Sr. No.-

July 2022

B.Tech. (IT/CE) 5th **SEMESTER**

Formal Languages and Automata PCC-CS-502

Time: 3 Hours **Max. Marks:75**

Instructions: **1.** *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART -A

Q1 (a) Represent the set $\{1^{2n+2} | n \geq 0\}$ by a regular expression and represent the regular expression $(00 + 01 + 10 + 11)^*$ by a set. [CO1] (1.5)

(b) Find all strings of length 4 or less for the following regular expression $(a^*b + b^*a)^*$ and Design a DFA for the regular expression $0(0 + 10)^*$ [CO1] (1.5)

(c) Write any two application of Finite Automata. [CO1] (1.5)

(d) Consider a grammar G whose productions are $S \rightarrow 0S/1S/\wedge$, write the language of this grammar. [CO2] (1.5)

(e) What do you mean by un-decidability? [CO2] (1.5)

(f) What are the functions of lexical analyzer? [CO3] (1.5)

(g) Show the left most and right most derivation for the string $a + a * a$ for the grammar (1.5)

E→E+E/E*E/(E)/a [CO4]

(h) What do you mean by Parser? What are the various types of parsers available? [CO4] (1.5)

(i) Differentiate between syntax and semantic. What do you mean by semantic actions? [CO4] (1.5)

(j) What is difference between single pass and multi pass compiler? [CO4] (1.5)

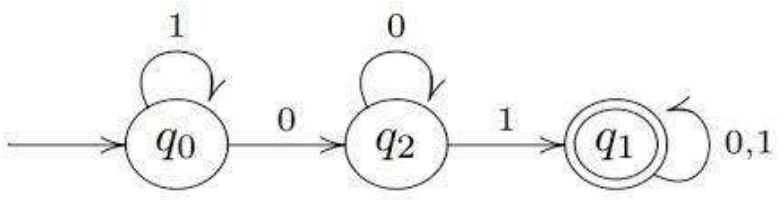
PART –B

Q2 (a) Explain pumping leema theorem for the regular languages. [CO1] (5)

(b) Design a DFA for the following regular expression $P = 0(01)^*$ Afterwards, convert that DFA in a way that it would accept P^*. [CO1] (10)

Q3 (a) Briefly discuss the functions of all the phases of a compiler. [CO3] (5)

(b) Find the regular expression corresponding to given DFA in the Figure using Arden's Theorem. [CO2] (10)



Q4 Construct the predictive parsing table for the following grammar G:- [CO4] (15)

E → T E' E' → + T E' E' → ^ T→F T' T'→ * F T' T' → ^ F → (E) F→ id

Q5 (a) Design a TM for deciding the language $M = \{ww^r | w \in (a+b)^*\}$ [CO2] (7.5)

(b) Design a PDA which will recognize the elements of following set $\{0^r 1^r | r \geq 0\}$ [CO2] (7.5)

Q6 (a) Explain LR-Parsing Algoritm in detail. [CO3] (7.5)

(b) For the grammar (1) E-> E+T (2) E->T (3) T->T*F (4) T-> F (5) F-> (E) (6) F->id Demonstrate the working of LR parser for the string id*id+id :- [CO3] (7.5)

STATE	ACTION						GOTO		
	Id	+	*	(	)	$	E	T	F
0	S5			S4			1	2	3
1		S6				Accept			
2		R2	S7		R2	R2			
3		R4	R4		R4	R4			
4	S5			S4			8	2	3
5		R6	R6		R6	R6			
6	S5			S4				9	3

7	S5			S4					10
8		S6			S11				
9		R1	S7		R1	R1			
10		R3	R3		R3	R3			
11		R5	R5		R5	R5			

Q7 Write short note on [CO4]

(a) Discuss the issues in the design of code generator (5)

(b) Intermediate Code Generation (5)

(c) Machine Code Optimization (5)