



ECU 3302 – Software Systems Engineering

Final Examination – 2005 / 2006

(Closed Book Type)

Date : Saturday, 6th of May, 2006

Time : 13:30 – 16:30

INSTRUCTIONS TO CANDIDATES

Answer any five questions. All questions carry equal mark.

1. (a) Describe evolutionary (incremental) model discussing its advantages and disadvantages. [8 marks]
- (b) Suppose you are developing a system composed of four modules A, B, C, and D, where A uses B, A uses C, C uses D, E uses D, F uses C and B uses D. Define some possible incremental implementation strategies. State all your assumptions. [12 marks]
2. Write about compilation process. Describe each compilation phase. Write about 400-500 words. [20 marks]
3. (a) Consider the following grammar for expression:
$$E \rightarrow E + E \mid E - E \mid E * E \mid E / E \mid ID$$

is an operator grammar. Using three disjoint precedence relations define operator-precedence relation table. [10 marks]
- (b) Using the table defined in 3.(a) write the string with the inserted precedence relations for the following expression:
$$x + y * z - c / b$$
 [5 marks]
- (c) Draw a parser tree for the following statement:
$$a = 35 - c / b$$
 [5 marks]
4. A ticket issuing system is intended to automate the sale of rail tickets. Users select their destination from a menu, and input a credit card number and a personal identification number. The rail ticket is issued and their credit card account is charged with cost. When the user presses a start button, a menu display of potential destinations is activated along with a message to the user to select a destination. Once the destination is selected, users are requested to input their credit card. Its validity is checked and the user is then requested to input a personal identifier. When the credit transaction has been validated, the ticket is issued.

(a) Considering above user requirements sketch or describe user interface for the automated railway tickets sale. (Hint: pay attention to the type of information that has to be available simultaneously on the screen.) [10 marks]

- (b) Draw a data flow diagram (DFD) to show all the process and the flow of data through the system. [10 marks]

5. The following is the initial statement of requirements for a system ordered by the proprietor of a small Garage.

Requirement Specification for GFI

The Garage Follow-up Invoicing (GFI) system for the Nawala garage will keep records of customers and their vehicles. It will send reminders to customers whose vehicles are due for servicing in the following week. When a vehicle is booked for servicing, it will print a job sheet for the mechanic, describing the work to do. When the job is completed, the time spent and the prices for the spare parts fitted will be added up and the invoice will be sent to the customer. At the end of the month it will print a list of all unpaid invoices. It will print reminders to be posted to all customers whose invoices have not been paid for some time.

The prices of spare parts will be taken from the garage's existing stock control database, which is not actually part of GFI, though it is needed to be updated when spare parts are taken out of the stores. GFI must run on the garage's existing personal computer, which is on-line to the stock control database, and it must be easy for use.

End of GFI Requirements

- (a) The requirements contain ambiguities and platitudes. There are omissions, and the functional requirements are mixed up with various types of non-functional requirements. List 15 questions that you would ask (as the developer of GFI system) to clarify the requirements. [15 marks]
- (b) Provide reasonable answer that you expect to get for each question. [5 marks]
6. Write Pascal procedures with linked representation to trace elements of a stack without destroying the stack. [20 marks]
7. (a) What are the general goals we try to achieve in practice when using modularity? [5 marks]
- (b) Describe the design process for a large software system. What are the documents produced at each stage. (You may use a drawing to clarify your answer.) [10 marks]
- (c) What are the two design strategies used for software design? Describe them briefly. [5 marks]
8. (a) What are the general sections of project plan? Provide their brief description. [7 marks]
- (b) What are the advantages of systematic reuse of existing software components in development process? [8 marks]
- (c) What are the conditions for software development with reuse? [5 marks]