



OXFORD BROOKES UNIVERSITY
BACHELOR OF SCIENCE (HONOURS)

DECEMBER 2007 EXAMINATION

12th DECEMBER 2007

U08182: INFORMATION SYSTEMS DESIGN

TIME : 2 Hours + 10 Minutes Reading

NUMBER OF PAGES : 1 Cover Sheet and 6 Pages of Questions

☞ INSTRUCTIONS:

- ☐ Question 1 in **SECTION A** is **COMPULSORY**. Choose any **TWO** questions in **SECTION B**.
- ☐ Section A carries 36 marks.
- ☐ All questions in Section B carry 32 marks each.
- ☐ Please start every question on a new page.
- ☐ Answers will not be marked if they are illegible.
- ☐ Enter the question numbers (in the order you have attempted) in the boxes provided in the answer script.
- ☐ Write your **INDEX NUMBER** and **MODULE NUMBER** on the cover page of the answer script.

SECTION A

(The question in this section is COMPULSORY)

QUESTION 1

a) Explain the concept of Test Driven Development (TDD). [5 marks]

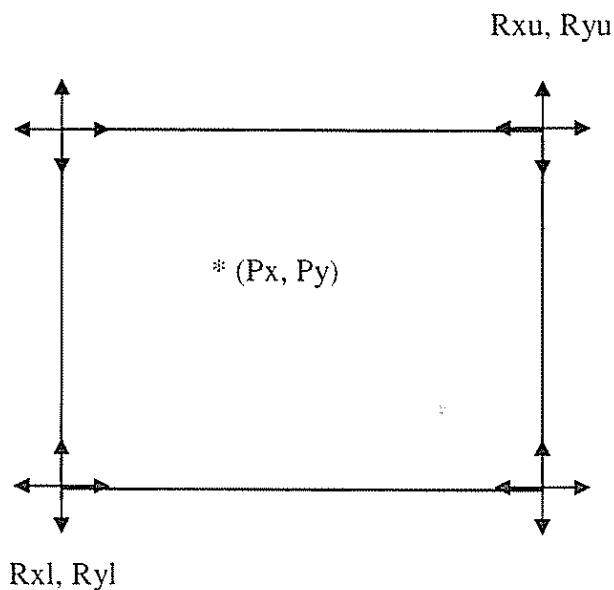
b) Construct a flow graph for the following pseudo-code. [7 marks]

```
Function( a[1..n], n)
1 For i=1..n-1
2   min := i+1
3   for j=i+1..n
4     if a[j]<a[min]
5       min:=j
6     endif
7   endfor
8   if a[min]<a[i]
9     swap(a[i], a[min])
10  endif
11 endfor
```

- c) A point can be represented by x, y coordinate as (Px , Py)

A rectangle can most simply be represented by the coordinate of its bottom left corner (Rxl, Ryl) and top right corners (Rxu, Ryu), as illustrated below. Assume all coordinate values are integer.

Function REGION is required to determine if point (Px, Py) lies over a rectangle area (Rxl, Ryl, Rxu, Ryu). If the point lies within the rectangle then a true value is returned. If the point lies outside the rectangle, or lies exactly on the rectangle edge then false is returned. Rectangle and point coordinate representation:



The function REGION has been specified as

```
inside_x = Rxl < Px AND Px < Rxu
inside_y = Ryl < Py AND Py < Ryu
inside = inside_x AND inside_y
return inside
```

It is important that this function returns the correct result for all positions of point and rectangle so a test plan is needed.

- i) Devise a suitable set of tests for the black box dynamic testing of this function using an adequate approach but requiring the minimum number of tests. For each test show the relative position of the point and rectangle coordinates using suitable diagrams. **[8 marks]**
- ii) For each test case specify suitable example point and rectangle coordinates together with the output expected from the REGION(10,40, 30,60) function test. **[4 marks]**

- d) The following is a description of a use case for a passenger to book an airline ticket online.-

Use case BOOK TICKET

Actor	System
Passenger gives source and destination, flight detail, date of travel	After checking the availability of flights, system displays the availability of flight
Select a date, time and the flight	Displays the price of the ticket and ask for the Passenger detail
Confirm the booking and give the detail of payment/	Ticket issued

- i) Identify the input and output variables of the system, and the data to be stored in the system using a table of the following form:

[6 marks]

Test data for the BOOK TICKET

Variables		Test data
Input		
Output		

- ii) Make a concrete scenario from the above use case description, and then derive test data from the scenario and fill the second column of the table Use case BOOK TICKET.

