



UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)  
उत्तराखण्ड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल)

**MCA-11/MCA-16 3<sup>rd</sup> YEAR 5<sup>th</sup> SEMESTER ASSIGNMENT**

*Last Date of Submission: 15 Dec, 2016*

**Course Title: Formal Languages and Automata**

**Course Code: MCA-18**

**Year: 2016-17**

**Maximum Marks: 30/40 Marks**

**Section 'A'**

Section 'A' contains 08 short answer type questions of 4/5 marks each. Learners are required to answer 4 questions only. Answers of short answer-type questions must be restricted to 250 words approximately.

1. Mention the difference between DFA, NFA and  $\epsilon$ -NFA
2. Explain the use of finite automata with the help of an example.
3. Define regular expression. Explain the use of regular expression.
4. What is a difference between DFA and NFA?
5. Define context free language.
6. Define ambiguous grammar.
7. Give formal definition of PDA.
8. Define Chomsky hierarchy.

**Section 'B'**

Section 'B' contains 04 long answer-type questions of 7/10 marks each. Learners are required to answer 02 questions only.

1. Explain how we can convert a NFA to DFA.
2. Design a Turing machine for the language to accept the set of strings with equal number of 0's and 1's and also give the instantaneous description of the input 110100.
3. What is Push Down Automata (PDA)? Explain how context free language is accepted by PDA?
4. Define CFG. Obtain CFG for the following language:
  - a.  $L = \{ ww^R \mid w \in \{a,b\}^* \}$ ,  $w^R$  is the reversal of  $w$
  - b.  $L = \{ w \mid w \text{ has a substring } ab \}$