

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- September 2017

B.Tech. V Semester

COURSE CODE: 10B11CI513

MAX. MARKS: 15

COURSE NAME: Theory of Computation

COURSE CREDITS: 04

MAX. TIME: 1 hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.  $\epsilon$  represents empty string.

Ques 1: a) Consider a Non deterministic finite machine  $M = (\{q_1, q_2, q_3\}, \{0, 1\}, \delta, q_1, \{q_3\})$

where  $\delta$  is given by:

[2 MARKS]

$$\delta(q_1, 0) = \{q_2, q_3\} \quad \delta(q_1, 1) = \{q_1\}$$

$$\delta(q_2, 0) = \{q_1, q_2\} \quad \delta(q_2, 1) = \epsilon$$

$$\delta(q_3, 0) = \{q_2\} \quad \delta(q_3, 1) = \{q_1, q_2\}$$

Construct an equivalent DFA.

b) Construct the DFA which accepts all the strings over  $\Sigma = \{a, b\}$  which does not end with 'aa'.

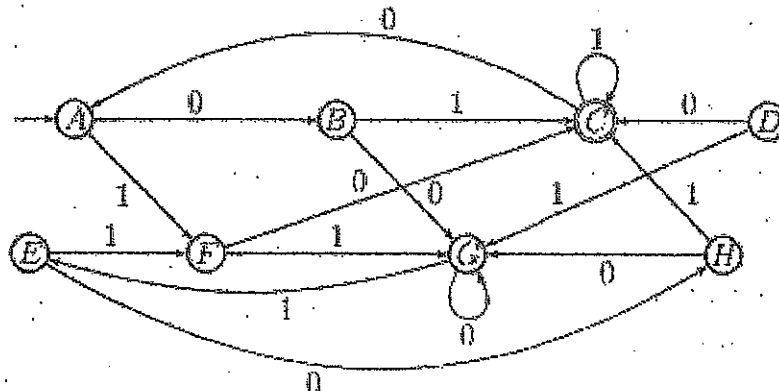
[1 MARKS]

Ques 2: a) Explain the limitations of finite automata.

[1 MARKS]

b) Minimize the given Deterministic Finite Automata

[2 MARKS]

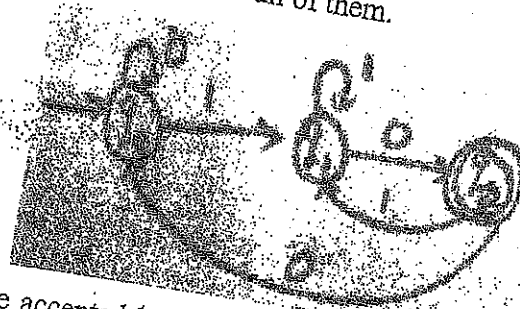


CJ-2, BT

Ques 3: a) Find the number of states in minimal DFA that accepts all the strings over  $\Sigma = \{a, b\}$  such that the number of a's are divisible of 2 and number of b's are divisible by 3. [1 MARKS]

b) Describe, in English, the language over the alphabet  $\{0, 1\}$  which is described by the regular expression?  $(0+1)^*0(0+1)^*0(0+1)^*$  [1 MARKS]

c) Let S denotes a set of strings accepted by a machine which are of length 5. How many such a string exists. Write all of them. [1 MARKS]



Ques 4: Write the language accepted by the given grammar? Draw the DFA of corresponding language. [3 MARKS]

$$S \rightarrow bS / b / \epsilon / Aa$$

$$A \rightarrow aB / bA$$

$$B \rightarrow bB / aS / a$$

Ques 5: Design a Moore machine which calculates residue mod 3 of a decimal number represented as binary integer? [3 MARKS]