[6 marks]

[TOTAL MARKS FOR QUESTION 1: 36 MARKS]

SECTION B

(Answer any TWO Questions)

QUESTION 2

The user-centered design makes use of a graphical user interface (GUI). The GUI is used to enter the student's information and the information is stored. The user will also be able to view the information that is being stored through the interface. When the user wants to run a report on the students the information will be sent to a function that will perform the calculations and store it. Finally the information will be pulled and put into a report format for the user to view.

- a) Draw a suitable architecture for the above scenario. Justify your choice

[14 marks]

- b) Explain, with examples, the following Architecture Styles.
Also give the advantages and limitations of them.

- i) Layered architecture
- ii) Virtual machines

[18 marks]

[TOTAL MARKS FOR QUESTION 2: 32 MARKS]

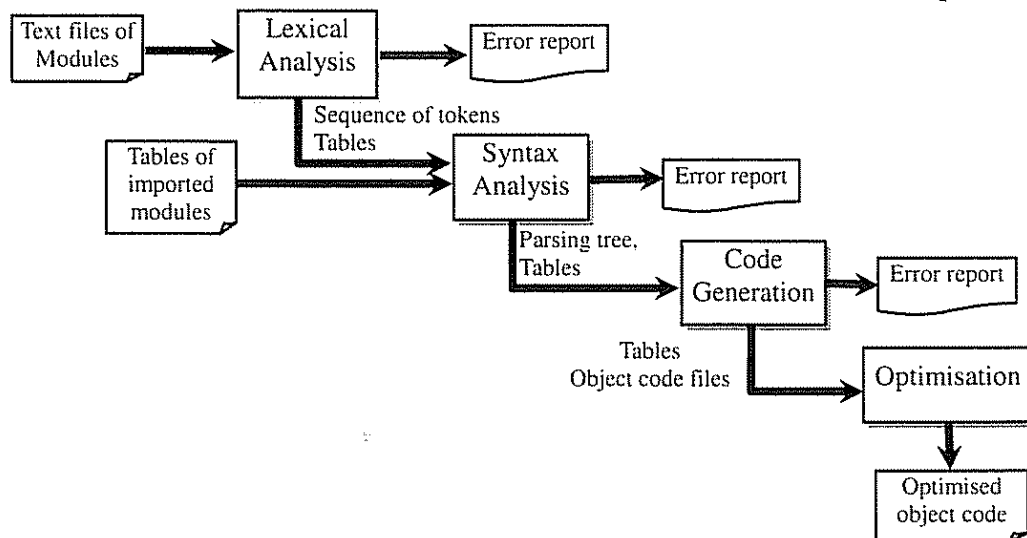
QUESTION 3

- a) List and explain Software Architecture notations used in the architecture style diagrams

[6 marks]

- b) The following is a simplified view of the structure of a compiler. Present your design of the architectural structure using the *Batch Sequential Processing* style.

[12 marks]



- c) A text consists of a sequence of paragraphs. Each paragraph is a collection of sentences each terminated by “.”. Each sentence consists of a sequence of words that are separated by spaces and punctuation symbols (such as : , ; etc). Each word consists of a sequence of letters.

To display the page on screen or to print the text on pages, the text must be wrapped. That is, the paragraphs must be decomposed into a number of lines to fit into the width of the screen or page. Such decompositions should not break in the middle of a word. It should also let each line contain as many words as possible.

Assume that all letters and characters take the same size of space when displayed or printed; design the architecture of a program that performs the text wrapping.

Present your design of the architectural structure using the Main Program and /Subroutine with Shared Data style

[14 marks]

[TOTAL MARKS FOR QUESTION 3: 32 MARKS]

QUESTION 4

- a) In certain cases, the design of a software system may need to combine different styles to solve the design problem. That is a heterogeneous styles have to be followed. Explain with examples any two types of heterogeneous style that are followed.

[16 marks]

- b) The selection of software architectural style is based on two factors namely nature of computation and quality concerns. Discuss the two factors with reference to the followings:

- i) Data flow
- ii) Independent components
- iii) Data- Centered
- iv) Virtual machine

[16 marks]

[TOTAL MARKS FOR QUESTION 4: 32 MARKS]

- END OF PAPER -