Total nos. of printed pages:2

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PRANVEER SINGH INSTITUTE OF TECHNOLOGY, KANPUR

Even Semester Session 2022-23 CT - 1

B. Tech. IV Semester

Theory of Automata and Formal Languages (KCS -402)

CO Number	Course Outcome
CO1	Define **[L1: Remember]** various types of automata, languages and grammars.
CO2	Express **[L2: Understand]** languages using grammar, automaton and to review class of language.
CO3	Interpret **[L3: Apply]** the behavior of machines (such as FA, TM &PDA) and grammars.
CO4	Analyze **[L4:Analysis]** ambiguity and decidability of grammars and languages.

Time: 1.5 Hrs. M. M. 15

Section A **(1X3 = 3 Marks)**

Q1. Attempt all questions:

a) Define Alphabets and Strings in Automata Theory. CO1

b) Explain epsilon closure with example. CO2

c) Comparison between DFA and NFA. CO2

Section B **(2X4 = 8 Marks)**

Q2. Attempt all questions:

a i) Construct a Deterministic Finite Automation (DFA) for the language L which accepts all the strings in which the third symbol from right end is always 'a' over $\Sigma = \{a, b\}$. CO3

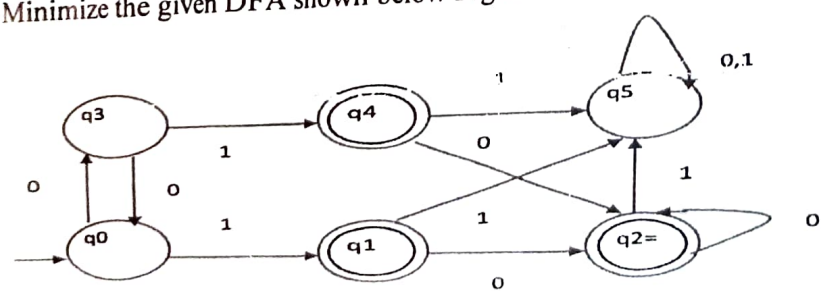
Or

ii) Design a DFA for language starts with b over $\Sigma = \{a, b\}$ and show the testing of "baabaa" as string. CO3

b i) Design a DFA for accepting all the strings of $\{L=0^m1^n \mid m>=0 \text{ and } n>=1\}$ CO3

Or

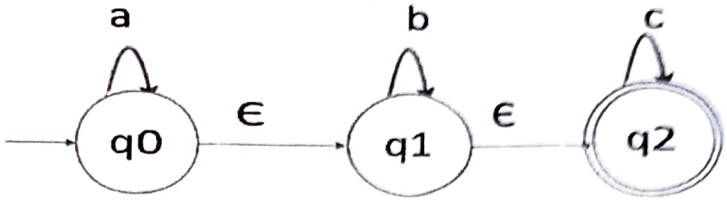
ii) Minimize the given DFA shown below Figure. CO3



c i) Design a DFA that accepts the binary number whose equivalent is divisible by 5. CO3

Or

ii) Convert to DFA for the following non-deterministic finite automata (NFA) with epsilon. CO3

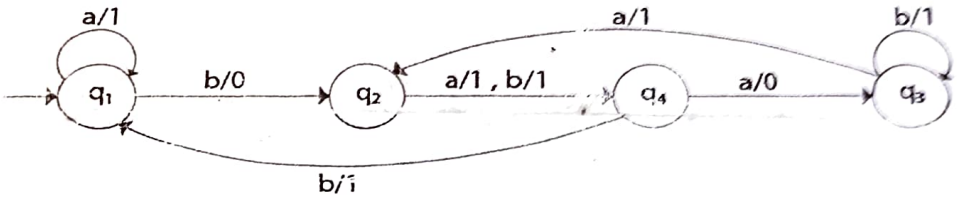


d i) Convert the following NFA {{p,q,r,s},{0,1},δ,p,{q,s}}into DFA where δ is given by: CO3

δ/∑	0	1
→ P	Q,S	Q
*Q	R	Q,R
R	S	P
*S	Φ	P

Or

ii) Convert the following Mealy machine into equivalent Moore machine. CO3



Section C

(4X1 = 4 Marks)

Q3

i) a) Design Moore Machine for the input from (0, 1,2) which prints the residue modulo 5 of the input treated as ternary number. CO3

b) Design a mealy machine to determine the residue mod 3 of a binary number. CO3

Or

ii) a) Design a Regular Expression for the language containing all the strings having any number of a's and b's . CO3

b) Write a Regular Expression for the language in which first character is a or c followed by b over ∑={a,b}. CO3