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

FORMAL LANGUAGE & AUTOMATA THEORY

SUBJECT CODE : CS - 404

Paper ID : [A0481]

[Note : Please fill subject code and paper ID on OMR]

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) What is context-free grammar?

b) What is Griebach normal form?

c) What do you understand by type-1 grammar?

d) What are palindromes?

e) What do you understand by acceptability of language by turing machine?

f) What is type-2 grammar?

g) Define LR(k) grammar.

h) Why do natural languages are not formal languages?

i) Represent the set of regular expression of all strings over (a, b) beginning and ending with a.

j) What do you understand by term union of sets?

Section - B

($4 \times 5 = 20$)

Q2) Prove $(1 + 00^*1) + (1 + 00^*1)(0 + 10^*1)^*(0 + 10^*1) = 0^*1(0 + 10^*1)^*$.

Q3) Define turing machine in details.

Q4) Define pushdown automata completely.

Q5) Design a turing machine over {1, b} which can compute concatenation function over $\Sigma = \{1\}$. If a pair of words (w1, w2) is an input, the output has to be w1w2.

Q6) Prove that grammar S-> 0A2, A->1A1, A->1 is not LR(0).

Section - C

($2 \times 10 = 20$)

Q7) Write note on universal turing machine and modification of basic model of turing machine.

Q8) Construct a pda accepting empty store of languages in each case :

(a) $\{a^n b^m a^n | m,n >= 1\}$.

(b) $\{a^n b^{2n} | n >= 1\}$.

(c) $\{a^m b^m c^n | m,n >= 1\}$.

(d) $\{a^m b^n | m > n >= 1\}$.

Q9) Construct a regular grammar G generating the regular set represented by $P = a^*b(a + b)^*$.

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