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Department of Information Science & Engineering

ASSIGNMENT-3

Course Name with Code: Automata Theory & Computability (21CS51)

Academic year: 2023-24

Semester: V **Date of Given:** 06/03/24 **Date of Submission:** 09/03/24 **Max Marks:** 10

SI.No	Questions	CO
	Group-1	
1	Define PDA. Design a PDA for the language L={n_a (w) < n_b(w) | w€{a,b}* } and show the instantaneous description of the PDA on the input "abbab" and "abaab"	4
2	i) List and explain actions of shift-reduce parser ii) Explain the Model of an LR Parser	4
3	Consider the grammar S → CC C → cC C → d i) Is the grammar LR(1) ii) Construct CLR(1) & LALR(1) parsing table iii) Show the moves made by CLR(1) & LALR(1) parser for the string "ccdd"	4
4	i. With a neat diagram explain the working of Multitape Turing Machine. ii. Design Turing machine to accept the language L={$a^n b^n$| n ≥ 1} and show the sequence of moves made by the PDA on the input string "aabb"	5
5	Explain synthesized attribute, inherited attribute, S-attributed definition and L-attributed definition with examples.	5
	Group-2	
6	Define PDA. Design a PDA for the language L={$a^n b^n$ | n ≥ 1} and show the sequence of moves made by the PDA on the input string "aaabbb" and "aabbb"	4
7	Construct SLR(1) parsing table for the following grammar. Show the moves made by the SLR parser for the string id*id+id. E → E + T | T T → T * F | F F → (E) | id	4
8	i. Define Turing Machine. Explain with neat diagram the working of a Turing Machine model. ii. Design Turing machine to accept the language L={$1^n 2^n 3^n$| n ≥ 1} and show the sequence of moves made by the PDA on the input string "112233"	5
9	What is three address code? Explain the different ways of representing three address code with examples.	5
10	What is SDD? Write the grammar and SDD for a simple desk calculation and show annotated parse tree for the expression (3+4)*(5+6)	5
	Group-3	
11	Define PDA. Design a PDA for the language L={wcw^R | w€{a,b}* } and show the sequence of moves made by the PDA on the input "aabcbaa" and "abacbba".	4

12	i) Define Shift-Reduce parser and Handle. What are conflicts in shift-reduce parse explain with example. ii) Is the following grammar LR(0)? E → E + T | T T → T * F | F F → (E) | id	4
13	i. Explain various technique used for construction of Turing machine ii. Design Turing machine to accept the language L ={wCw^R | w€{0,1}* } and show the sequence of moves made by the PDA on the input string "101C101"	5
14	Define S-Attribute and I-attribute with respect to SDD and construct annotated parse tree for string 5*6+7 by using given grammar S → En E → E +T | E – T | T T → T * F T → T | F T → F F → (E) | digit n → ;	5
15	What are the different three address code instructions? Translate the arithmetic expression a + b - (-c) into quadruples, triplets and indirect triplets.	5
	Group-4	
16	Define PDA. Design a PDA to accept string of balanced parantheses. The parantheses to be considered are (,), [,]. Show the sequence of moves made by the PDA on the input string "[()][]" and "[](])"	4
17	Check whether the grammar is LR(1) or not? S → Aa | bAc | Bc | bBa A → d B → d	4
18	Explain i) Multitape TM ii) Non-deterministic TM Define TM. Design a TM to accept the following language i) L = {w| w€{0,1}*} containing the substring 001 ii) L= { w is even | w€{a,b}* } iii) L = {w| w€{a,b}*} ending with bab	5
19	Explain the issues in design of code generation	5
20	What is dependency graph? Give SDD for simple type declaration including int and float. Construct annotated parse tree and dependency graph for the declaration *int a, b* and *float a, b, c*.	5

Course Outcomes:	**CO**
1. Design and develop Turing Machines and its variants, Linear Bounded Automata for decidable and semi decidable languages	CO4
2. Classify problems with respect to different models of computations and applications	CO5

Course Coordinator Name
Supriya

HOD