



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – COMPUTER SCIENCE

THIRD SEMESTER – NOVEMBER 2015

CS 3875 – THEORY OF COMPUTATION AND COMPILER DESIGN

Date :

Dept. No.

Max. : 100 Marks

Time :

Part A

Answer ALL questions:

(10 x 2 = 20)

1. Bring out the differences between one - one and onto functions with examples.
2. Define a terminal. Give an example.
3. Define a finite automaton.
4. Write down any two differences between a FSA and a NDFSA.
5. What is a Turing machine?
6. Differentiate between Compiler and Assembler.
7. Why do we need scanner generators?
8. Define Context free grammar.
9. What do you mean by copy propagation?
10. What is Constant Folding.

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 strings on $\{0,1\}$ starting with "1".

12. (a) Construct a DFA to produce all non-negative integers ending with even numbers.

Or

(b) Determine the FSA corresponding to the following NDFSA:

$M = (K, I, \delta, q_0, F)$, where $K = \{q_0, q_1, q_2\}$, $I = \{a, b\}$ q_0 $F = \{q_2\}$ and δ defined by

q_0	q_1	ϕ
q_1	$\{q_1, q_2\}$	q_0
q_2	ϕ	ϕ

13. (a) State and prove Halting problem.

Or

(b) Translate the following assignment statement on different phases

$$A = B + C * 600$$

14. (a) Construct a DFA for the expression $(a/b)^*abb$.

Or

(b) Identify whether the following grammar is ambiguous. If so convert it into unambiguous.

$$S \rightarrow iEtS$$

$$S \rightarrow iEtSeS$$

$$S \rightarrow a$$

$$E \rightarrow b$$

15. (a) Explain Flow Graph with an example.

Or

(b) Describe the different categories of optimization.

Part C

Answer any TWO questions:

(2 x 20 = 40)

16. (a) Explain Chomsky classification.

(b) Create a phrase structure grammar to produce strings on the character set $\{a,b\}$ ending with "aa". Simulate the following strings: (i) "ababbaa" (ii) "bbbbaa".

17. (a) State and prove pumping lemma.

(b) With a neat sketch explain the different phases of a compiler.

18. (a) Construct the predictive parsing table for

$$E \rightarrow E + T / T$$

$$T \rightarrow T * F / F$$

$$F \rightarrow id$$

(b) What is DAG? Construct DAG for the following expression

$$(a+b) - ((a+b) * (a-b)) + ((a+b) * (a-b))$$
