



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – COMPUTER SCIENCE

THIRD SEMESTER – APRIL 2017

CS 3875- THEORY OF COMPUTATION AND COMPILER DESIGN

Date: 24-04-2017
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

Part A

Answer ALL questions:

(10 x 2 = 20)

1. Define an one-one function. Give an example
2. Define an infinite set. Give an example.
3. Define a finite automaton.
4. Write down any two differences between a FSA and a NDFSA.
5. Write brief notes on Turing machine.
6. What is parser generator?
7. What is regular expression?
8. What is left factoring?
9. What is the use of code optimization?
10. Define basic blocks.

Part B

Answer ALL questions:

(5 x 8 = 40)

11. (a) State and prove the associative properties in sets diagrammatically (2 properties).
Or
(b) Construct a grammar to produce all strings over of even length.
12. (a) Construct a DFA accepting all strings over $\{0,1\}$ with even number of zeroes and ones.
Or
(b) Construct a finite state automaton on the character set $\{0, 1\}$ to produce strings ending with "100".
13. (a) Elaborately explain the structure of Universal Turing machine.
Or
(b) Explain the phases of a compiler.
14. a) convert the following expression to NFA $(aa(a/b)^*b)$
(b) Consider the grammar $S \rightarrow (L) / a, L \rightarrow L,S / S$. Find Shift Reduce parser for the input $((a, a),a)$

15. (a) What is optimization? Explain about Loop optimization

Or

(b) Write the algorithm to construct basic blocks. Explain with an example.

Part C

Answer any TWO questions:

(2 x 20 = 40)

16. (a) Explain the types of grammar in a detailed account. Classify them with the hierarchy.

(b) Convert the given NDFSA to a FSA:

$M = (Q, \Sigma, \delta, q_0, F)$ where $Q = \{q_0, q_1, q_2, q_3\}$, $\Sigma = \{a, b\}$, q_0 is the start symbol, $F = \{q_3\}$ and δ is defined by

δ	a	b
q_0	$[q_1]$	$[q_3]$
q_1	$[q_2, q_3]$	$[q_3]$
q_2	$[q_1, q_3]$	$[\]$
q_3	$[q_1, q_2, q_3]$	$[\]$

(10+10)

17. (a) (i) Construct a finite automaton on the character set $\{0, 1\}$ to produce strings with three consecutive zeroes (i.e) "000".

(ii) Construct a DFA to produce all positive integers divisible by 5. Hence simulate "2550".

(b) i) Write a procedure to construct predictive parsing table.

ii) Eliminate left recursion and left factoring for the following grammar

$E \rightarrow E+T/T, T \rightarrow T*F/F, F \rightarrow (E)/id$

10+10)

18. a) Explain in detail about the construction of DAG.

(b) Write the algorithm to develop

a) a shift reduce parser

b) a Predictive parser

(10+10)

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