

# ASSOCIATION OF COMPUTER PROFESSIONALS

DIPLOMA EXAMINATION

SPECIMEN PAPER

## SOFTWARE ENGINEERING (TWO AND A HALF HOURS ALLOWED)

*You have ten minutes to read through this paper before the start of the examination.*

*Answer a total of FIVE questions.*

*Each question carries 20 marks.*

1. Software is often developed using the traditional Life Cycle model.
  - a. State and explain the stages in the Software Life Cycle. [16 Marks]
  - b. Suggest TWO limitations (or criticisms) of the Life Cycle approach to modern software development. [4 Marks]
  
2. Programming methodologies aim to produce high quality software products.
  - a. Name and explain SIX features of good quality programs. [12 Marks]
  - b. Explain TWO of the following:
    - (1) Structured programming and Modularity.
    - (2) Stepwise refinement (or functional decomposition).
    - (3) Coupling and Cohesion.
    - (4) Flowchart and Pseudocode. [8 Marks]
  
3. Computer programs contain various components such as statements, procedures, labels, functions, expressions, comments,.. High level programming languages require some, but not all, of these components to be declared.
  - a. Explain the meaning of the term *Declaration*. [4 Marks]
  - b. In a named programming language (preferably Java or QBasic), give examples to show how FOUR different components are declared. [8 Marks]
  - c. Suggest TWO components which do NOT need an explicit declaration. [4 Marks]
  - d. Explain your rules for naming components, with examples of real, integer, string (or other) program components. [4 Marks]
  
4. A computer user wishes to create a large customer file, but needs advice on the best method of file organisation. The user wishes to search the file quickly by customer name or by customer account number.
  - a. Explain the differences between the following methods of file organisation:
    - (1) Serial.
    - (2) Sequential.
    - (3) Indexed sequential. [9 Marks]
  - b. Explain whether the above methods would allow a quick search, either by name or by account number. [6 Marks]
  - c. Explain whether it is possible to index a serial file. [3 Marks]
  - d. State, with a reason, your preferred method of organising the customer file. [2 Marks]

5. Testing is the most important practical method of removing faults from software and showing that programs perform as required. A good test plan and the right choice of test data are essential ingredients in the testing process.
- a. Explain the meaning of a *Test Plan*. [4 Marks]
- b. Explain what is meant by each type of test data:  
 (1) Typical.  
 (2) Boundary (extreme).  
 (3) Invalid. [6 Marks]
- c. A program prints the results of an examination according to the percentage mark awarded to each candidate:  
 (1) A mark below 42% should show 'FAIL'.  
 (2) A mark between 42% and 64% should show 'PASS'.  
 (3) A mark between 65% and 74% should show 'CREDIT'.  
 (4) A mark of 75% and above should show 'DISTINCTION'.  
 (5) A special value '-1' should show 'DID NOT SIT PAPER'.  
 With reasons, select TEN mark values to test the logic of the program.  
 (Do NOT draw flowcharts or write programs.) [10 Marks]
6. With examples from a high level language you have used, distinguish between FIVE of the following pairs of terms:  
 a. Constant and Variable.  
 b. Function and Procedure (subroutine).  
 c. Input and Assignment.  
 d. Relational operator and Logical operator.  
 e. Statement and Comment (remark).  
 f. Unconditional branch and Conditional branch.  
*Remember to include examples of instructions in your answers.* [20 Marks]
7. A simple print statement such as:  
**PRINT "Average is: ", TOTAL/COUNT**  
 requires translation before it can be executed.
- a. Explain the term *Compiler*. [4 Marks]
- b. Describe the action of a compiler and include at least FOUR of the terms: Lexical Analysis, Syntax Analysis, Code Generation, Optimisation, and Diagnostic Reporting. [16 Marks]
8. Modern database packages, such as Access or Oracle, provide many commands and functions for managing data files.
- a. Explain the term *Database*. Suggest a practical application for a database package; suggest a computer application for which a database package would NOT be suitable. [4 Marks]
- b. Name TWO file types (or extensions) in a database package you have used, and describe their purpose. [4 Marks]
- c. Explain the term *Record Structure*; what is meant by 're-structuring' a file? [4 Marks]
- d. Distinguish between the terms *Command* and *Function*. Give TWO examples of each (two commands and two functions) and explain their action. [8 Marks]