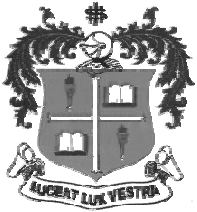


LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – MATHEMATICS

FIFTH SEMESTER – NOVEMBER 2013

MT 5407/5404 - FORMAL LANGUAGES AND AUTOMATA

Date : 18/11/2013
Time : 9:00 - 12:00

Dept. No.

Max. : 100 Marks

PART - A

ANSWER ALL QUESTIONS

10 x 2 = 20

- 1) Define context free languages.
- 2) Give an example for an regular language.
- 3) Show that every context-free language is a context-sensitive language.
- 4) Write a grammar to accept $L = \{a^n / n \geq 1\}$.
- 5) Define concatenation of two languages.
- 6) Write the CNF form.
- 7) Define left most derivation.
- 8) Define ambiguous grammar and give an example.
- 9) Define derivation trees.
- 10) Define the language accepted by an NFA.

PART - B

ANSWER ANY FIVE QUESTIONS

5 x 8 = 40

- 11) Construct a finite automaton which can test whether a given positive integer is divisible by 5.
- 12) Write a grammar to $L = \{a^n b^n / n \geq 1\}$.
- 13) Write about Backus Naur Form.
- 14) Find the CNF grammar to $S \rightarrow aSa / bSb / aa / bb / a / b$.
- 15) Eliminate unit productions in the grammar with production rules
 $S \rightarrow AB, A \rightarrow a, B \rightarrow C / b, C \rightarrow D, D \rightarrow E / bC, E \rightarrow d / Ab$.
- 16) Write about Chomsky hierarchy.
- 17) Construct the left most and right most derivations and derivation trees for the following grammar $S \rightarrow S + S / S * S / a / b / c$ which accepts the string $a * b + b * c + c * a$.

18) Construct a DFA to accept the set of all strings over {0, 1} ending with 00.

PART – C

ANSWER ANY TWO QUESTION.

2 x 20 = 40

19 a) Construct a grammar to generate $L = \{a^n b^n c^n / n \geq 1\}$.

b) Construct a grammar to generate the set of all palindromes over {a, b}. (14+6)

20)a) Reduce the grammar to CNF given that $S \rightarrow S / S \supset S / p/q$ are the productions of G.

b) Prove that CFL is closed under concatenation. (14+6)

21) Find the Greibach normal form grammar equivalent to the following CFG;

$$S \rightarrow AA/0, A \rightarrow SS/1.$$

22)a) Construct a DFA with minimum states for the following NFA.

	a	b
\rightarrow q_0	$\{q_1\}$	ϕ
q_1	$\{q_1\}$	$\{q_2\}$
$*$ q_2	ϕ	$\{q_2\}$

b) Consider a grammar $G = (V, T, P, S)$ with $P = \{S \rightarrow aA, A \rightarrow aA/bS/a\}$. Find an NFA to accept $L(G)$. (12+8)
