1)

Explain why an object is an example of abstraction.  
[2]

2)   
 A new higher level programming language is being developed.  
(a) Identify two reasons why consistent grammar and syntax should be essential features of a higher level programming language. [2]  
(b) Identify two features of a user interface that will allow application programmers to   
interact more easily with the programming language. [2]

Application programmers who use this programming language will be able to choose to use   
either an interpreter or a compiler.  
(d) (i) Outline the need for an interpreter or a compiler. [2]  
(ii) Describe one advantage to application programmers of having both an   
interpreter and a compiler available. [2]

One of the predefined sub-programs in the new language is  
sumOdd(). It accepts an integer N as input. If N<=0 it outputs -1, otherwise it outputs the sum of the first N odd numbers.   
For example:  
sumOdd(4) outputs 16, because 4 is not less than 0, and 1 + 3 + 5 + 7 = 16.  
sumOdd(−3) outputs −1, because −3 is less than 0.  
(e) Construct, in pseudocode, the algorithm for sumOdd(). [4]  
(f) Outline the need for predefined sub-programs and collections. [2]

3)   
 (a) Outline the need for higher level languages. [2]  
(b) Explain two benefits of using sub-procedures within a computer program. [4]  
(c) Identify three characteristics of a collection. [3]

Collection NUMBERS already exists and stores real numbers.  
(d) Construct in pseudocode an algorithm, using the access methods of a collection, which   
will iterate through the collection NUMBERS and count how many elements stored in the   
collection are in the interval [–1,1]. The final answer should be output. [6]  
  
4)   
(a) Draw an annotated diagram showing how an array can be used to store a stack.[2]

(b) Explain how elements in the stack may be reversed using a queue.[4]

5)   
 Consider the following recursive method, where N is a positive integer   
 mystery(N)  
 if (N > 0) AND (N mod 2 = 0) then  
mystery(N−2)  
 end if  
 output N  
 end mystery  
 (a) Determine the output produced by the method call mystery(5).[1]  
 (b) Determine the output produced by the method call mystery(4).[3]  
 (c) Construct an iterative algorithm for the method mystery(), which uses a single   
while loop instead of recursion. [4]