RAMAPURAM SRM

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

Ramapuram Campus

Department Of Computer Science and Engineering

18CSC261T / FORMAL LANGUAGE AND AUTOMATA

CONTINUOUS LEARNING ASSESMENT-II

SET – I

Branch: BTech CSBS **Marks: 50**

Year/Sem: II/III

Part – A (10 X 1 = 10 marks)

Answer all the questions

1.Which one of the following languages over ∑={a,b} is NOT context-free?

A. {wwR|w∈{a,b}*}
B. {wanbnwR|w∈{a,b}*,n≥0}
C. {wanwRbn|w∈{a,b}*,n≥0}
D. {anbi|i∈{n,3n,5n},n≥0}

2.Automaton accepting the regular expression of any number of a' s is

A. a*
B. ab*
C. (a/b)*
D. a*b*c

3.Consider the following context-free grammar over the alphabet ∑={a,b,c} with S as the start symbol:S→abScT|abcTT→bT|bWhich one of the following represents the language genrated by the above grammar?

A. {(ab)n(cb)n|n≥1}
B. {(ab)ncbm1cbm2
C. cbmn|n,m1,m2,mn≥1}
D. {(ab)n(cbm)n|m,n≥1}

4. Assume the statements S1 and S2 given as:S1: Given a context free grammar,there exists an algorithm for determining whether L (G) is infinite.S2: There exists an algorithm to determine whether two context free grammars generate the same language. Which of the following is true?

A. S1 is correct and S2 is not correct
B. Both S1 and S2 are correct
C. Both S1 and S2 are not correct
D. S1 is not correct and S2 is correct

5. A student wrote two context-free grammars G1 and G2 for generating a single C-like array declaration. The dimension of the array is at least one. For example, int a[10][3];The grammars use D as the start symbol, and use six terminal symbols int ; id [ ] num.Grammar G1 Grammar

G2 D→intL; D→intL;L→id[E L→idEE→num] E→E[num]E→num][E E→[num] Which of the grammars correctly generate the declaration mentioned above?

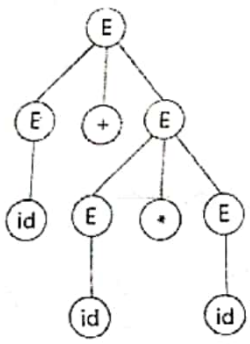
A. Both G1 and G2
B. Only G1
C. Only G2
D. Neither G1 nor G2

6. For any two languages L1 and L2 such that L1 is context-free and L2 is recursively enumerable but not recursive, which of the following is/are necessarily true?

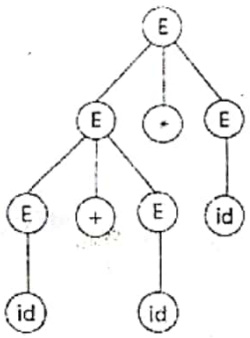
I. L1 (complement of L1) is recursive
II. L2 (complement of L2) is recursive
III. L1 is context – free
IV. L1∪L2 is recursively enumerable *

A. I
B. III
C. III and IV
D. I and IV

7. ConsiderE → E + E E → E * E E → id *



Parse tree 1



Parse tree 2

A. E → E + T,T → T * F,F → id
B. E → E + T , T → F
C. E → E + T , E → T T → T * F, T → F
D. E → E + T , E → T

8.Push down automata accepts _____ languages.

A. Type 3
B. Type 2
C. Type 1
D. Type 0

9.A push down automaton with only symbol allowed on the stack along with fixed symbol.

A. Embedded PDA
B. Nested Stack automata
C. DPDA
D. Counter Automaton

10. Which of the following option resembles the given PDA?

A. {0^n1^n|n>=0}
B. {0^n1^2n|n>=0}
C. {0^2n1^n|n>=0}
D. {0^21^n|n>=0}

PART-B (4 X 4 = 16 marks)

11. Define CFG.
12. Construct a CFG over {a,b} generating a language consisting of equal number if a's and b's.
13. Eliminate all unit production S->Aa|B;B->A|bb;A->a|bc|B.
14. Define Push Down Automata.
15. Is it true that non-deterministic PDA is more Powerful than that of deterministic PDA? Justify your answer.
16. Construct a PDA to accept a language $\{(ab)^n | n>=1\}$ by empty stack.

Part - C (2*12 = 24 marks)

17. a. Convert to Chomsky Normal Form S → ASA | aB, A → B | S, B → b | ε

OR

17. b. Consider the grammar,

S→iCts , S→iCtSeS , S→a , C→b

1) Construct leftmost derivation for the sentence W=libtibtaea.
2) Show the corresponding Parse tree for the above sentence.
3) Is the above grammar ambiguous? If so prove it.

18 .a. Design a PDA for L = $\{WCW^R | W \text{ in } (0+1)^*\}$

OR

18 .b. Obtain CFG for the PDA as given below

$\partial(q_0,0,Z)=(q_0,AZ)$
$\partial(q_0,0,A)=(q_0,AA)$
$\partial(q_0,1,A)=(q_0,\varepsilon)$
$\partial(q_1,1,A)=(q_1,\varepsilon)$
$\partial(q_0,\varepsilon,A)=(q_1,\varepsilon)$
$\partial(q_0,\varepsilon,Z)=(q_1,\varepsilon)$

HOD/CSE

17/11/21