Code No: RT22055 **R13** SET - 1

**II B. Tech II Semester Supplementary Examinations, Dec/Jan-2015-16**
**FORMAL LANGUAGE AND AUTOMATA THEORY**
(Computer Science and Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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## PART-A

1. a) Write a short note on Mathematical representation of Finite State Machine?
   b) List out the properties of recursive enumerable language?
   c) Draw the NFA accepting the set of all strings whose second symbol from last is 1?
   d) Construct a regular grammar for L={ $0^n11 | n \geq 1$}?
   e) List and explain four components used to form a context free grammar?
   f) Define P and NP? Give some examples that fall into the class of P and NP?
   (3M+4M+4M+4M+4M+3M)

## PART-B

2. Design a Finite State Machine (FSM) that will take an arbitrary-sized integer as input, one bit at a time (starting from most significant bit), and return the remainder after this integer is divided by 3. (16M)

3. a) Show that every context sensitive language is recursive?
   b) Find the language generated by context sensitive language G={V,T,P,S} where the production P={S->aSB|abc, bB->bbc,cB->Bc} (8M+8M)

4. Construct a Deterministic Finite State Automata equivalent to the NFA given below M={($q_0$,$q_1$,$q_2$), {a,b} ,δ, $q_0$, { $q_2$}} where δ is defined by the following transition table (16M)

| δ | 0 | 1 |
|---|---|---|
| $q_0$ | ($q_0$,$q_1$,$q_2$) | ($q_2$) |
| $q_1$ | ($q_0$) | ($q_1$) |
| $q_2$ | null | ($q_0$,$q_1$) |

5. a) Construct a Finite Automata equivalence to the regular expression (0+1)*(00+11)(0+1)*?
   b) Construct a NFA equivalent to the regular expression (10+11)*00. (8M+8M)

6. a) Construct equivalent grammar in Chomsky Normal Form for the grammar G=( {S,A,B, {a,b}, S->aAbB, A->aA/a, B->bB/b } ,S}
   b) List and explain the Properties for Equivalence of Moore and Mealy Machines? (10M+6M)

7. Define Turing Machine and design it to recognize the language L = { $0^n1^n$ | n≥1}. Illustrate the action of turing machine in accepting the word $0^31^3$ (16M)
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