Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U5203

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Fifth Semester

Computer Science Engineering

21UCS503 THEORY OF COMPUTAION

(Regulation 2021)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	List out the differences between DFA, NFA and ∈ NFA.	CO1- U
2.	Construct an NFA with input symbol {0, 1} in which double '1' is followed by double'0'	CO2-App
3.	List out the closure properties of Regular Language.	CO1- U
4.	Convert the following Regular grammar into finite automata S->0A|1A, A->0A|1A|+B|-B, B->0B|1B|0|1	CO2-App
5.	Remove ε production from the given context free grammar S->XYX, X->0X|ε, y->1Y|ε	CO2-App
6	Construct CFG for the language having any number of "a" over the input symbol {a}.	CO2-App
7	Write down the formal definition of Push Down Automata (PDA).	CO1- U
8	List out closure properties of CFL.	CO1- U
9	Construct a Turing Machine which accepts the string W= aba over the input symbol {a,b}	CO2-App
10	Differentiate Recursive and Recursively Enumerable Language	CO1- U

PART – B (5 x 16= 80 Marks)

11. (a) Convert the following NFA to its equivalent DFA CO2-App (16)

	a	b
->q1	{q1,q2}	{q2}
*q2	{q3}	{q2}
q3	{q3}	{q3,q4}
*q4	ϕ	ϕ

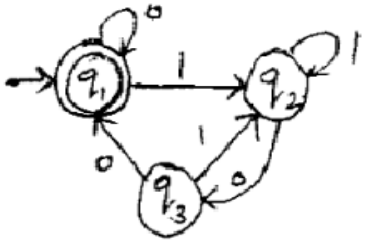
Or

(b) Convert the following ε-NFA to NFA without ε transition CO2-App (16)

	ε	a	b	c
->p	ϕ	{q}	{p}	ϕ
q	{r}	ϕ	{q}	ϕ
*r	ϕ	ϕ	ϕ	{r}

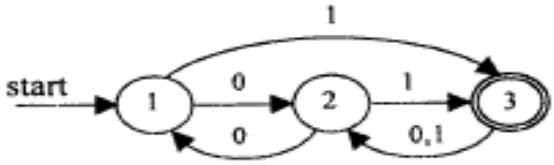
12. (a) (i) Construct an ε-NFA to accept the language indicated by the following regular expression ((01+001)*0*)*. CO2-App (8)

(ii) Construct Regular Expression for the following DFA. CO2-App (8)



Or

(b) (i) Find the regular expression for the following deterministic finite automata using State Elimination Method. CO2-App (8)



(ii) Construct an NFA to accept the language indicated by the following regular expression (0+1)*(00+11) CO2-App (8)

13. (a) (i) Convert the following CFG to Greibach Normal Form CO2-App (10)

S->CA|BB

B->b|SB

C->b

A->a

(ii) Simplify the Following Context Free Grammar. CO2-App (6)

S->AB|CA

B->BC|AB

A->a

C->aB|b

Or

(b) (i) Convert the following CFG to GNF CO2-App (10)

S->AA|0

A->SS|1

(ii) Consider the following productions CO2-App (6)

S->0B|1A

A->0|0S|1AA

B->1|1S|0BB

For the string W=00110101, find a leftmost derivation

14. (a) (i) Construct a PDA accepting by empty stack for the language $L= \{a^n b^n \mid n \geq 1\}$. CO2-App (16)

(ii) Convert the following Context free grammar to a Push DownAutomata.

E->E+ E

E->id

Or

(b) Construct a context-free grammar G which accepts L(M), where M = ({q0,q1}, {a,b}, {a,z0}, δ, q0, z0, ϕ) and where δ is given by CO2-App (16)

a.δ(q0, a, z0) = { (q0,az0)}

b.δ(q0, a,a) = { (q0, aa)}

c.δ(q0, b,a) = { (q1, ε)}

d.δ(q1, b, a) = { (q1, ε)}

e.δ(q1, ε,z0) = { (q1, ε)}

15. (a) Construct Turing Machine for the Language $L=\{a^n b^n\}$where n>=1 CO2-App (16)

Or

(b) Design a Turing Machine M for f(x,y)= x*y and x,y are stored in the tape in the form o^x1o^y1. CO2-App (16)