



OXFORD BROOKES UNIVERSITY
BACHELOR OF SCIENCE (HONOURS)

APRIL 2007 EXAMINATION

19th APRIL 2007

U08182: INFORMATION SYSTEMS DESIGN

TIME : 2 Hours + 10 Minutes Reading

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

☞ INSTRUCTIONS:

- ☐ **PART A QUESTION IS COMPULSORY**
- ☐ **Answer any TWO questions from Section B**
- ☐ 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

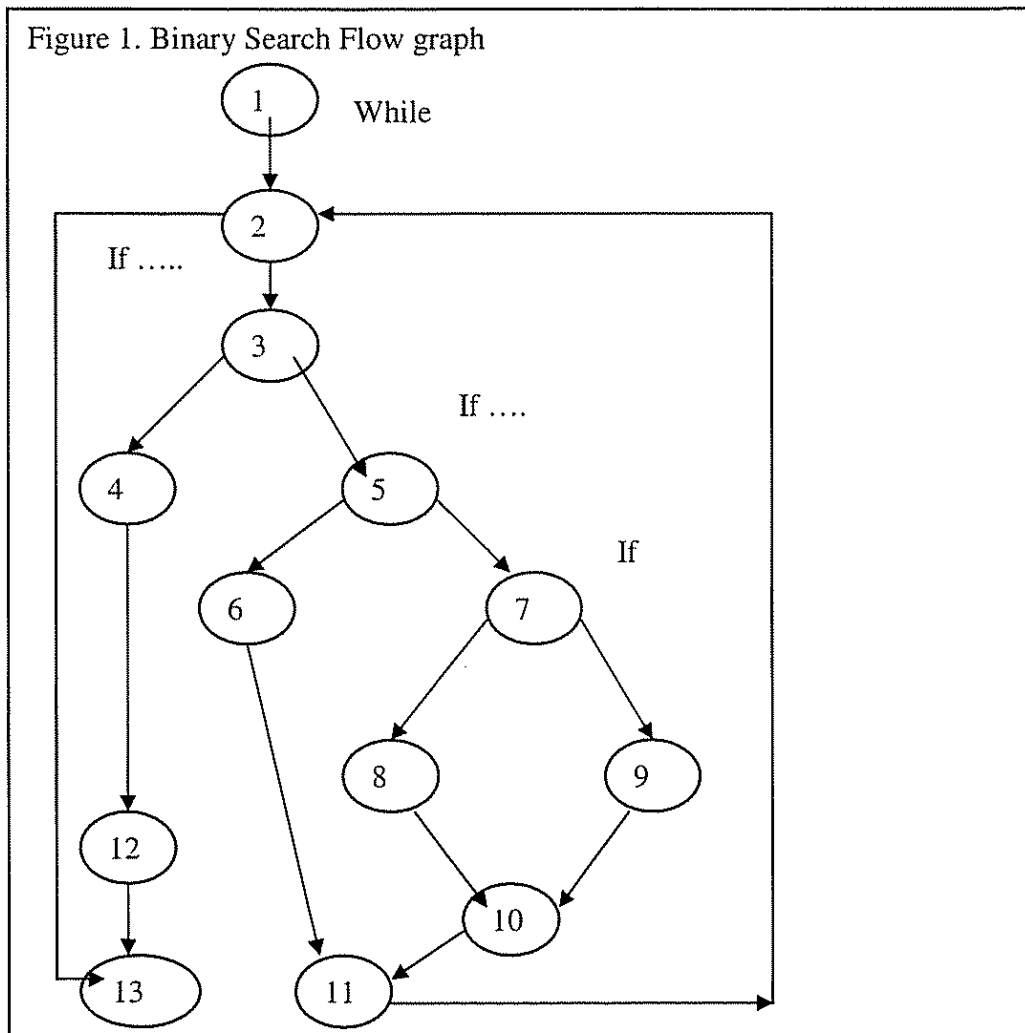
(THIS QUESTION IS COMPULSORY)

QUESTION 1

- a) Define validation and verification

[4 marks]

- b) The Binary search Flow graph is given in Figure 1



- i) Identify the independent paths for which test cases should be tested
- ii) McCabe Cyclomatic complexity is a software metric that provides a quantitative measure of the logical complexity of a program. Determine the McCabe complexity for the given flow graph.

[8 marks]

- c) Discuss the use of symbolic execution in testing.

[4 marks]

- d) Construct a flow graph for the following pseudo code.

[8 marks]

```
Start
Read n=0
While <>0
If((b**2 - 4*a*c)>0)
Calculate roots
else
    if ((b**2 - 4*a*c)=0)
        calculate roots

    else
        print ("roots are imaginary")
        n = n+1
    endif
endif
endwhile
end
```

- e) Explain with an example the following Control flow analysis approaches - to test a program statically

i) statement testing

ii) branch testing

[10 marks]

[TOTAL MARKS FOR QUESTION 4: 34 MARKS]

SECTION B

(Answer Any TWO Questions)

QUESTION 2

- a) The functional view of the compiler is as given in Figure 2. Give the corresponding object oriented view of the compiler.

[15 marks]

- b) Name the three steps of object-oriented analysis? State what each step determines.

What is the output of each step?

