Paper ID [A0481]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 7th/8th)

FORMAL LANGUAGES & AUTOMATA THEORY (CS - 404)

Time : 03 Hours   **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.

2) Attempt any **Four** questions from Section - B.

3) Attempt any **Two** questions from Section - C.

Section - A

Q1)   *(10 × 2 = 20)*

a) Define Finite Automata.

b) Define Context Free Grammar.

c) What do you mean by Context Sensitive Language?

d) Define Pushdown Automata.

e) Give an example of an ambiguous grammar.

f) Design a Turing Machine to recognize all strings consisting of an even number of 1's.

g) Define Chomsky Normal Form.

h) Explain rewriting systems.

i) Explain the difference between the transition functions of DFA and NFA.

j) If u and v are Regular expressions, u = ababb and v = baa then find uv and u + v.

Section - B

(4 × 5 = 20)

Q2) Write a note on Cellular Automata.

Q3) Write a note on Formal Languages and Grammars.

Q4) Construct Finite Automata equivalent to the regular Expression
$(0 + 1)^* (00 + 11) (0 + 1)^*$.

Q5) Design a Turing Machine over $\{1,b\}$ which can compute a concatenation function over $\Sigma = \{1\}$. If a pair of words (w_1, w_2) is the input, the output has to be $w_1 w_2$.

Q6) Explain The Krudo Normal Form.

Section - C

(2 × 10 = 20)

Q7) Explain the properties of LL (k) and LR (k) grammars.

Q8) Convert the following grammar into GNF (Greibach Normal Form)

$S \rightarrow AA / 0$

$A \rightarrow SS / 1$

Q9) Construct a pushdown automata A accepting the set of all strings over $\{a,b\}$ with equal number of a's and b's.

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