

**CS 6255  
Fall 2004 - Midterm Exam**

Problem	Possible	Score
1	20	
2	20	
3	10	
4	20	
5	30	
<b>Total</b>	<b>100</b>	

You can use 1 page of notes plus the MIB-II and SMI specifications. Answer the questions in the space provided. When answering questions, please state any and all assumptions you are making.

**Part 1: SNMP (20 points)**

1. (14 pts) Describe the functional SNMP management architecture. Describe each component and explain where and how each of the standard SNMP messages are used in the architecture. You may want to use a diagram.

2. (6 pts) What is the purpose of a SNMP Trap PDU?

**Part 2: Performance Monitoring (20 points)**

We discussed two main approaches for network monitoring, *active* and *passive*. Describe these approaches in detail, comparing them in terms of the information they can provide as well as the impact on the network. Give advantages and disadvantages of both.

**Part 3: SNMP Tables (10 points)**

The following is an excerpt from a MIB for toasters

```
toaster OBJECT IDENTIFIER ::= { 1 3 6 1 4 1 2002 }
```

```
toastSlotTable OBJECT-TYPE
    SYNTAX SEQUENCE OF ToastSlotEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION A list of toaster slot entries.
    ::= { toaster 10 }
```

```
toastSlotEntry OBJECT-TYPE
    SYNTAX ToastSlotEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION A single toaster slot.
    INDEX { toastSlotIndex }
    ::= { toastSlotTable 1 }
```

```
ToastSlotEntry ::=
    SEQUENCE {
        ToastSlotIndex INTEGER,    -- { toastSlotEntry 1 }
        ToastSlotStatus INTEGER,  -- { toastSlotEntry 2 }
        ToastSlotTemp    Gauge    -- { toastSlotEntry 3 }
    }
```

We want to walk this table to discover its entire contents. Show the **sequence of OIDs** used to walk the entire table using the **GetNext** request with only one variable per request. Assume that the table currently has three rows.

**Part 4: General (20 points)**

1. (10 pts) What is a VLAN? What does it provide and how does it help in the day to day tasks of network management?

2. (10 pts) “A MIB defines a virtual database, not a real physical database.” Explain what I mean by this statement.

**Part 5: MIB Design (30 points)**

Home automation is an increasingly popular networking arena. The prospect of a “smart home” that allows you to monitor and manage it remotely is quickly becoming a reality. In addition to interfacing with the networked appliances like refrigerators and microwave ovens, the rest of the house is coming on line. Remote control of the house includes things like lighting, heating and cooling, sprinklers, pool/spa, security cameras, door locks, etc.

You are to design a MIB for managing the smart home. I will be looking for two things in your MIB design: (15 points) good high level MIB design (data organization) and (15 points) how well you map this design into valid MIB objects. For the MIB objects you should give appropriate Syntax, Definition, Access and Status. I will not be grading on picky details of ASN.1 syntax.

I’m looking for how well you cover the areas. I chose the house because you are already domain experts in how they work (or at least how to use them). Save time and space. Do not re-invent standard MIBs. If a specific piece of information you want is already available from a standard MIB you should simply state that your smart home agent will also support that MIB.

**Part 5: MIB Design Continued**