



UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)

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

*Last Date of Submission: 15 Jan., 2015*

**Course Title: Formal Languages and Automata**

**Course Code: MCA-18**

**Year: 2014-15 Summer**

**Maximum Marks: 40**

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

1. Prove that  $(xy)^R = y^R x^R$ , for all  $x, y \in \Sigma^*$
2. Explain the use of finite automata with the help of an example.
3. Explain the use of regular expression.
4. What is a difference between DFA and NFA?
5. Define context free language.
6. When do you say that a Turing machine is accepting a string?
7. Give formal definition of PDA.
8. Construct an NFA equivalent to the regular expression  
 $10+(0+11)0^*1$

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

1. Explain how we can convert a NFA to DFA.
2. Design CFG for the following
  - a)  $\{0^n 1^n \mid n > 0\}$
  - b)  $\{a^n b^{2n} \mid n > 0\}$
3. What is Push Down Automata(PDA)? Explain how context free language is accepted by PDA?
4. Design DFA and NFA to recognize the following set of strings  
 $abb, abaa, ab^*a^*b$  assuming that  $\Sigma = \{a,b\}$