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CS-73

BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Pre-Revised)

Term-End Examination, 2019

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.

1. (a) Prove that if L & M are regular language then L-M is regular. [5]
- (b) The Teansition table of NDFA M is defined by following table. Construct a DFA equivalent to M. [5]

State	0	1	2
→ q ₀	q ₁ , q ₄	q ₄	q ₂ , q ₃
q ₁	-	q ₄	-
q ₂	-	-	q ₂ , q ₃
Ⓢ q ₃	-	q ₄	-
q ₄	-	-	-

(c) Write the CFG for regular expression : [5]

$$r = 0^*1(0+1)^*$$

(d) Design the Push down Auto mata for the language : [5]

$$L = \{a^n b^m / n > m \geq 0\}$$

(e) Design a Turing Machine that reads a strings $\{0,1\}^*$ & erases, the right most symbol. [5]

(f) $\frac{n^2}{2} - 3n = \theta(n^2)$ [5]

$$6n^3 \neq \theta(n^2)$$

2. (a) If x & y are regular over Σ then $x \cap y$ is also regular over Σ . [8]

(b) Design a F.A. which accepts the language $L = \{\omega \mid \omega \text{ has both an even no of 0's \& even no of 1's over alphabet } \Sigma = \{0,1\}\}$. [7]

3. (a) Show that $L = \{a^p \mid p \text{ is prime}\}$ is not a CFG. [8]

(b) Design a CFG for the language : [7]

$$L = \{(0^n 1^n / n \geq 0) \cup (1^n 0^n / n \geq 0)\}$$

4. (a) Explain the following with example : [5+5=10]

(i) Non deterministic PDA

(ii) Recursive function theory

(b) Design a Turing machine which works as an eraser. [5]

5. (a) Discuss the following NP complete problems : [5+5=10]

(i) Traveling salesman problem

(ii) Hamiltonian cycle problem

(b) Show that x^y is primitive recursive function. [5]

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