

**School of Information Technology
IIT Kharagpur**

Course Id: IT60112 Information and System Security (Class Test 1)

**Date: February 4, 2011
Max. Marks: 30**

Total Time: 1 Hour

1. In Lipner's model, assume that we change the security level of Production Code to (SL, {PC, PD}), security level of Production Data to (SL, {PD}), Security level of software tools to (AM, ϕ), what impact will it have on the access control policy? Write your answer in light of who will be able to access something he is not supposed to and who will not be able to access something he is supposed to as per Lipner's requirements for commercial organizations. **[10]**

2. (a) State Biba's Low Watermark (LWM) Policy. (b) Consider a new policy with only the write condition of LWM policy changed as follows: if s writes to o , then $i'(o) = \min(i(s), i(o))$. Read and execute statements remain unchanged. Now consider an information transfer path from o_1 to o_{n+1} . Does the new policy require $i(o_1) \leq i(o_{n+1})$? (c) Consider the following subjects (p, q and r) and objects (w, x, y and z) where numbers in parenthesis represent their respective integrity levels: $p(2), q(3), r(1), w(2), x(5), y(1), z(3)$. Can you construct an information transfer path from w to z satisfying Biba's Ring Policy using the other two objects as intermediate objects (in either order) and each subject being used only once (in any order)? **[3+3+4=10]**

3. Consider the two graphs G and $G1$ given below. Can you generate $G1$ from G using a sequence of valid graph rewriting rules as specified in Take Grant Protection model? Show the intermediate graphs and clearly state the graph rewriting rule used at each step. If it is impossible to generate $G1$ from G , state and explain the reason. **[10]**

