B.Tech II Year II Semester (R13) Supplementary Examinations May/June 2017

FORMAL LANGUAGES & AUTOMATA THEORY

(Computer Science & Engineering)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) List and explain the components of finite state automat.
(b) Show the elimination of unit productions with an example.
(c) Differentiate between DFA and NFA with examples.
(d) What are context sensitive languages? Write one example.
(e) How to remove ambiguity from grammars? Explain with an example.
(f) Differentiate Chomsky and Greibach normal forms.
(g) Give the formal definition of a PDA.
(h) What is two-way DFA? Give its advantages of DFA.
(i) Differentiate between PDA and TM with respect to: halt state and final state.
(j) Justify the role of checking of symbols in a Turing machine.

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 (a) Design DFA which accepts even number of 0's over {0, 1}.
(b) Design DFA which accepts language L = {100, 101}.

OR

3 Describe the following:

(a) Operations on sets.
(b) Relation and its properties.
(c) Prefix, suffix, concatenation, empty string.
(d) NFA with ∈ (Epsilon) moves.

UNIT - II

4 (a) State and prove Arden's theorem.
(b) List the closure properties of regular languages.

OR

5 Construct FA for the following regular expressions:

(a) (0+1)* (1+00) (0+1).
(b) 0+10* + 01*0.

Contd. in page 2

Code: 13A05404 **R13**

UNIT - III

6 Convert the following context free grammar to Greibach normal form:
$G = \{(\{S, A, B\}, \{a, b\}, P, S)\}$
P is
$S \rightarrow AB$
$A \rightarrow BS/a$
$B \rightarrow SA/b$

OR

7 (a) Find the grammar for the language $L = \{a^{2n}bc, where\ n > 1\}$.
(b) Write and explain closure properties of CFL's.

UNIT - IV

8 Design DPDA for language $L = \{a^n b^{2n}/n > 0\}$.

OR

9 Convert the following context free grammar to push down automata:
$S \rightarrow 0A$
$A \rightarrow 0ABC\ |1B|\ 0$
$B \rightarrow 1$
$C \rightarrow 2$

UNIT - V

10 Design a Turing machine over $\Sigma = \{1\}$ to accept the language $L = \{1^m/m\ is\ odd\}$.

OR

11 Design a Turing machine to recognize the language $\{1^n 2^n 3^n/n \geq 1\}$.

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