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CS-73

00129

BACHELOR OF COMPUTER APPLICATIONS (PRE-REVISED)

Term-End Examination

December, 2012

CS-73 : THEORY OF COMPUTER SCIENCE

Time : 3 hours *Maximum Marks : 75*

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

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1. (a) Describe Post Correspondence Problem. **4**

(b) Define the following with example. **8**

(i) Non Context free Grammar

(ii) Push down Automata

(iii) Turing Machine

(iv) Finite Automata

(c) Build FA to accept odd no. of a's and even no. of b's. **5**

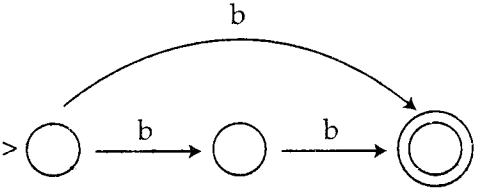
(d) Convert the following Regular expression into F.A. $(a+b)^*$ aa $(a+b)^*$ **4**

(e) What is Non determinitic turing machine ? Explain with example. **3**

(f) State any three decision problem which are unsolvable. **6**

2. (a) Convert Regular expression into FA : 5
$(a+b)\ a\ ((a+b)\ a)^*$

(b) Derive DFA from the following NFA : 5



(c) Give Regular Expression that has strings with a even no. of a's followed by odd no. of b's. 5

3. (a) Show that the $L = \{ ai : i \text{ is prime} \}$ is not regular. 6

(b) Design a TM that accepts all strings over alphabet $\Sigma = \{a, b\}$ whose second letter is a. 5

(c) Describe Universal Turing Machine in brief. 4

4. (a) Build a PDA for a language of palindromes with even length of words. 5

(b) Show that the language 5

$$L = \left\{ a^{n^2}\ b^n \mid n \geq 0 \right\} \text{ is not context free.}$$

(c) Show that predecessor function 5

$$\text{pred}\ (n) = \begin{cases} 0 & \text{if } n=0 \\ n-1 & \text{if } n>1 \end{cases}$$ is primitive recursive.

5. (a) If $f(x) = 2x^3 + 3x^2 + 1$ then show that $f(x) = 0(x^4)$ and also $f(x) \neq 0\ (x^2)$ 6

(b) List the applications of Regular Expressions. 3

(c) Briefly describe NP complete and NP hard problem. 6