JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- December 2017

M.Tech III Semester

COURSE CODE: 15M1WCI331　　　　　　　　　　　　　　MAX. MARKS: 35

COURSE NAME: Advanced Theory of Computation

COURSE CREDITS: 3　　　　　　　　　　　　　　　　　MAX. TIME: 2Hr

Note: All questions are compulsory.

1. [2.5 + 2.5 Marks]

   a. Give a polynomial reduction from PARTITION to TWO MACHINE SCHEDULING.

   b. Give a polynomial reduction from TWO MACHINE SCHEDULING to PARTITION.

2. [2.5 + 2.5 Marks]

   Consider the language $L = \{ a^m b^{2n} c^{3n} d^p : p > m$ and $m, n \geq 1 \}$.

   a. What is the shortest string in L?

   b. Write a context-free grammar to generate L.

3. [2.5 + 2.5 Marks]

   Consider the following language: $L = \{ w^R w'' : w \in \{a, b\}^*$ and w'' indicates w with each occurrence of a replaced by b, and vice versa$\}$. Give a context-free grammar G that generates L and a parse tree that shows that aababb $\in$ L
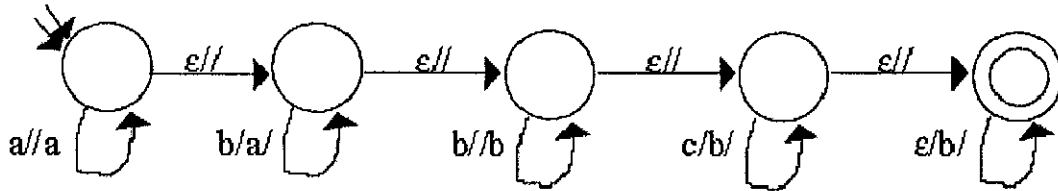
4. [2.5 + 2.5 Marks]

   Construct pushdown automata that accept each of the following:

   a. $L = \{ a^m b^n : m \leq n \leq 2m \}$

   b. $L = \{ a^m b^n : m \geq n \}$

5. [5 Marks]

   Write a context-free grammar for L(M), where M is

6. [2.5 + 2.5 Marks]

Consider the following context free grammar: G = ({S, A, a, b}, {a, b}, R, S), where R = {

S → aAS

S → a

A → SbA

A → SS

A → ba }

a. Give a leftmost derivation according to G of aaaabaa.

b. Give a nondeterministic PDA that accepts L(G).

7. [5 Marks]

Design and write out in full a Turing machine that scans to the right until it finds two consecutive a's and then halts. The alphabet of the Turing machine should be {a, b, □, ◊}.