LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2019**

18PCS3ID01 – THEORY OF COMPUTATION AND COMPILER DESIGN

Date: 04-11-2019 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

Part A

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

1. Define Bijection.
2. Define partial recursive function.
3. Construct a DFA to check whether the given number is divisible by 2.
4. Define non – deterministic finite automaton.
5. Define the term transition function of a Turing machine.
6. Define the term: Automatic Code Generators.
7. What is the purpose of syntax Analysis?
8. What is mean by Production Rule in CFG?
9. Define the term: DAG
10. Why optimization is needed?

Part B

Answer ALL questions: **(5 x8 = 40)**

11. (a) State and prove De Morgan's law in sets diagrammatically.

Or

(b) Write a brief note on Chomsky Hierarchy.

12. (a) Construct a finite automaton accepting {ab, ba}.

Or

(b) Determine an NFA accepting all strings over {0, 1} which end in 1 but does not contain the substring 00.

13. (a) Design a Turing machine to add two given integers.

Or

(b) Discuss about the Language Processing System with a neat diagram?

14. (a)Explain Lexical Analyzer functions with suitable example.

Or

(b)Write short notes on regular expression and Regular grammar.

15. (a)Explain Dead Code Elimination with suitable example.

Or

(b)Discuss about Common Sub-Expression elimination in code Optimization phase of the compiler.

Part C

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

16. (a) Given a grammar G defined by the production rules $S \to AB, A \to Aa, B \to Bb, A \to a, B \to b.$

Show that the word $w = a^2b^4 \in L(G)$.

(b) Let $M = (\{q_0, q_1, q_2\}, \{0,1\}, \partial, \{q_0\}, \{q_2\})$ be an NFA, construct a deterministic finite automaton equivalent to an NFA with the transition state $\partial(q_0,0) = \{q_2\}$, $\partial(q_0,1) = \{¤\}$, $\partial(q_1,0) = \{¤\}$, $\partial(q_1,1) = \{q_0, q_2\}$, $\partial(q_2,0) = \{q_0, q_1\}$, $\partial(q_2,1) = \{q_0\}$.

17. (a) State and prove Pumping lemma.

(b)Explain any four Compiler construction tools in detail.

18. (a)Explain Predictive Parser with an example.

(b) Explain Loop Optimization techniques with an example.

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