Question 1

a) In pseudocode, write down the structure of a Windows message loop. Make sure you include and explain all API calls in the message loop.

(4 marks)

b)

i. What is the purpose of the *WndClassEx* structure?
ii. List and describe five commonly used fields in this structure.

(5 marks)

c) List and explain the arguments passed to the *WinMain* function.

(4 marks)

d) What is a *window message queue*? You may use examples to support your answer.

(4 marks)

e)

i. A process is said to have 2-Gb of *virtual address* space. Is this statement correct?
ii. How is this address space partitioned when it has been allocated?
iii. Why is this address space called 'virtual'?

(6 marks)

f) When a process uses a DLL, is memory claimed by DLL functions taken up from the address space of the process or not? Explain your answer.

(2 marks)

[Total: 25 marks]

<u>Question 2</u>

a)

i. In pseudocode, write a function that would behave erratically if it where running simultaneously in two or more threads (i.e. a thread synchronisation issue). Explain where the problem lies.

ii. How can this problem be solved? Augment the code in the answer above to show this.

(6 marks)

b) Write down short notes on the following:

i. Each thread has a *stack* for local variables and other data required.

ii. Context switches.

iii. The *ExitThread* API call.

iv. The *TerminateThread* API call.

(8 marks)

c) How does thread scheduling work in the Windows operating system? In your answer make sure to include (at least):

i. Thread priority values and ranges.

ii. Any special thread priority values.

iii. *Starvation*.

iv. *Base* and *relative* priorities.

v. The *(Get/Set)PriorityClass* and the *SetThreadPriority* API calls.

(9 marks)

d) What is *pre-emptive* multitasking?

(2 marks)

<u>[Total: 25 marks]</u>

Question 3

a) If a window hosts a number of child controls (such as combo boxes and list boxes), how does a programmer handle any messages related to these controls?

(5 marks)

b) How does painting/repainting work in Windows? In your explanation make sure to include references to the following:

i. *Device contexts*,
ii. Painting-related Windows messages,
iii. Paint structures,
iv. The Windows *GDI*.

(8 marks)

c)

i. Write down the prototype for the *DllMain* function.
ii. What is the purpose of this function.
iii. Briefly explain the parameters passed to this function.

(6 marks)

d) What is *implicit* and *explicit* linking (in the context of DLLs)?

(4 marks)

e) What are *mapping modes* and why are they necessary?

(2 marks)

[Total: 25 marks]