

Code No: 114AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, September/October - 2023

FORMAL LANGUAGES AND AUTOMATA THEORY

(Computer Science and Engineering)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

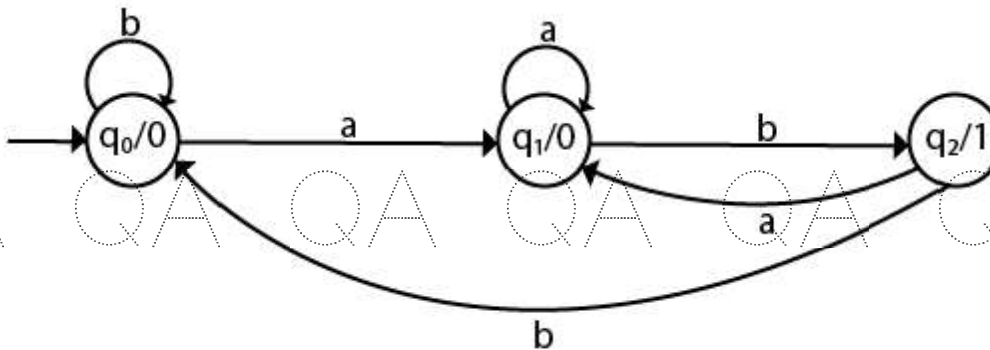
(25 Marks)

- 1.a) What is the acceptance of a string in automata? [2]
- b) Explain NFA with ϵ transitions with example. [3]
- c) Identify the properties of Derivation Tree. [2]
- d) Write the regular expression for the language accepting all combinations of a's except the null string, over the set $\Sigma = \{a\}$. [3]
- e) Identify the applications of Context Free grammar. [2]
- f) Construct a CFG for the regular expression $(0+1)^*$. [3]
- g) Identify the components of Turing Machine. [2]
- h) Explain about counter machine. [3]
- i) Define P problems. [2]
- j) Write about Universal TM. [3]

PART - B

(50 Marks)

- 2.a) Compare DFA and NFA and quote examples for both.
- b) Convert the given Moore machine into its equivalent Mealy machine. [5+5]



OR

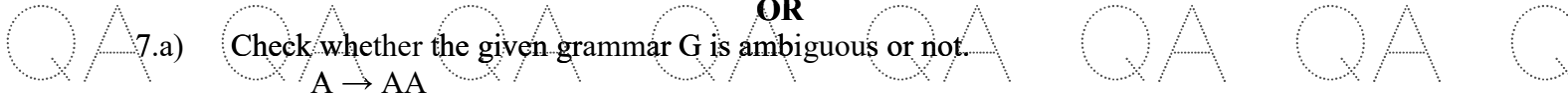
- 3.a) Discover the ground rules of finite automata.
- b) Identify steps for minimization of DFA with an example. [5+5]
- 4.a) Construct the FA for regular expression $0^*1 + 10$.
- b) Explain Right and left Linear Regular grammars with example. [5+5]

OR

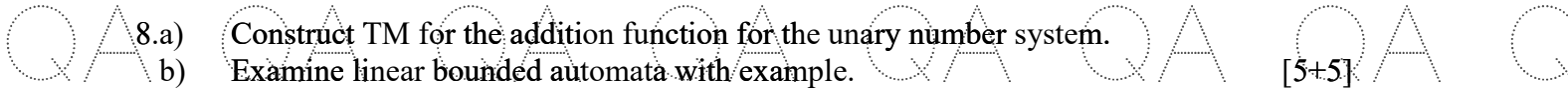
- 5.a) Illustrate the rules and properties of regular expression.
- b) Write a detail note on pumping lemma of regular expressions. [5+5]



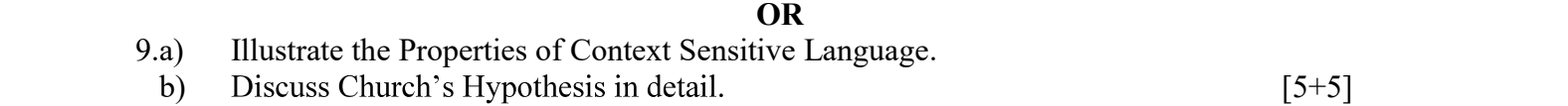
- 6.a) Design a Push Down Automata for accepting a language $\{anb2n \mid n \geq 1\}$.
- b) Explain Greibach Normal Form with example. [5+5]



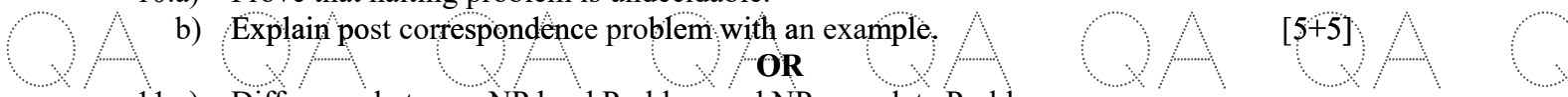
- OR**
- 7.a) Check whether the given grammar G is ambiguous or not.
 - $A \rightarrow AA$
 - $A \rightarrow (A)$
 - $A \rightarrow a$
 - b) Identify the conventional notations of Push Down Automata. [5+5]



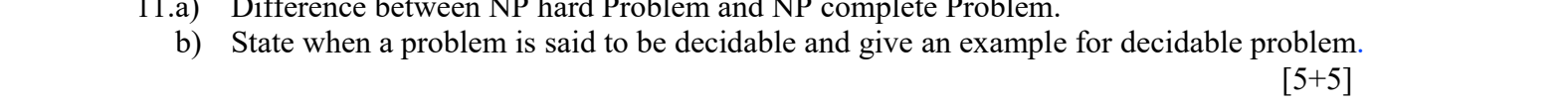
- 8.a) Construct TM for the addition function for the unary number system.
- b) Examine linear bounded automata with example. [5+5]



- OR**
- 9.a) Illustrate the Properties of Context Sensitive Language.
 - b) Discuss Church's Hypothesis in detail. [5+5]



- 10.a) Prove that halting problem is undecidable.
- b) Explain post correspondence problem with an example. [5+5]



- OR**
- 11.a) Difference between NP hard Problem and NP complete Problem.
 - b) State when a problem is said to be decidable and give an example for decidable problem. [5+5]

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