

## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

## TEST -2 EXAMINATION- 2016

## M.Tech II Semester

COURSE CODE: 10M11CI211

MAX. MARKS: 25

COURSE NAME: Advanced Algorithms

COURSE CREDITS: 3

MAX. TIME: 1Hr 30 Min

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

1. Maximize:  $P = 3x + 4y$  which is subject to the following equations  $x+y \leq 4$ ,  $2x+y \leq 5$ ,  $x \geq 0$ ,  $y \geq 0$ . (use Simplex Method) [4 Marks]
2. Proof: Given Graph  $G = (V, E)$  that is connected but not completely connected, the vertex subset  $V'$  derived from the marking process (as discussed in class), forms the dominating set of  $G$ . [4 Marks]
3. Explain briefly: [6 Marks]
  - a. The two Algorithm  $A_1$  and  $A_2$  run on the same machine. The run time of  $A_1$  machine is  $100n^{30}$  and the run time of  $A_2$  is  $2n$ . Can  $A_1$  run faster than the  $A_2$ ?
  - b. Connected Dominating Sets
  - c. Steiner Tree
4. Explain the Greedy Algorithm for Graph Coloring and Brook's Theorem? [5 Marks]
5. A bipartite graph is a graph whose vertices can be separated into two sets  $A$  and  $B$  such that every edge of the graph joins a vertex in  $A$  to a vertex in  $B$ . [6 Marks]
  - a) Explain why if chromatic number = 2 then  $G$  must be a bipartite graph.
  - b) If  $G$  is a bipartite graph, then every circuit in  $G$  must have an even number of vertices. True or False? Explain
  - c) Explain why if (chromatic number)  $\chi(G) = 1$  then  $G$  consists of just isolated vertices.