Reg. No.												

Question Paper Code	12397

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

Fifth Semester

Computer Science and Engineering

(Common to M.Tech.- Computer Science and Engineering (5 Years Integrated))

20CSPC502 - THEORY OF COMPUTATION

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

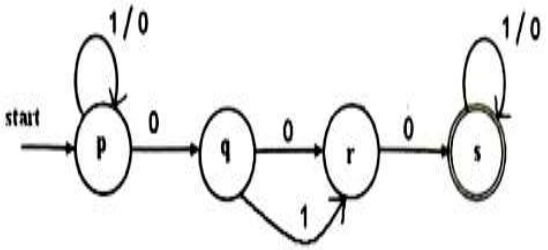
Answer ALL Questions

		Marks, K-Level, CO
1.	Show by Induction 1+2+3+.....n = n(n+1)/2.	*2,K2,CO1*
2.	Illustrate a DFA for the Language L = $\{0^n / n \bmod 3 = 2, n >= 0\}$.	*2,K2,CO1*
3.	Illustrate a regular expression for the set of all strings over {a,b,c} with any number of a's followed by any number of b's followed by any number of c's.	*2,K2,CO2*
4.	Illustrate an FA for the Regular expression (00+(0+1))1*.	*2,K2,CO2*
5.	Define Grammar and its types.	*2,K1,CO3*
6.	Describe a CFG for the following the language $L=\{ww^R / w \in \{0,1\}^*\}$.	*2,K2,CO3*
7.	Describe null production and unit production? Give an example.	*2,K1,CO4*
8.	Define Greibach Normal Form (GNF) and its general form.	*2,K1,CO4*
9.	Define the classes of P and NP.	*2,K1,CO6*
10.	State when a problem is said to be decidable and give an example of an undecidable problem.	*2,K1,CO6*

PART - B (5 × 13 = 65 Marks)

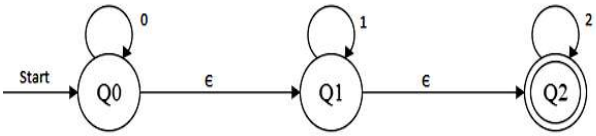
Answer ALL Questions

11. a) Convert the following NFA to a DFA using the subset construction algorithm. *13,K2,CO1*

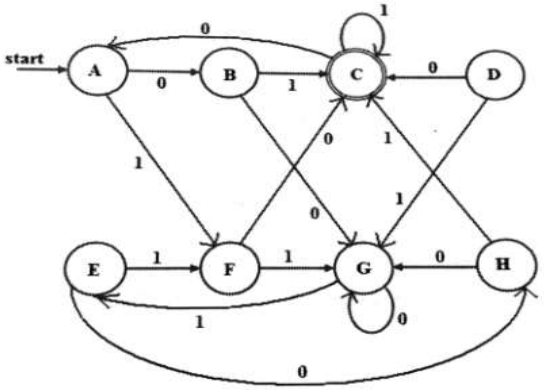


OR

b) Illustrate an NFA without ε-transitions for the given NFA. *13,K2,CO1*

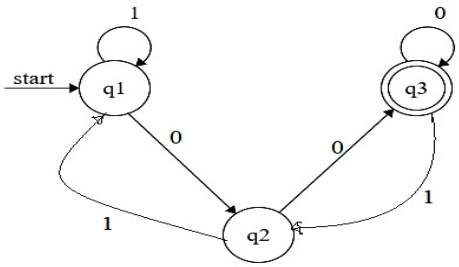


12. a) Construct minimized automata for the following automata to define the same language using Equivalence Partitioning Algorithm. *13,K3,CO2*



OR

b) Construct a regular expression by converting the Finite Automata using the State elimination Method. *13,K3,CO2*



13. a) Construct PDA to accept the language L={0^n1^n / n>=1} accepting by final state. Also check the string "0011" and "011" by instantaneous description. *13,K3,CO3*

OR

b) Convert the given PDA to a Context Free Grammar (CFG) *13,K3,CO3*

M=({q_0, q_1},{0,1},{X,Z_0},δ,q_0,Z_0,Φ)

and where δis given by

δ(q_0,0,z0)={(q0,XZ_0)},

δ(q_0,0,X)={(q0,XX)},

δ(q_0,1,X)={(q1,ε)},

δ(q_1,1,X)={(q1,ε)},

δ(q_1,ε,X)={(q1,ε)},

δ(q_1,ε,Z_0)={(q1, ε)}.

14. a) Identify Greibach Normal Form (GNF) for the following grammar. *13,K2,CO4*

$S \rightarrow AB$
$A \rightarrow BS / b$
$B \rightarrow SA / a$

OR

b) Identify and eliminate the useless symbols, Epsilon production, Unit Productions for the following Grammar and determine the Chomsky Normal Form (CNF). *13,K2,CO4*

$S \rightarrow 0A0 / 1B1 / BB$
$A \rightarrow C$
$B \rightarrow S / A$

15. a) Compare Recursive and Recursive Enumerable languages with an example. Also describe RICE theorem. *13,K2,CO6*

OR

b) Explain about the tractable and intractable problems. Also Discuss about MPCP problem *13,K2,CO6*

i	List A (Wi)	List B (Xi)
1	10	10
2	110	11
3	11	011

PART - C (1 × 15 = 15 Marks)

16. a) Construct a TM to accept the language $L=\{a^n b^n c^n \mid n>=1\}$. *15,K3,CO5*

OR

b) Construct a Turing Machine(TM) to accept palindromes of odd length in an alphabet set $\sum = \{a,b\}$.Trace the strings "ababa". *15,K3,CO5*