

Quaid-i-Azam University  
Department of Computer Science

MS (Data Science)  
Sample Admission Test

The purpose of this sample test is to give applicants an idea of computing subject areas in which their knowledge will be evaluated. The number of questions may vary in the actual admission test. The duration of actual test will be around 2 hours.

Problem Solving and Programming

Q1) Write code in C++ / Java/Python to reverse the data stored in an array of size N (after execution, item stored at location 0 is swapped with the item stored at location N-1 and so on).

Q2) How would you measure exactly 6 litres of water when you have only two containers, a 4 litres bucket and a 9 litres bucket. Write an optimal algorithm to solve the problem.

Database Design

The following tables form part of a database held in a relational DBMS (underlined fields make up the primary key):

Hotel (hotelNo, hotelName, city)

Room (roomNo, hotelNo, type, price)

Booking (hotelNo, guestNo, dateFrom, dateTo, roomNo)

Guest (guestNo, guestName, guestAddress)

Q3-A) Explain how the entity and the relational integrity rules apply to these relations.

Q3-B) Write Structured Query Language (SQL) statement for the following query based upon the above tables:

Give a list of booked rooms for months of May, June and July 2009, having price greater than 8000 per day.

Software Engineering / Web Engineering

Q4) What is the difference between

- |  |                              |
|--|------------------------------|
| A) Performance Testing & Load Testing  | B) Browsing and Searching    |
| C) Validation and Verification         | D) Intranet and Internet     |
| E) Direct and Indirect Pointing Device | F) E-commerce and E-business |

Q5) At QAU, students would like to drink tea, coffee, or green tea during short breaks. The management is planning to have one vending machine in the library, so that students can get the above-mentioned drinks. You are assigned to design the front panel of such a vending machine. Create a working paper-based prototype of your design.

Q6) You have to design a part of the Web-based assignment submission system for the academic departments in a university. The system is to be implemented using Web-based technologies. The users are faculty members and the students. The students can add an assignment, remove an assignment before the D/Line, and see their submitted assignments. The teachers can see all the assignments for his / her course and download any of those for evaluation.

- A) Sketch the different components which are required to be implemented in context of MVC (Model-View-Controller architecture).
- B) Select the most appropriate technology (such as HTML, JSP/ASP, PHP, Servlets) for the implementation of each component and justify your selection. Pay particular attention to incorporate “separation of concerns”.
- C) Model the relationships showing the necessary interconnections between the data entities

Q7-A) The owner of a video store has contacted you to develop a system to keep track of videos and rentals. He has never used computer systems before but feels that such a system will help in managing accounts and providing better customer services. Which process model will be most appropriate to use for software development and why?

Q7-B) In part Q7-A., if the owner states his requirements clearly, and you have developed similar systems, will this change your choice of a model? Which model will you choose now and why?

Q.8) Fill in the blanks:

- a. Default port number for connecting to web server is -----
- b. HTTP works on top of ----- protocol
- c. The two most widely used methods with HTTP request are ----- and -----
- d. DTD may be used with an XML schema for -----
- e. In an XML file external DTD can be specified by -----
- f. XML document follows ----- object model
- g. In MVC architecture, model is used for -----
- h. Presentation as well as contents are jointly encoded in ----- markup language
- i. WSDL is used to describe -----
- j. HTTP return code 200 means -----

## Human Computer Interaction

Q.9) Design a usable interface for a vending machine.

## Data Structures and Algorithms

Q. 10) How an empty AVL tree would look like after inserting the following values in the given order: 67, 33, 55, 9, 81, 76, 24, 95

Q. 11) What is the time complexity of the following code?

```
int sum = 0;
for (i = 1; i <= N; i++) {
    for (j = N; j > 0; j=j/2)
        sum = sum + i + j;
    }
}
```

## Networks

Q. 12) What is the difference between packet switch and circuit switch network?

Q. 13) How IPv6 resolves the problem of IPv4 address exhaustion?