TOC ASSIGNMENT
Academic Year 2022-23
B.Tech 4th Semester (CSE)
Each question is mapped with course outcomes

Course Outcomes of Course Name: Theory of Computation

Subject Code: 102405CS

CO1	Design finite automata to accept a set of strings of a language.
CO2	Determine whether the given language is regular or not.
CO3	Design context free grammars to generate strings of context free language.
CO4	Design push down automata and equivalent context free grammars and design Turing machine
CO5	Distinguish between computability and non-computability, decidability and un-decibility.

1. Differentiate between NFA and DFA with an example. Why DFA is a fast recognizer than NFA. (**CO1**)

2. Construct regular expressions for the following languages (**CO2**)

   i. A language containing all the words over *{a, b, c}* ending in *a.*
   ii. A language containing all the words over *{0, 1}* not having "*00*" as a substring.
   iii. Set of all strings over *{a, b}* containing exactly *2a's.*
   iv. Write the regular expression for the set of strings of 0's and 1's whose tenth symbol from the right end is 1.

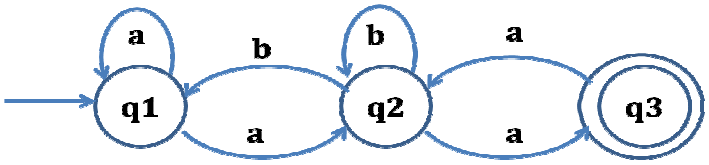
3. Design a Moore machine, which outputs residue mod 3 for each binary input string treated as a binary integer.

(**CO1**)

4. Consider the transition system and prove that the string recognized by it is

(a + a (b +aa)* b)* a (b + aa)* a

(**CO2**)



5. Construct a minimum state DFA for the following regular expressions: (**CO2**)

i. $(a+b)^* a\ (a+b)\ (a+b)$

ii. $(0+1)^*\ (00+11)\ (0+1)^*$

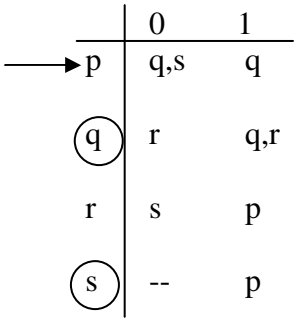
iii. 01(0+1)*10.

iv. (0+1)*101

6. Design a finite automata that reads strings made up of letters in the word "HOUSE" & Recognizes those strings that contain the word "USE" at anywhere. (**CO1**)

7. What is acceptability of a string by finite automata? Discuss the acceptability of the DFA and NFA. (**CO1**)

8. Construct DFA corresponding to the Following NFA (**CO1**)



	0	1
→ p	q,s	q
(q)	r	q,r
r	s	p
(s)	--	p

9.. State and prove pumping lemma for regular sets. Prove that L={a^{n^2} | n >=1} is not regular.

(CO2)

10. Consider the machine M which is a NDFA with ε (Null) transitions: **(CO2)**

M = ({q1,q2,q3,q4}), {a,b}, δ , q1, {q4} where :

δ (q1,a) → q2 δ (q3,a) → q3

δ (q1,ε) → q3 δ (q3,a) → q4

δ (q1,ε) → q2 δ (q4,b) → q1

δ (q2,b) → q3 δ (q4,b) → q4

Convert this NDFA with ε transitions to one without ε transitions.