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## STATIONERY AND OTHER REQUIREMENTS

SCHOOL

CMS

MODULE

CMSCS306

ITEM	NUMBER REQUIRED PER STUDENT	TOTAL NUMBER REQUIRED (ESTIMATE)
14 PAGE ANSWER BOOKS	1	80
6 PAGE ANSWER BOOKS	1	80
CONTINUATION BOOKS		
DRAWING PAPER A1 DRAWING PAPER A2 DRAWING PAPER A3		
GRAPH PAPER		
ABSTRACT PAPER		
DIMENSION PAPER		
TRACING PAPER A1 TRACING PAPER A2 TRACING PAPER A3		
DIAGRAMS		
DRAWINGS		
ANY OTHER REQUIREMENTS		

Are there any special items which may be taken into the examination by candidates?. If so, please list here

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Signed .....

Date .....



**Liverpool John Moores University**  
School of Computing and Mathematical Sciences

Summer Examinations, 1995

## **CMSCS306 Software Systems Design**

Duration 2 hours

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### **Instructions to candidates**

Do not open this question paper until you have been told to do so by the invigilator.  
A figure in [] denotes the number of marks available for that question or part of question.

There are 5 questions.

Answer 3 questions. If you present answers to more than 3 questions, the first 3 of these answers will be assessed.

Questions carry 25 marks each.  
The total number of marks available is 75.

Calculators may be used.

1. a) Jackson System Development (JSD) and SSADM are two system design methods that were introduced in the early 1980s. SSADM has been widely adopted by the UK software industry while Jackson's method has not. Discuss possible reasons for this. [5]
  - b) The majority of software system design methods use the notion of functional decomposition in designing computer-based solutions to problems. Explain how JSD is different in this regard. [5]
  - c) JSD allows the use of backtracking in the production of entity/process structure diagrams. State the two cases in which the use of backtracking is appropriate and thus explain what its benefit is. [5]
  - d) At the end of the JSD Networking stage, there exists a specification for the proposed system in the form of the System Specification Diagram, or SSD. The SSD shows the proposed system as a network of *concurrently* running processes. In most cases, the system will be implemented on a single-processor machine. Explain how the JSD method allows the system designer to turn the concurrent model into an implementation that will run *sequentially*. [5]
  - e) Describe the differences between the *data stream* and *state vector* connections on a JSD specification diagram. [5]
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2. Several contrasting system design methods have been examined over the course of this module. When selecting a method to use for a system development project, what factors should influence the practitioner's choice? [25]
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3. a) Below are various opinions of some of the software system design methods examined on this module. Comment on any **three** of these: [7 each]
    - "JSD is ideal as a method for object-oriented design."
    - "Information Engineering views data as a better basis for an information system because it is more stable than processes or procedures. This is simply copying Jackson's assertion that a model of the real world provides a more stable basis for development than the functions built upon it."
    - "Gane and Sarsons' approach commits the analyst to very little whilst making him very rich."
    - "Yourdon's method is merely a cosmetic repackaging of several old methods and tools."
  - b) Yourdon Structured Method employs a range of diagrammatic tools, one of which is the structure chart. Draw a simple structure chart that illustrates the use of *data-* and *control-couples*. [4]
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4. a) *"The response to the problems of developing large software systems has been two-fold: firstly, the creation of an overall framework [life cycle] for software development and secondly, the use of that framework to devise a variety of methods for the construction of software."* [C.G. Davies & P.J. Layzell, 1993].

In the light of Davies and Layzells' comments, discuss why JSD is criticised as being *"self consciously incomplete as a methodology."* [D.E. Avison & G. Fitzgerald, 1988]. [10]

- b) *"In most projects, the first system built is barely usable. It may be too slow, too big, awkward to use or all three. There is no alternative but to start again ... and build a redesigned version in which these problems are solved. The ... question, therefore, is not whether to build a ... system and throw it away. You will do that. ... Hence plan to throw one away; you will, anyhow."* [F.P. Brooks, 1972]

*"[a] jaundiced view of top-down decomposition is corroborated by the often made suggestion that a software development project should be tackled twice: once to do it, and once to do it properly. The brilliant top-down developer is one who completes the development in his mind's eye before committing himself to writing down even the top level of decomposition. Where developers are merely skilled and competent, rather than brilliant, the consequences of their early decisions emerge only at the end of the project: hence the appealing suggestion that it could all be done properly the second time around."* [M.A. Jackson, 1983]

Brooks and Jacksons' comments were made some years ago. Comment on their statements. (You may find it helpful to consider the following questions:

- What were these commentators observing?
- Why did they take opposing viewpoints?
- How relevant are their comments today?) [15]

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5. a) Figure 1 in the appendix shows a simple JSD specification for a car hire system. A customer may make many hirings, each of which relates to a single vehicle. Elaborate the diagram by adding two function processes. The first function will provide, at the managing director's request, a list of all vehicles on hire at the time of the request. The second function is of a report-writing nature. Each week it will generate a formatted report that lists the details of all hirings that have taken place that week.

You should update the specification by drawing the two functions on Figure 1. Be sure to hand in the appendix with your answer book(s). [8]

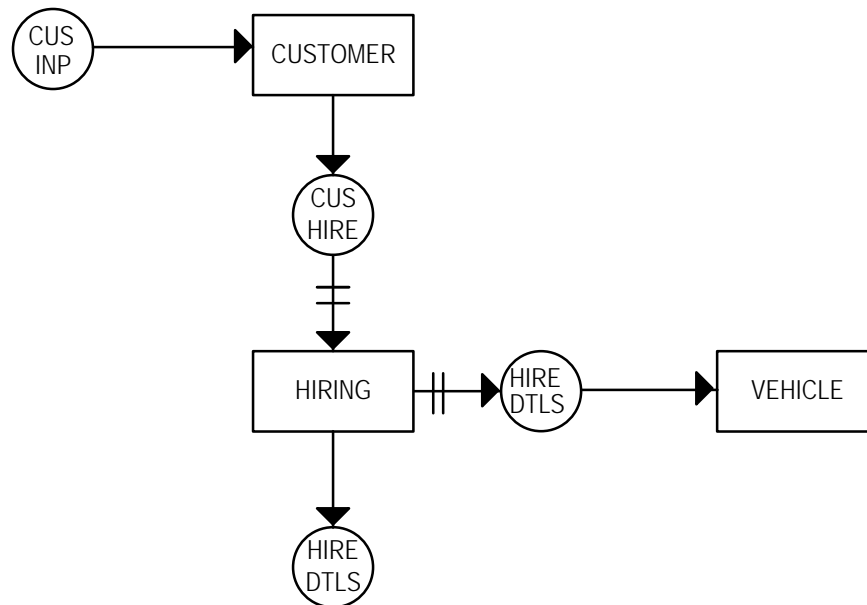
- b) Draw a process structure diagram for each of the two functions. [12]
- c) Give the Structure Text for one of the functions described in (b). [5]
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**End of Paper**

**Appendix**  
**To be handed in with your solution to question 5.**

Name : \_\_\_\_\_

Registration Number : \_\_\_\_\_



**Figure 1**