

7. (a) Construct a PDA equivalent to following CFG. 10

$S \rightarrow \epsilon$

$S \rightarrow SS$

$S \rightarrow (S)$

(b) Explain the instantaneous Description of PDA. 6

SECTION – D

8. (a) Design a T.M. which copies of string ? 10

(b) Explain Universal Turing Machine. 6

9. (a) What are Primitive Recursive Functions ? Explain with the help of example. 8

(b) Design a T.M. to compute $m + n$, where m and n are positive integers. 8

Roll No.

67193

MCA 4th Semester CBCS Scheme

w.e.f. 2017-18

Examination – May, 2018

THEORY OF COMPUTATION

Paper : 17MCA34DA1

Time : Three Hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. 1 is *compulsory*. Attempt *five* questions in total selecting *one* question from each Unit.

1. Explain the following :

$2 \times 8 = 16$

(a) What is dead state? Give an example.

(b) Two differences between DFA and NFA.

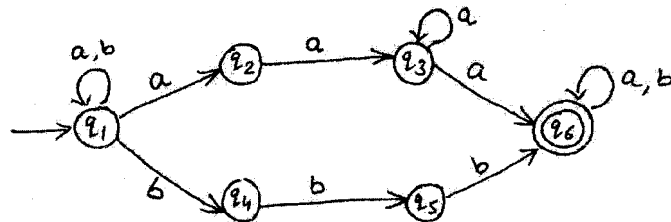
(c) Define Context-Sensitive Language.

(d) List and explain four components used to form a context free grammar.

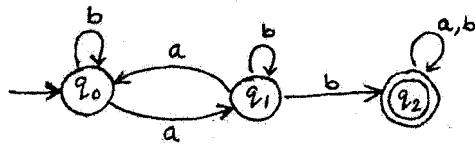
- (e) Draw and explain the block diagram of TM.
- (f) Explain PDA mathematically.
- (g) Is the halting problem recognizable ?
- (h) What is the usage of Pumping Lemma for CFL ?

SECTION - A

2. (a) Construct DFA equivalent to following NFA. 8



- (b) Construct the Regular Expression from the following state diagram. 8



- 3. (a) Explain Moore and Mealy Machines with the help of tuples. 4
- (b) Explain the Recursive Definition of Regular expression. 4
- (c) Prove that every NFA has an equivalent DFA. 8

SECTION - B

4. (a) Convert the grammar in CNF. 8

$$S \rightarrow bA \mid aB$$

$$A \rightarrow bAA \mid aS \mid a$$

$$B \rightarrow aBB \mid bS \mid b$$

- (b) Construct an equivalent reduced grammar of the following grammar. 8

$$S \rightarrow AACD$$

$$A \rightarrow aAb \mid \epsilon$$

$$C \rightarrow aC \mid a$$

$$D \rightarrow aDa \mid bDb \mid \epsilon$$

5. (a) Convert the following CFG into GNF. 12

$$S \rightarrow AB$$

$$A \rightarrow BS \mid a$$

$$B \rightarrow SA \mid b$$

- (b) Explain the Ambiguity in CFG with the help of example. 4

SECTION - C

6. (a) Construct a PDA for the language : 8

$$L = \{a^m b^m c^n \mid m, n \geq 1\}$$

- (b) Prove the pumping lemma for CFL. 8