School of Information Technology
Indian Institute of Technology, Kharagpur

IT60112 Information and System Security **Class Test 1**
Date: January 25th, 2005. **Total Time: 1 Hour** **Max. Marks: 20**

Answer All Questions. Clearly write any reasonable assumption that you make.

Q1.

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	0

Rules for access to the tables Employee, Accounts, Project and Design are given below

Table	Rules
Employee	Select: 'Programmer' 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 <18 and time.hour > 9
Design	

(a) Draw the access control matrix for the above protection system at 11:00 AM.

(b) If the default access table is changed so that default rule for Select is 1 and default rule for all others (i.e., Insert, Update and Delete) is 0, draw the new access control matrix of the protection system at 7:00 PM. **[5+5=10]**

Q2.

Consider a command called GENERATE_PROCESS to spawn a new process q from an existing process p. At the end of the command, p must have the rights: own(o), read(r) and write(w) on q while q will have rights r and w on p.

(a) Show step-by-step implementations of this command with the help of complete state representations of the protection system at the end of each primitive operation.

(b) At the end of the command described above, consider the following commands:

(i) CREATE (p, new_file)
(ii) CREATE (q, another_file)
(iii) $\text{CONFER}_{\text{read}}$ (p, q, new_file)
(iv) $\text{CONFER}_{\text{execute}}$ (q, p, another_file)
(v) $\text{REMOVE}_{\text{read}}$ (p, q, new_file)

Show the updated access control matrix at the end of execution of each command. You need not show the details at the end of each operation for the second part of the question. **[5+5=10]**