LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **COMPUTER SCIENCE**

THIRDSEMESTER – APRIL 2018

16PCS3ID01- THEORY OF COMPUTATION AND COMPILER DESIGN

Date: 21-04-2018 Dept. No. Max. : 100 Marks
Time: 09:00-12:00

Part A

Answer ALL questions: **(10 x 2 = 20)**

1. Define one-one function. Give an example.
2. Define terminals and non-terminals.
3. Define finite automaton.
4. Bring out the differences between FSA and NDFSA.
5. Write short notes on Turing machine.
6. Define a compiler.
7. What is parsing?
8. Define a Grammar.
9. Define a DAG.
10. Why do we need Code optimization phase.

Part B

Answer ALL questions: **(5 x 8 = 40)**

11. (a) State and prove De Morgan's law diagramatically.
    Or
    (b) Construct a grammar to produce strings on {0,1} starting with "1".

12. (a) Construct DFA's to produce all non-negative integers
    i. divisible by 2
    ii. divisible by 5
    Or

    (b) Determine the FSA corresponding to the following NDFSA.
    $M = (K, I, \delta, q_0, F)$, where $K = \{q_0, q_1, q_2\}$, $I = \{a, b\}$, $F = \{q_2\}$ and δ is defined by

δ	a	b
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) How the following expression will be converted to machine code while passing through the phases of a compiler?

    Result = Fvalue + Svalue + 900

14. (a) Explain the Top down parsing with an example.

    Or

    (b) Explain the Bottom up parsing. Give example.

15. (a) Explain the Local Optimization with example.

    Or

    (b) Discus about Loop optimization.

Part C

Answer any TWO questions: **(2 x 20 = 40)**

16. (a) Give a detailed account on Chomsky's classification.

    (b) Create a phrase structure grammar to produce strings on the character set $\{a, b\}$ ending with "aa". Hence construct a DFA for the same criterion.

17. (a) Explain the Turing machine.

    (b) Explain in detail the different phases of a compiler. Draw the Block diagram.

18. (a) Write a procedure to construct a DAG. Explain with an example.

    (b) Construct a DFA for a regular Expression (a/b)*abb.

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