

12/12/19 (m)

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[This question paper contains 7 printed pages]

Your Roll No. :

Sl. No. of Q. Paper : **7407** **J**

Unique Paper Code : 32341502

Name of the Course : **B.Sc.(Hons.) Computer Science**

Name of the Paper : Theory of Computation

Semester : V

Time : 3 Hours **Maximum Marks : 75**

Instructions for Candidates :

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) **All** questions in **Section-A** are compulsory.
- (c) Attempt any **four** questions from **Section-B**.
- (d) Parts of a question must be answered together.
- (e) Assume alphabet $\Sigma = \{a,b\}$ unless stated otherwise.

P.T.O.

Section - A

1. (a) Do the following regular expressions represent the same language (give reason) :

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$$R_1 = ((a + b)(a + b))^* a$$

$$R_2 = (a + b)((a + b)(a + b))^* a$$

- (b) Write a regular expression and build a deterministic finite automata for the language containing all strings having **a** at every odd position. 2+3

- (c) Describe in English the languages represented by the following regular expressions : 2+2

(i) $b^*ab^*ab^*ab^* + b^*ab^*ab^*$

(ii) $(a + b)^*aa(a + b)^*$

- (d) Describe pumping lemma for regular languages. 2

- (e) Based on the language $S = \{aa, ba, ab, bb\}$, describe the language S^* . 2

7. (i) Build FA for each of the following regular languages L_1 and L_2 . 4

$$L_1 = b(a+b)^* \quad L_2 = a(a+b)^*b + b(a+b)^*a$$

- (ii) Build FA for $L_1 \cap L_2$. 4

- (iii) Describe in English the language represented by $L_1 \cap L_2$. 2