

Section III

20 marks

Attempt either Question 24 or Question 25

Allow about 35 minutes for this section

Answer the question in a SEPARATE writing booklet. Extra writing booklets are available.

If you include diagrams in your answer, ensure that they are clearly labelled.

		Marks
Question 24 — Evolution of Programming Languages (20 marks)		
(a)	(i) The imperative and functional programming paradigms are characterised by their particular use of procedures and functions. Define <i>procedure</i> and <i>function</i> in terms of their uses in these paradigms. Where possible use small fragments of code in languages of your own choice to illustrate your definitions.	3
	(ii) Explain the reasons for the development of the functional paradigm.	4

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Question 24 (continued)

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(b)  1  main :- int_database, go.
      2  init_database :- assert(country(australia)),
      3                      assert(country(spain)),
      4                      assert(country(france)),
      5                      assert(city(canberra)),
      6                      assert(city(paris)),
      7                      assert(city(madrid)),
      8                      assert(capital(australia, canberra)),
      9                      assert(capital(france, paris)),
     10                      assert(capital(spain, madrid)).

     11  go :- nl,list_countries,
     12          write($ Enter a country name or quit to finish. $),
     13          read(X),
     14          X \=quit,
     15          show_capital(X),
     16          !, go.
     17  go :-

     18  list_countries :- write($ Countries in database: $),
     19                      can_use(Country),
     20                      tab(2), write(Country),
     21                      fail.
     22  list_countries :- nl.

     23  can_use(X) :- country(X).

     24  show_capital(X) :- country(X), capital(X,Y),
     25                      write(Y), write($ is the capital of $), write(X), nl.
     26  show_capital(X) :- city(X), write(X), write($ is a city, not a country. $), nl.
     27  show_capital(X) :- write (X), write($ is not in my database. $), nl.

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- (i) Identify the paradigm supported by the programming language used to write the above program. Justify your answer by listing THREE features of the paradigm, giving examples from the code. 3
- (ii) Currently, this program has limited use as a geography database. Using the code given as examples of syntax, extend the third `show_capital` module (line 27) so that it prompts for and accepts the capital of the country not already in the database. The module must also add the new data to the database. 4

Question 24 continues on page 18

Question 24 (continued)

- (c) A major Australian bank has been using, and maintaining, the same software for many years to manage customer accounts. The software was written using the programming language COBOL (Common Business Oriented Language), which supports the imperative programming paradigm. The management of the bank has decided that it is time to completely rewrite their account management software. **6**

The new software should be able to add new customers, process deposits to and withdrawals from customers' accounts, prepare statements of customer accounts and delete customers who close all their accounts. Customers may have one or more savings, cheque and/or loan accounts. During the design stage of the project the systems analyst decided that the new software would be written using a programming language that supports the Object Oriented Programming (OOP) paradigm.

Compare and contrast the appropriateness of the choice of the OOP paradigm for this software solution with three paradigms you have studied. Your response should relate the concepts and basic building blocks of the paradigms to the software solution.

End of Question 24

OR