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

Question Paper Code: U3C01

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

Third Semester

Computer Science and Business Systems

21UCB301 - FORMAL LANGUAGES AND AUTOMATA THEORY

(Regulations 2021)

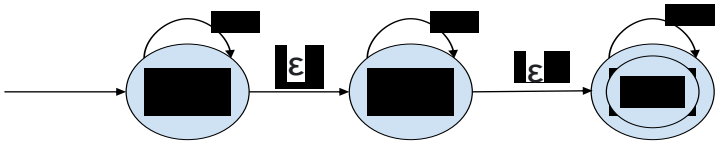
Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	List out the differences between DFA , NFA.	CO1-U
2.	Design a DFA to accept strings of a's and b's having even no of a's also check whether the string w1=abaa is accepted or not.	CO2-App
3.	Design an NFA with $\sum$={0,1} which accepts all the string in which the 3rd symbol from the right end is always 0.	CO2-App
4.	State Pumping Lemma for Regular language and its advantages.	CO1-U
5.	Construct CFG for the language L={WCW^R|W is a string in (a+b)*}	CO2-App
6	Simplify the following CFG by removing unit Production? S->A|1,A->01|10	CO2-App
7	List out closure properties of CFL.	CO1-U
8	Check whether L= {$a^n b^n$ |n>=1} is CFL or not.	CO2-App
9	Differentiate Recursive and Recursively Enumerable Language.	CO1-U
10	List out different Technique's for Turing Machine construction.	CO1-U

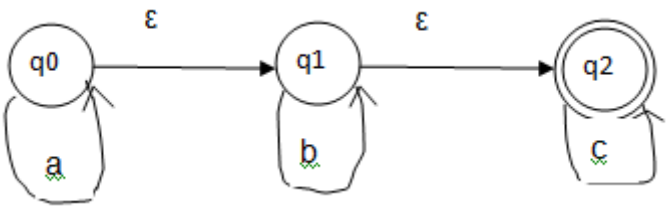
PART – B (5 x 16= 80 Marks)

11. (a) 

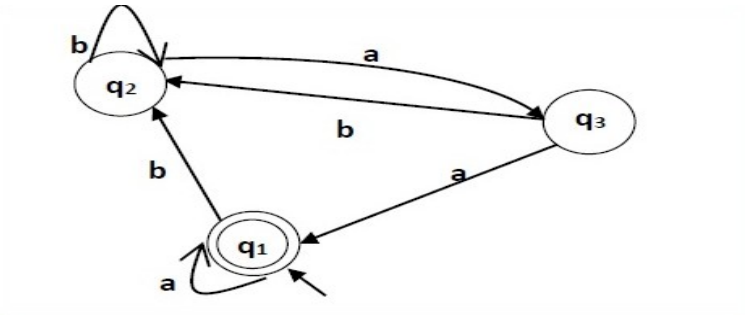
Conversion of ε-NFA to DFA CO2-App (16)

Or

(b) Convert the given ε-NFA to DFA. CO2-App (16)

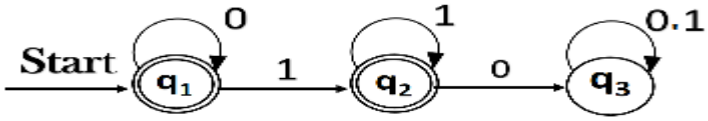


12. (a) Construct regular expression for the following Finite automata using Arden's theorem. C02-App (16)

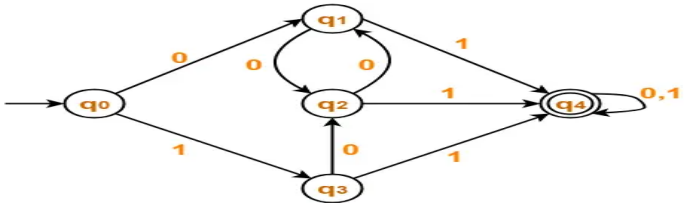


Or

(b) (i) Construct regular expression for the following finite automata. (8) C02-App (16)



(ii)Minimize the following DFA (8)



13. (a) (i) Show that the grammar S->a | abSb | aAb, A->bS | aAAb is ambiguous or not. (6) CO2-App (16)

(ii) Find a Grammar in Chomsky Normal Form equivalent to the given Grammar. (10)

S-> aAbB, A ->aA | a, B->bB|b.

Or

(b) (i) Consider the following grammar (6) CO2-App (16)

S -> aAS | a

A-> SbA | SS | ba

Find leftmost Derivation and draw a derivation tree for the string W=aabbaa.

(ii) Find a Greibach normal Form to the following Grammar

S->CA (10)

A->a

C->aB|b

14. (a) (i)Construct a PDA accepting by empty stack for the language L= $\{a^n b^n \mid n \geq 1\}$. (10) CO2-App

(ii)Convert the following Context free grammar to a Push Down Automata. (6) (16)

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) Compute Turing Machine for the function f(x)=x+3 CO2-App (16)

Or

(b) Construct a TM to recognize even length palindrome. CO2-App (16)