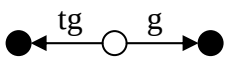
School of Information Technology
IIT Kharagpur

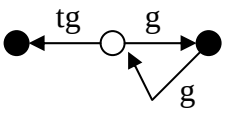
Course Id: IT60112 Information and System Security (Class Test 1)

Date: February 7, 2012 **Total Time: 1 Hour**
Max. Marks: 20

1. 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 the Take Grant Protection model? Having extra nodes in the final state other than those shown in G1 is acceptable but there should not be any extra edges. Show the intermediate graphs and clearly state the graph rewriting rule used at each step. If it is impossible to generate G1 from G, briefly describe the reason. **[5]**



G



G1

2. Consider the set of generic rights R = {read, write, own} and a Command CREATE_ADD_RW_RIGHTS (a, b, c) in the HRU model. This command causes subject *a* to create an object *c*, give itself *own* right on *c*, and then give *read* and *write* rights to subject *b* on object *c*.

(a) Write the interpretation of this command in terms of the primitive operations as defined in the HRU model as well as the conditions/constraints (if any) for execution of the command.

(b) Starting with an arbitrary protection state (write this initial protection state of your choice) before the execution of the command, show the final protection state at the end of execution of the command by passing actual parameters. You must also show the intermediate states at the end of each primitive operation.

(c) The Principle of Attenuation of Privileges (POAP) can be stated as follows: "A subject can only give rights which it possesses to other subjects while executing any primitive operation." Consider that the CREATE_ADD_RW_RIGHTS (a, b, c) you have defined above must also satisfy the POAP. In that case, is the following protection state transition valid? If yes, explain why. If no, modify the definition of CREATE_ADD_RW_RIGHTS (a, b, c) and write its new interpretation that makes this a valid transition satisfying POAP. **[5+5+5=15]**

	O1	P1	P2
P1			
P2			

|--
CREATE_ADD_RW_RIGHTS (P1, P2, O2)

	O1	P1	P2	O2
P1				own
P2				read, write