SECTION A

Answer ALL questions

1. Briefly define the term 'Software Engineering' and provide three reasons for Software Engineering.

(4 marks)

2. As the IT manager you have four options for your new software package; build new, reuse and modify, buy off-the-shelf and modify, outsource.

   - If you build, there is a 80% probability of complex/difficult development, at a cost of £450,000, and only a 20% probability of straightforward development, at a cost of £380,000.
   - If you reuse, there is a 40% probability of a minor number of modifications, at a cost of £275,000. If there are a major number of modifications (60% probability), at a likely cost of £380,000.
   - If you buy off-the-shelf, in addition to the initial cost of £240,000, there is 50% probability of minor changes, taking the cost to £320,000, and a 50% probability of major changes, taking the cost to £400,000.
   - If you outsource, you have been quoted a fixed price of £348,000 from a reliable company.

   Which option do you choose?

(6 marks)

   Discuss the factors might make you select the nearest option instead?

(5 marks)

3. a) What does Boehm's COCOMO ('81) model predict?

(2 marks)

   b) Describe the overall structure of this model and evaluate its advantages and disadvantages.

(8 marks)

SECTION B

Answer THREE questions

4. The objectives of testing as stated by Myers were;
   - *testing is the process of executing a program with the intent of finding errors,*
   - *a good test case has a high probability of finding an as- yet undiscovered error,*
   - *a successful test is one that uncovers an as-yet-undiscovered error.*

   a) Evaluate why they represented a major change of viewpoint.

   (6 marks)

   b) Compare and contrast black box and white box testing and illustrate each with a test method.

   (6 marks)

   c) Suggest a series of rules to generate software test data.

   (8 marks)

   d) Would exhaustive testing, even if possible, guarantee a program was 100 percent correct? Explain your reasoning.

   (5 marks)

5. a) Define software reliability and,

   (4 marks)

   b) compare and contrast the Basic and Logarithmic Poisson software failure models, giving the underlying assumptions that apply to both, and to each separately.

   (15 marks)

   c) Following on from the software failure models above, illustrate what is meant by 'reliability growth models' – you should use an appropriate diagram as part of your answer.

   (6 marks)

6. Briefly describe the stages of the quality management certification process.

   (10 marks)

   Evaluate the role of a software quality auditor by citing; the three types of audit they may be called upon to perform, and the basic principles of a QM system they are seeking to verify through the audit.

   (9 marks)

   What are the main clauses of ISO 9000-3?

   (6 marks)

7. Name and briefly describe the five levels of the CMM.

(10 marks)

Evaluate the points for and against the SEI's description of each level of the Capability Maturity Model (CMM) as a 'well-defined plateau on the path towards becoming a mature software organisation'.

(8 marks)

As a small, specialist, European software developer would you reject or adopt the CMM, and why?

(7 marks)

8. a) Define Software Risk, give brief descriptions of the three classes of software development risk.

(9 marks)

b) Describe each stage in the SEI's Risk Management Paradigm and discuss the importance of each stage in relation to the complete paradigm.

(16 marks)

End of Examination Paper