School of Information Technology
IIT Kharagpur

Course Id: IT60112 Information and System Security **Class Test 1**

Date: January 31, 2006 **Total Time: 1 Hour**
Max. Marks: 30

Instructions: Answer all questions. You may answer the questions in any order. However, all parts of the same question must be answered together. Clearly state any reasonable assumption you make.

1. Consider a database system in which access control is enforced through evaluation of Boolean expressions. The various users, their groups and roles are as follows:

user	group	role
Amit	Programmer, Analyst	Team Member
Kaushik	Analyst, Designer	Team Leader, Manager
Nitin	Programmer, Analyst, Designer	Team Member

The database tables have the following default access rules

Mode of Access	Default Rule
Select	0
Insert	1
Delete	0
Update	1

Specific rules for access to the tables Employee, Accounts, Project and Design are given below.

Table	Rules
Employee	Select: 'Analyst' in subject.group or 'Team Member' in subject.role; Delete:1
Accounts	Insert:0; Update: 'Manager' in subject.role and 'Programmer' in subject.group
Project	Select:1; Delete:1; Insert:0; Update: time.hour <14 and time.hour > 10
Design	

(a) Draw the access control matrix for the above protection system at 11:00 AM.
(b) If the default access rules table is changed so that default rule for all the four modes of access (i.e., Select, Insert, Update and Delete) is 0, draw the new access control matrix of the protection system at 7:00 PM. **[5+5=10]**

2. Consider the set of generic rights G = {read, write, append, own} and a Command ADD_ALTERATION_RIGHTS (a, b, c) in the HRU model. This command causes subject **a** to give write and append rights to **b** on **c** only if **a** owns **c**.

   (a) Write the interpretation of this command in terms of the primitive operations as defined in the HRU model.
   (b) Starting with an arbitrary protection state before the execution of the command, show the final protection state at the end of execution of the command. You must also show the intermediate states at the end of each primitive operation.
   (c) Let us state the Principle of Attenuation of Privileges (POAP) as follows: "A subject may not give any right it does not possess while executing any primitive operation." Consider that ADD_ALTERATION_RIGHTS (a, b, c) must also satisfy the POAP. In that case, is the following protection state transition valid? If yes, write the new interpretation of ADD_ALTERATION_RIGHTS (a, b, c). If no, clearly and precisely state why no. **[5+5+10=20]**

	P1	P2	O1
P1			own
P2			

to

	P1	P2	O1
P1			own
P2			write, append