[6 marks]

- c) Credit card payment service is one of the main business in banking industry. CB is a credit bank in the region concerned. It plans to build an online Credit card. Management System (CMS) in order to provide better service to the customers. With the advance of information technology, CB is going to conduct the feasibility analysis, system analysis and design of online credit management system CMS. The two major functional requirements are

- Application for credit card and
- Produce monthly statement

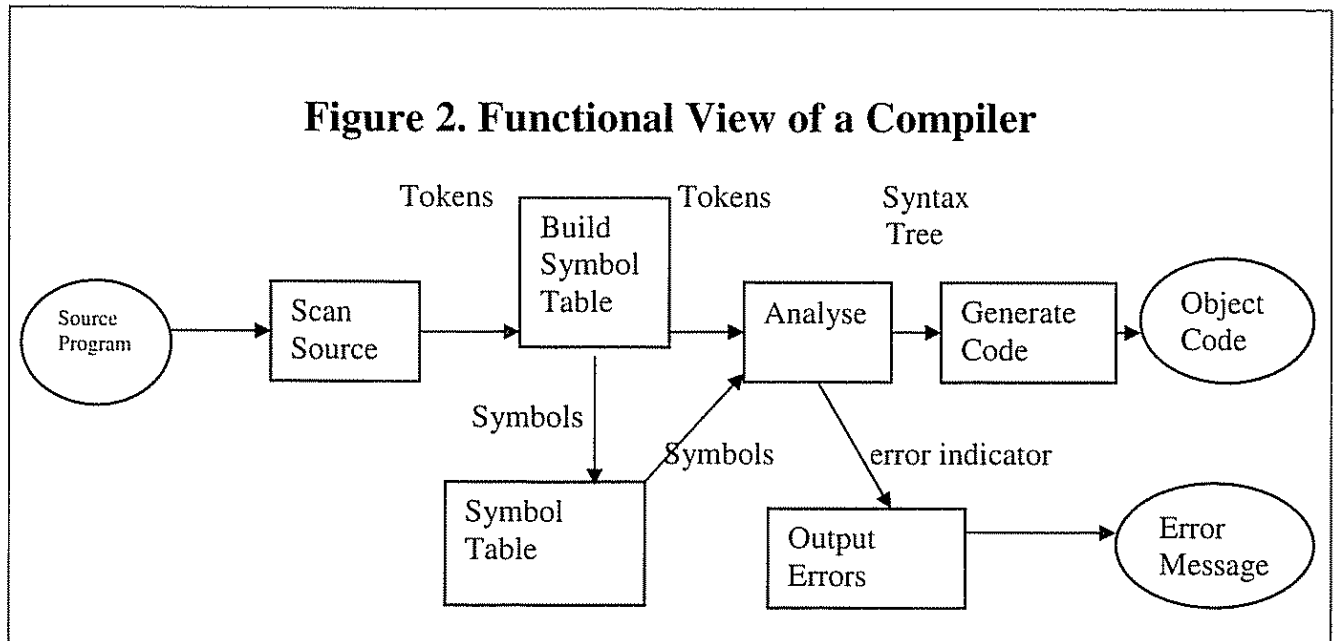
Application for credit card:

In order to obtain a credit card , customers may make the application by filling up an online application form through CMS. In the application they need to specify the type of credit card that they want to apply (Master, Visa or Cash Plus) The differences among them are the requirement on the minimum personal annual income, credit limit and current employment. Once the bank accepts the application, it will send a confirmation mail to the applicant and state the available date. When the applicants receive the mail with the credit card , they need to call the CMS to activate the card. If the application is rejected, a letter of rejection will be mailed to the customers.

To produce Monthly statement on every 10th day of the month, CMS generate electronic statements for each customer. Paper based statements are also produced for customers who prefer to receive them. For each credit card for the transaction in a month CMS compute the amount of debits and minimum amount to be paid. For late payment in the previous month a late fee amount is also included in the present month.

- i) Identify the major inputs and major outputs available in the above scenario
- ii) Identify the use cases and the Actors

[12 marks]



[TOTAL MARKS FOR QUESTION 2: 33 MARKS]

QUESTION 3

- a) Why is Software Architecture Important?

[6 marks]

- b) Software architecture is considered as a description of the high level structure of a software system in terms of architectural elements and the interactions between them.

- i) Explain any three components that are generally used in Software architecture.
- ii) Explain any two interactions among the identified components:

[9 marks]

- c) For each of the following architectural style,

- i) Layered
- ii) Black board

What are the variables of the style that influence the performance?

What are the performance characteristics of the above two architectural styles?

[6 marks]

- d) Basic Architecture of a Compiler was regarded as pipelined process, though the phases are not always incremental. The phases in the pipeline include.

Lexical analysis + Syntax analysis + Code generation+ Optimization

Lexical analysis phase generates symbol table.

Syntax analysis phase generates parsing tree

Code generation phase generates object codes

Optimization phase improves the efficiency of object code

In each phase error reports are generated and stored

Architectural shift to a **repository** style, with elements of the **pipeline** style, since the order of execution of the processes is still predetermined has been requested.

Suggest a suitable the hybrid Compiler Architecture and explain the functions.

[12 marks]

[TOTAL MARKS FOR QUESTION 3: 33 MARKS]

QUESTION 4

KWIC (Key Word in Context) is an algorithm often found in a cataloging or library indexing system. By generating all permutations of a line, which is often the title of a book, KWIC is able to produce a better and more convenient index or catalog.

The KWIC index system accepts an ordered set of lines; each line is an ordered set of words, and each word is an ordered set of characters. Any line may be “circularly shifted” by repeatedly removing the first word and appending it at the end of the line. The KWIC index system outputs a listing of all circular shifts of all lines in alphabetical order.

- a) Present your design of the architectural structure using the following two styles for KWIC
 - i) Implicit invocation
 - ii) Data centered structure - repository

[20 marks]
- b) Discuss the strength and weakness of the above schedules

[8 marks]
- c) If you are allowed to use any one of the above styles, what will be your choice. Give the reasons why your choice is appropriate

[5 marks]

[TOTAL MARKS FOR QUESTION 4: 33 MARKS]

- END OF PAPER -