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CS102501

B.Tech.(Fifth Semester) Examination,

Nov-Dec 2022

[CSE, CSE (DS), CSE (IOT), CSE (BDA), CSE (IOTCS), CSE (AI), CSE (AIML), CSE (GT) Branch]

THEORY OF COMPUTATION

Time Allowed: 3 hours

Maximum Marks: 100

Minimum Marks: 35

Note: *All five units are compulsory. Part (a) is compulsory carry 4 marks. Attempts any two parts from (b),(c) & (d) carry 8 marks each.*

CO1:-Design finite automata to accept a set of strings of a language.
CO2:-Determine whether the given language is regular or not.
CO3;-Design context free grammars to generate strings of context free language.
CO4:-Design push down automata and the equivalent context free grammars and Design Turing machine.
CO5:-Distinguish between computability and no computability, Decidability and un-decidability

UNIT-1

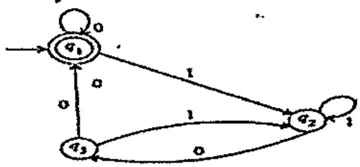
Q. No		Questions	Marks	CO	BL	PI
Q.1	a)	Differentiate between NFA & DFA.	4	CO1	L2	1.3.1
	b)	Construct a Moore machine equivalent to Melay Machine:	8	CO1	L2	1.3.1
	c)	Minimize the given DFA with My Hill Nerode Theorem:	8	CO1	L5	1.3.2

Table for Q.1 b):

	a = 0		a = 1	
	State	Output	State	Output
➡q1	q1	1	q2	0
q2	q4	1	q4	1
q3	q2	0	q3	1
q4	q3	0	q2	1

Table for Q.1 c):

State/Σ	0	1
->q0	q1	q4
q1	q2	q3
q2	q7	q8
q3	q8	q7
q4	q5	q6
q5	q7	q8
q6	q7	q8
q7	q7	q7
q8	q8	q8

	d)	Design a DFA which accepts a language L= {w where number of a in w=2 and number of b in w≥3}	8	CO1	L5	1.3.2
		UNIT-2				
Q.2	a)	Explain closure property of regular grammar.	4	CO2	L2	2.1.2
	b)	Construct a finite automata equivalent to the regular expression: (0+1)*(00+11) (0+1)*	8	CO2	L4	2.1.2
	c)	Prof that the following language is not regular : $L=\{a^n b^n$ where $n \geq 1\}$	8	CO2	L3	2.2.3
	d)	Calculate regular expression from the following transition system: 	8	CO2	L4	2.1.2
		UNIT-3				
Q.3	a)	(1) Give a regular expression for the set of all strings having odd number of 1's. (2) Give the regular expression for the set of all strings ending in 00.	4	CO3	L2	2.2.2
	b)	Explain Chomsky classification of Grammar.	8	CO3	L2	2.2.3
	c)	E->E+T/T T->T*F/F F->(E)/a Convert it to GNF.	8	CO3	L5	2.2.3
	d)	S->0B/1A A->0/0S/1AA B->1/1S/0BB Find LMD, RMD & also calculate the derivation tree for the string w=00110101.	8	CO3	L5	2.2.3
		UNIT-4				
Q.4	a)	Write down difference between NPDA& DPDA.	4	CO4	L5	1.4.1
	b)	Design a PDA which accepts the language : $L=\{a^n b^{2n}\}$ where $n \geq 1$	8	CO4	L2	1.4.1
	c)	Design a Turing machine M to recognize the language $L=\{a^n b^n c^n\}$ where $n \geq 0$.	8	CO4	L4	1.4.1
	d)	Write short notes on (any two) : (1) Decidable and undecidable Problem	4 Each	CO4	L4	1.4.1

		(2) Halting problem of Turing machine. (3) Post correspondence problem.				
UNIT-5						
Q.5	a)	Explain partial and initial functions.	4	CO5	L4	2.2.3
	b)	Show that $f(x,y)=x*y$ and $f(x,y)=x^y$ is primitive recursive function.	8	CO5	L5	2.2.3
	c)	Explain space & time complexity.	8	CO5	L2	2.2.3
	d)	What is computation? Explain Turing Model for computation.	8	CO5	L4	2.1.2

CO- Course Outcomes, BL– Bloom's TaxonomyLevels, PI– Performance Indicator

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