## No. of Printed Pages : 3

## BACHELOR IN COMPUTER APPLICATIONS

## Term-End Examination December, 2011

## **CS-73 : THEORY OF COMPUTER SCIENCE**

Time : 3 hours

0673

Maximum Marks: 75

**CS-73** 

**Note**: Question no. 1 is compulsory. Attempt any three questions from the rest of the question paper.

1. (a) Construct a NDFA that recognizes the 5 following language :

L = { $x \in \{a, b, c\}^*$  : x contains a substring 'acaba' }

- (b) What is a grammar of a language and 10 mention its one application in computing ? Enumerate different types of grammar under Chomsky Hierarchy with an example.
- (c) What are regular languages ? Explain with 5 appropriate examples.

**CS-73** 

P.T.O.

(d) Let  $\Sigma = \{0, 1\}$  and A and B be the list as given 5 below :

i	List A	List B
	w <sub>i</sub>	<i>x</i> <sub><i>i</i></sub>
1	10	101
2	011	11
3	101	011

Find the instance of PCP.

- (e) Distinguish clearly the NP complete and NP 5 hard problems.
- 2. (a) Construct a DFA equivalent for the given 10 NFA- $\epsilon$  with the transition diagram as follows :



- (b) Show that the set of regular languages is 5 closed under intersection through an example.
- 3. (a) Construct a PDA for the language 8  $\{0^n \ 1^n \mid n \ge 1\}$  and enumerate all the stages of construction.
  - (b) What is about the universal turing machine ? 7 Cite an example.

CS-73

- 4. (a) Design a TM that recognizes a specified 10 string of 0's and 1's on a tape and prints an 'E' if the number of 1's is even and a 'D' if odd.
  - (b) What is meant by Halting problem ? 5 Explain its significance.
- 5. (a) Show that the function f defined as 5  $\Sigma^2(\Sigma = \{a, b\})$  defined by f(x, y) = x.y is primitive recursive.
  - (b) Let  $g(x, y) = 2^{x} + y 3$ . Find  $H_{y}[g(x, y) = 0]$ . 5
  - (c) For the functions  $f(x) = 2x^3 + 3x^2 + 1$  and  $h(x) = 2x^3 3x^2 + 2$ . Show that  $h(x) = 2(x^3)$ .

CS-73

