

4-4-2016



**DOON UNIVERSITY, DEHRADUN**  
**Mid Semester Examination, Second Semester, 2015-16**  
**School of Technology**

**MCA Integrated (Sem. IV)**  
**Course: STM-524: Theory of Computation**

Time: 2 Hrs.

Marks: 30

**Section A**

[1×6=6 Marks]

1. What is a regular expression?
2. What is a trap in FA?
3. Design the FA for regular expression  $a^*b+b^*a$ .
4. What is the difference between DFA and NFA? Explain on the basis of transition function.
5. What is Chomsky's hierarchy?
6. Write down Arden's theorem for regular expression.

**Section B**

[3×4=12 Marks]

7. Design a finite automaton to accept the language  $L=\{a^n b^n | 0 < n < 5\}$ , if possible. If such an automaton can not be designed, explain why it is not possible.
8. Explain pumping lemma for regular grammars.
9. Differentiate Mealy and Moore models by defining each model with proper notations.
10. Find the language generated by following production rules and design corresponding FA:  
 $S \rightarrow aA | \Lambda, A \rightarrow bB | \Lambda, B \rightarrow c | \Lambda$ .

**Section C (Attempt any 2)**

[6×2=12 Marks]

11. Define an FA with proper notation. How many ways are there to represent a transition function? Explain with an example.
12. Prove that  $L=\{a^n c b^n | n > 0\}$  is not regular.
13. Convert following NFA into DFA and find the language accepted by it. Write the regular expression for the language.

