15 JUN 2023

Reg. No.													

Question Paper Code	11889

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL/MAY 2023

Fifth Semester

Computer Science and Engineering

20CSPC502 - THEORY OF COMPUTATION

(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Define ε-closure(q) with an example.	*2,K1,CO1*
2.	State the difference between NFA and DFA.	*2,K1,CO1*
3.	Express a RE for the language containing all the strings of any number of a's and b's.	*2,K2,CO2*
4.	Illustrate an FA for the Regular expression (00+(0+1))1*.	*2,K2,CO2*
5.	Define a context free grammar.	*2,K1,CO3*
6.	Define Deterministic PDA.	*2,K1,CO3*
7.	State Turing machine.	*2,K1,CO4*
8.	State chomsky normal form.	*2,K1,CO4*
9.	Discuss on checking off symbols.	*2,K2,CO5*
10.	State is a multi-tape Turing machine.	*2,K1,CO5*

PART - B (5 × 13 = 65 Marks)

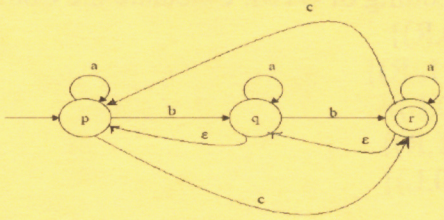
Answer ALL Questions

11. a) Illustrate a DFA equivalent to the NFA.M=({p, q, r},{0,1}, δ, p,q) Where δ is defined in the following table. *13,K2,CO1*

δ	0	1
-> p	{q,s}	{q}
q	{r}	{q,r}
r	{s}	{p}
* s	-	{p}

OR

b) Express the following ε-NFA to DFA *13,K2,CO1*



12. a) Solve the following to a regular expression. *13,K3,CO2*

	0	1
-> q1	q2	q3
* q2	q1	q3
q3	q2	q2

OR

b) Construct a ε-NFA for the following regular expression. *13,K3,CO2*
a*(b + ab*)

13. a) Solve a PDA for accepting a language $\{a^n b^{2n} \mid n>=1\}$. *13,K3,CO3*

OR

b) Deduce PDA for the given CFG, and test whether 010000 is acceptable by this PDA. 1. S → 0BB 2. B → 0S | 1S | 0 *13,K2,CO3*

14. a) Illustrate the Chomsky Normal Form equivalent to the grammar S->0A0/1B1/BB, A->C, B->S/A, C->S/ ε. *13,K2,CO4*

OR

b) Illustrate a Turing machine for the following $L=\{1^n 0^n 1^n | n>=1\}$. *13,K2,CO4*

15. a) Explain how a Turing Machine with the multiple tracks of the tape can be used to determine the given number is prime or not. *13,K2,CO5*

OR

b) Illustrate a Turing Machine to compute f(m+n)=m+n, V m,n>=0 and simulate their action on the input 0100. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Discuss post correspondence problems. Let∑={0,1}.Let A and B be the lists of three strings each, defined as

A	B	
i	wi	xi
1	1	111
2	10111	10
3	10	0

(i) Does the PCP have a solution? *7,K2,CO6*
(ii) Prove that the universal language is recursively enumerable. *8,K2,CO6*

OR

b) Describe the encoding of UTM. Calculate the Code for TM. *15,K2,CO6*
δ(q0,0)={(q0, 0,R)}
δ (q0,0)={(q0, 1, R)}
δ (q0,1= {(q1,0,L)}
δ (q1,1)= {(q1,1,R)}
δ (q1,0)={(q1,0,L)}