18CS502

Hall Ticket Number:

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III/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION

January, 2022 — **Computer Science & Engineering**

Fifth Semester — **Automata Theory & Formal Languages**

Time: Three Hours — **Maximum:** 50 Marks

Answer Question No.1 compulsorily. (1X10 = 10 Marks)

Answer ONE question from each unit. (4X10=40 Marks)

1.	a)	Design DFA for accepting all strings end with 01.	CLO-1	
	b)	Differentiate DFA and NFA.	CLO-1	
	c)	Write transition functions for DFA and NFA.	CLO-1	
	d)	$(P^* + Q^*)^* = ?$	CLO-2	
	e)	$(r^*)^*=?$	CLO-2	
	f)	Give the definition of a regular expression.	CLO-2	
	g)	Define Context Free Grammar.	CLO-3	
	h)	Define ambiguous grammar.	CLO-3	
	i)	State decision properties of CFL's.	CLO-4	
	j)	Give formal definition of Turing Machine.	CLO-4	

Unit -I

2. a) Convert the following NFA into equivalent DFA. (* refers the final state) CLO-1

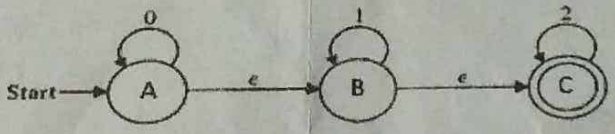
δ	0	1
→ p	{p,r}	{q}
q	{r,s}	{p}
*r	{p,s}	{r}
*s	{q,r}	∅

7M

b) Construct DFA for even number of 0's and odd number of 1's. CLO-1 3M

(OR)

3. a) Construct an equivalent DFA for the following ϵ-NFA. CLO-1



7M

b) Design a DFA for the language of strings those begin and end with different symbol over the alphabet Σ = {a, b}. CLO-1 3M

Unit -II

4. a) State and prove pumping lemma for regular languages. CLO-2 5M

b) Prove the language $L=\{ a^n \mid p \text{ is a prime number} \}$ is not regular. CLO-2 5M

(OR)

5. a) Convert the regular expression $(0+1)^*00\ (0+1)^*$ to FA. CLO-2 5M

b) Convert the following DFA to regular expression. (* refers the final state) CLO-2

δ	a	b
→*P	S	P
Q	P	S
R	R	Q
S	Q	R

5M

P.T.O.

Unit -III

6. a) Convert the following grammar to Chomsky Normal Form. CLO-3 7M

$S \rightarrow bA \mid aB$
$A \rightarrow bAA \mid aS \mid a$
$B \rightarrow aBB \mid bS \mid b$

b) Remove useless symbols from the following CFG. CLO-3 3M

$S \rightarrow aB \mid aCD \mid aE$
$B \rightarrow bC$
$C \rightarrow aB \mid b$
$D \rightarrow aE$
$E \rightarrow bCD$

(OR)

7. a) Construct PDA for the language $L = \{ a^n b^n \mid n>=1 \}$. CLO-3 5M

b) Give left most and right most derivations and parse tree for the string "id + id * id" to the following grammar. CLO-3 5M

$E \rightarrow E + E \mid E * E \mid id.$

Unit -IV

8. a) Construct TM for the language $L=\{ 0^n 1^n 2^n \mid n>=0\}$ CLO-4 10M

(OR)

9. a) State and prove the closure properties of CFL's. CLO-4 5M

b) Explain the Post Correspondence Problem with suitable example. CLO-4 5M