

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
AUGUST SUPPLEMENTARY EXAMINATIONS 2004

SUBJECT: SOFTWARE DESIGN METHODOLOGY
CODE: SCP 1201

INSTRUCTION TO CANDIDATES

Answer any five (5) questions.
Each question carries 20 marks

Time: 3 hours

QUESTION ONE

- a) What are the skills required to collect and record software requirements?
[5]
- b) given below is a specification for a small information system. Identify the functional and data components of the system. Identify problems with the specification such as ambiguities, inconsistencies and vagueness.
- i) Software is required to maintain information about books held in a small departmental library.
 - ii) The software must run on a standard IBM PC XT with a 20Mb hard disk.
 - iii) For each book, the following information is held in the computer: title; author; ISBN; year; borrower (if no loan); date of issue (if on loan).
 - iv) The computer should be able to store information on up to 1 million books.
 - v) With suitable security precautions, the system will initialize the library information so that it contains zero books. [15]

QUESTION TWO

- a) What are the most important attributes a specification should have for a programmer who has to implement it?
[10]
- b) Convert the following into a structured program:

```
i:=start
loop:
if x=a[i] then goto found endif
if i= end then goto notFound endif
i:= I+1
goto loop
```

```
notFound:
    write 'not found'
    action1
    goto end
```

```
found:
    write 'found'
    action2
```

end: [10]

QUESTION THREE

- a) Analyze the conflicts and consistencies between the goals of software engineering. [10]
- b) Explain the difficulties in using natural language for describing requirements. [10]

QUESTION FOUR

- a) What language features would you expect to find in a language designed for each of the following application domains?
- i) business data processing
 - ii) scientific programming
 - iii) systems programming [6]
- How suitable is your favourite language for each of these application domains? [4]
- b) Using functional decomposition, write a program to direct a robot to make a cup of instant coffee. [10]

QUESTION FIVE

A computer is being used to monitor an industrial plant. The computer periodically inputs readings from instruments in the plant. Some of the reading requires conversion to normal units of measurement (e.g. microvolts into degrees C). the computer checks each of the readings against permissible values. Alarm reports are displayed on a VDU screen when a value is outside its valid range.

- a) Draw a data flow diagram for this problem. [10]
- b) Derive the program structure diagram for this problem. [10]

QUESTION SIX

- a) Can object-oriented design be characterized as a top-down or a bottom-up process? [5]
- b) Is programming/software development easy? Justify your answer. [10]
- c) Who should be consulted when collecting the requirements of a computer-based control system? [5]

QUESTION SEVEN

- a) Substantial testing of a system uncovers no errors at all. What conclusions would you draw? [6]
- b) How can software tools exploit knowledge of the syntax and semantics of a particular language? [10]
- c) How can we achieve completeness and consistency in a specification? [4]

END OF QUESTION PAPER



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JUNE EXAMINATIONS 2004

SUBJECT: SOFTWARE DESIGN METHODOLOGY
CODE: SCP1201

INSTRUCTION TO CANDIDATES

Answer any five questions.
Each question carries 20 marks
Total marks 100

Time: 3 hours

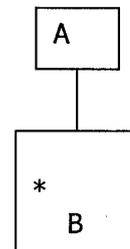
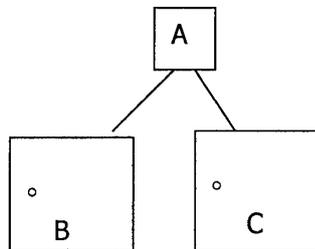
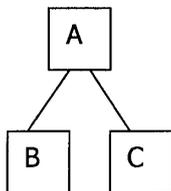
QUESTION ONE

- i) The following are basic JSP control structures for a sequence, selection and iteration. Write the equivalent JSP text (schematic logic) and pseudocode for each.

a) Sequence

b) Selection

c) Iteration



[11]

- ii) State any THREE phases in the design of a program structure using JSP.

[6]

- iii) For a correspondence to exist between two components of the input structure and output structure of the JSP three conditions must be satisfied. Outline these correspondences.

[3]

QUESTION TWO

Outline the stages of waterfall system/software development paradigm. State its strength and weaknesses. [20]

QUESTION THREE

a) Explain the meaning of the following terms as they are used in Functional Approach to software design:

- i) Transform
- ii) Black box
- iii) Driver
- iv) Stub
- v) Span of control

[10]

b) Using diagrams or practical examples outline the concept of the following heuristics used to determine good design;

- i) Coupling
- ii) Module size
- iii) Fan-in

[9]

c) State ONE advantage of using functional approach over data-oriented approach to structured program design. [1]

QUESTION FOUR

a) When would it be advisable for the analyst to use the following design constructs;

- i) Decision table
- ii) Decision tree

[10]

b) State the phases of top-down and bottom-up testing and discuss the strength of top-down testing over bottom-up testing. [10]

QUESTION FIVE

Write brief notes and give examples of each of the following:

- i) Code generators
- ii) Object and classes
- iii) Inheritance
- iv) Polymorphism
- v) Use-case diagrams

[20]

QUESTION SIX

A small shop receives/has customers of two different categories. Credit clients and those who pay cash when they need some goods. The credit customers can place orders over the e-mail or simply phone the shop. A delivery note and invoices are then produced and sent with the goods. A customer who pays cash can only receive goods if he/she has paid cash. A receipt is produced and given to this customer once the payment has been made. In either case of the customers, once an order has been placed, the shop assistant checks with their stores to see if the goods ordered are available. The stores department then sends a response immediately to the assistant on the status of their stock. If the goods are available, the stores controller immediately produces an issue note to the assistant and also checks to see if the stock-level is ok or they need to order more goods from the supplier.

Model this scenario using the DFD. You are only required to get to illustrate level 0 and level 1 DFDs. [20]

END OF QUESTION PAPER



GOOD LUCK!

