Reg. No.												

Question Paper Code	11575

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

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.	Describe and prove "Let S is a Finite subset of some Infinite set U. T be the component of S with respect to U then T is Infinite".	2,K2,CO1
2.	Define Finite Automata (FA), Transition Diagram.	2,K1,CO1
3.	Explain a finite automaton for the regular expression 0*1*.	2,K2,C02
4.	Differentiate between the + closure and*closure.	2,K2,CO2
5.	Convert the following CFG to PDA. S→aAA A→aS|bS|a	2,K2,CO3
6.	Define Deterministic PDA.	2,K1,CO3
7.	Construct CFG without Є production from : S →a | Ab | aBa A →b | Є B →b | A.	2,K3,CO4
8.	State Chomsky normal form.	2,K1,CO4
9.	Discuss on Checking off symbols.	2,K2,CO5
10.	State the techniques for Turing machine construction.	2,K1,CO5

PART - B (5 × 13 = 65 Marks)

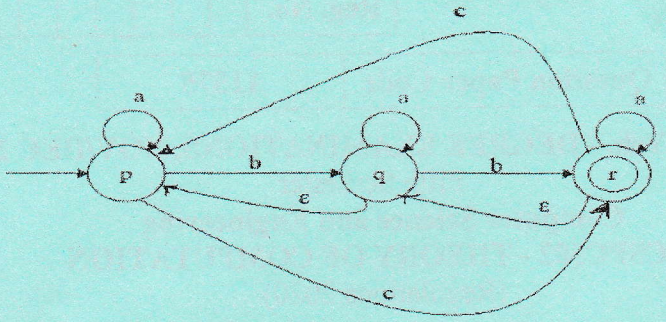
Answer ALL Questions

11. a) Convert the following NFA to its equivalent DFA. 13,K2,CO1

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

OR

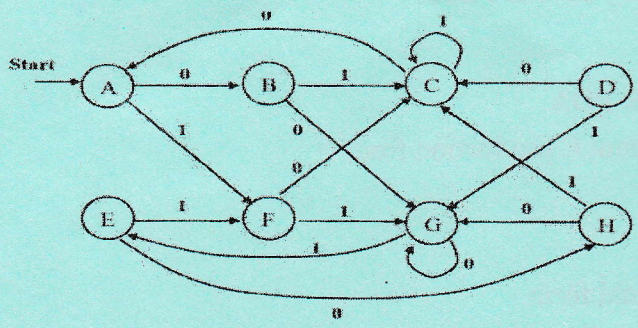
b) Convert the following ε-NFA to DFA and list the difference between NFA and DFA. 13,K2, CO1



12. a) (i) Construct a ε-NFA for the following regular expression. *7,K3,CO2*
(0+1)*(00+11)(0+1)*
(ii) Solve to prove the Language L= $\{a^n b^n / n>=1\}$ is not a regular Language by Pumping Lemma. *6,K3,*

OR

b) Convert the DFA to minimize it using the Equivalence partition algorithm. *13,K2,CO2*



13. a) Solve the given grammar for the following questions.
S→aB|b
A →Aa|aS|bA
A →Bb|bS|aBB for the string "baaabbabba"
(i) Leftmost derivation & rightmost derivation *6,K3,CO3*
(ii) Derivation Tree *3,K3,CO3*
(iii) Is the above grammar ambiguous? If so, prove it. *4,K3,CO3*

OR

b) Convert the grammar *13,K2,CO3*
S→0S1|A
A→1A0|S|ε into PDA that accepts the same language by the empty stack .Check whether 0101 belongs to N(M).

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

OR

b) Construct a equivalent grammar G in CNF for the grammar G1 where *13,K3,CO4*
G1 =({S,A,B},{a,b},
{S→bA/aB
A→bAA/aS/a
B→aBB/bS/b},S).

15. a) Discuss the various programming techniques of Turing machine construction and explain Checking off Symbols for the language *13,K2,CO5*
$L= \{wCw / w \in (0,1)^*\}$ i.e. $\sum=\{0,1\}$.

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) Describe and prove RICE theorem. *15,K2,CO6*

OR

b) (i) Explain the solution for the following system of posts correspondence problem, X = {100, 0, 1}, Y = {1, 100, 00}. *7,K2CO6*
(ii) Describe the encoding of UTM. Calculate the Code for TM. *8,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)}