

Enrollment No: _____

Exam Seat No: _____

C. U. SHAH UNIVERSITY

Summer Examination-2022

Subject Name : Theory of Computation

Subject Code : 4TE06TOC1

Branch: B.Tech (CE)

Semester: 6

Date: 07/05/2022

Time: 02:30 To 05:30

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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Q-1 Attempt the following questions: (14)

- a) The minimum number of states required to recognize an octal number divisible by 3 are/is 1
[A] 3 [B] 5 [C] 7 [D] 1
- b) If an Infinite language is passed to Machine M, the subsidiary which gives a finite solution to the infinite input tape is _____ 1
[A] Interpreter [B] Compiler
[C] Loader and Linkers [D] None of the mentioned
- c) An automaton that presents output based on previous state or current input: 1
[A] Acceptor [B] Classifier
[C] Transducer [D] None of the mentioned.
- d) Assume the R is a relation on a set A, aRb is partially ordered such that a and b are _____ 1
[A] reflexive [B] transitive
[C] symmetric [D] reflexive and transitive
- e) L is a regular Language if and only If the set of _____ classes of IL is finite. 1
[A] Equivalence [B] Reflexive [C] Myhill [D] Nerode
- f) Concatenation Operation refers to which of the following set operations: 1
[A] Union [B] Dot [C] Kleene [D] None of the above
- g) If NFA of 6 states excluding the initial state is converted into DFA, maximum possible number of states for the DFA is _____. 1
[A] 64 [B] 32 [C] 128 [D] 127
- h) Which of the following does not represents the given language? 1
Language: {0,01}
[A] 0+01 [B] {0} U {01} [C] {0} U {0}{1} [D] {0} ^ {01}
- i) Which of the operations are eligible in PDA? 1
[A] Push [B] Delete [C] Insert [D] Add
- j) Push down automata accepts _____ languages. 1
[A] Type 3 [B] Type 2 [C] Type 1 [D] Type 0



- k) 'a' in a-machine is : 1
 [A] Alan [B] arbitrary [C] automatic [D] None of the mentioned
- l) A turing machine is a 1
 [A] real machine [B] abstract machine
 [C] hypothetical machine [D] more than one option is correct
- m) A generalization of P class can be: 1
 [A] NP [B] PTIME [C] DTIME [D] None of the mentioned
- n) A string is accepted by a PDA when 1
 [A] Stack is not empty [B] Acceptance state
 [C] All of the mentioned [D] None of the mentioned

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions (14)**
 A What is BNF? Explain four components of BNF. Construct grammar for language that contain string with at least two a's. 7
 B Design PDA for accepting language 7
 $\{L = a^n b^{2n} \mid n \geq 1\}$
- Q-3 Attempt all questions (14)**
 A What is parse tree? Explain with example. Also write its properties. 7
 B Design PDA for accepting language 7
 $\{L = a^n b^n \mid n \geq 1\}$
- Q-4 Attempt all questions (14)**
 A What is/are the limitation/s of FA? How to overcome that/those explain with example. 7
 B What is syntax directed translation? Construct CFG which having string that contains at least one occurrence of 000. 7
- Q-5 Attempt all questions (14)**
 A Define: decidable problems, tractable problems, intractable problems, book keeping operation, active operation, NP class, P class. 7
 B What do you mean by ambiguous grammar? Consider grammar, 7
 $E \rightarrow E+E \mid a \mid b$
 Check grammar is ambiguous or not for input string $a + b + a$
- Q-6 Attempt all questions (14)**
 A Explain cook's theorem. 7
 B Explain one to one and onto function. Check whether following is one to one and onto or not, Also explain why? 7
 [1] $f: \mathbb{R} \rightarrow \mathbb{R}$
 [2] $f: \mathbb{R} \rightarrow \mathbb{R}^+$
 Where \mathbb{R} = All real numbers
 \mathbb{R}^+ = All nonnegative real numbers
- Q-7 Attempt all questions (14)**
 A Compare FA, NFA and NFA- \wedge with suitable example. 7
 B Construct DFA for $(a|b)^*abb$ 7
- Q-8 Attempt all questions (14)**
 A Construct DFA for $aa^*bc^*\#$ 7
 B Define relation. Explain equivalence relation and equivalence classes. 7

