

### B3.3: SOFTWARE ENGINEERING & CASE TOOLS

**NOTE:**

1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

**Time: 3 Hours**

**Total Marks: 100**

1. Give brief answers to the following questions.
  - a) What do you understand by software crisis? What are its causes? What are its possible remedies?
  - b) What is the difference between functional testing and structural testing? Can system testing be considered to be a structural testing?
  - c) What do you understand by component-based software engineering? What are its advantages compared to traditional software engineering?
  - d) What is the difference between object-oriented analysis and object-oriented design? How are the outcomes of these processes documented?
  - e) What do you understand by structural complexity of a program? How can it be measured?
  - f) What are software agents? Enumerate their use.
  - g) "One of the objectives of the system testing is to check whether coding standards have been adhered to or not." Do you agree with the above statement. Justify your answer.  
**(7x4)**
  
2.
  - a) What are the advantages and disadvantages of formal specification over traditional specification? Give at least one example for which formal specification is desirable and another for which formal specification is undesirable.
  - b) List the important shortcomings of LOC for use as a software size metric. Does the function point metric overcome these? Explain your answer.
  - c) "Modern quality assurance paradigms are centered around carrying out through product testing." Do you agree with the above statement. Justify your answer.  
**(6+6+6)**
  
3.
  - a) What is reusability? List the common reusability metrics. How can the reusability of a developed software module be enhanced?
  - b) What do you mean by "data dictionary" in software development? What is the role of the data dictionary in a CASE environment? How can automated support for data dictionary be provided?
  - c) What is a legacy system? Why is it necessary to re-engineer a legacy system? Explain using a schematic diagram, the main steps that you would undertake to reengineer a legacy system.  
**(6+6+6)**
  
4.
  - a) What do you understand by software configuration management? What problems might arise if a development organization does not use any configuration management tool?
  - b) What do you understand by software re-engineering? How is it different from reverse engineering? Explain situations under which they would be useful.
  - c) What do you understand by "Cleanroom" software development approach? How does it ensure to develop high quality software?  
**(6+6+6)**

- 5.
- a) Design the black box test suite for a function that accepts a character strings and checks if it is a palindrome.
  - b) What do you understand by requirements validation? How can requirements be validated?
  - c) Explain the metrics that you would use to measure the following factors of an object-oriented program. Describe briefly how you would estimate these characteristics.
    - Design quality
    - Estimated number of faults
    - Maintainability
    - Estimated test effort

**(6+6+6)**

- 6.
- a) Suppose a very large software is to be developed for an innovative application. Naturally, the development would be beset with many risks due to the innovative product to be developed. Explain, which development model should be used and how the risks would be handled in the model.
  - b) What do you mean by process modelling? Why is it required to model processes?
  - c) Explain the human cognition capabilities (relevant to human-computer interfaces) and their limitations. How do these influence design of effective human-computer interfaces?

**(5+6+7)**

- 7.
- a) Do you think that testing object-oriented programs is easier than testing procedural programs? Explain your answer with special mention as to how the object-orientation features of inheritance, encapsulation, polymorphism and dynamic binding influence effective test case design.
  - b) The major responsibility of a software development organization is to ensure that the products are of high quality. Explain the principal tasks the organization is required to perform to meet this responsibility.
  - c) Explain static and dynamic tool support that can be provided during program testing. What are the different types of results produced by these tools? Explain how are these useful in testing.

**(6+6+6)**