Printed Pages: 4 NCS-402/ECS-403

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 110407 Roll No. | | | | | | | | | |

B.TECH.

Theory Examination (Semester-IV) 2015-16

THEORY OF AUTOMATA AND FORMAL LAUNGUAGE

Time : 3 Hours *Max. Marks : 100*

Section-A

Q.1 Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)

(a) Design a FA to accept the string that always ends with 00.

(b) Differentiate between the L* and L^+.

(c) Write regular expression for set of all strings such that number of 0's is odd.

(d) What is a Moore and Mealy machine?

(e) Construct the CFG for the regular expression $(0+1)^*$.

(f) What are the features of universal Turing machine?

(g) Define the languages generated by Turing machine.

(h) Describe the instantaneous description of a PDA.

(i) Design a DFA to accept the binary number divisible by 3.

(j) What do you understand by Epsilon-closure of sate in finite automata?

Section-B

2. Attempt any five parts. All parts carry equal marks: (5×10=50)

a. Construct a NFA for the language L which accept all the strings in which the third symbol from right end is always an over $\Sigma = \{a, b\}$.

b. State and Prove Pumping Lemma of RE. Show that $L= \{a^p : p \text{ is prime}\}$ is not regular?

c. Explain the parse tree with an example. Reduce the context free grammar into GNF whose productions are $S \rightarrow aSb$. $S \rightarrow ab$.

d. Define Pushdown automata. Differentiate PDA by empty stack and final state by giving their definitions.

e. Obtain PDA to accept all strings generated by the language $\{a^n b^m a^n, m,n>=1\}$.

f.. Construct DFA eauivalent to NFA. where δ is defined in the following table: 1

Q	δ(q,a)	δ(q,b)
A	A,B	C
B	A	B
C*(final stale)	–	A,B

Table: 1

g. Consider the CFG ({S, A, B} {a,b}, P,S) where productions Pare as follows:

S->aABB/ aAA, A→aBB/a, B→bBB / A. Convert the given grammar to PDA that accept the same language by empty stack.

h. Design CFG for the language consisting of all strings of even length over {a, b}.

Section-C

Note:Attempt any two questions from this section.

(2×15=30)

3. Write short notes on the following:

   (a) Halting Problem

   (b) Church's thesis

   (c) Recursively enumerable language

4. What is Chomsky hierarchy? Explain post correspondence problem.

5. Construct a Turing machine which accepts the regular expression, $L = \{0^n1^n | n >= 1\}$.