   Let X and Y are two positive integer numbers. Obtain a Turing Machine to perform X+Y.   (10)

8)

A)   Prove that for any context free language L, there exists non deterministic pushdown automata (PDA) such that $L = L(M)$.   (10)

B)   Obtain a Turing Machine to accept a string w of a's and b's such that the number of a's (w) is equal to number of b's (w).   (10)

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