Question 1

a) Describe the purpose of the following three Windows system libraries:

   i. Kernel32.dll.
   ii. GDI32.dll.
   iii. User32.dll.

(6 marks)

b) List and describe two functions in *each* of the system libraries listed above (six in all). Your answer should also include a short description of the main parameters in each of these functions.

(9 marks)

c)

   i. What is a *callback function*?
   ii. How is a callback function associated with a window?
   iii. The callback function associated with a window is usually called *WndProc*. List and briefly describe the parameters of this callback function.

(6 marks)

d) Describe the parameters passed to the *WinMain* entry point function.

(2 marks)

e) Describe the parameters passed to the *DllMain* entry point function.

(2 marks)

[Total: 25 marks]

Question 2

a) In pseudo-code, but using the correct API calls and their parameters, implement a stack data structure using *heap* API calls to dynamically allocate memory. Your data structure should stack elements of the following *struct* type:

```
struct Point
{
     int X;
     int Y;
}
```

Hint: your implementation should include functions to *initialise* the stack, *shut it down* by releasing all the memory it uses, as well as *pushing* and *popping* items on the stack.

(15 marks)

b) What is the purpose of the *GlobalAlloc* and *GlobalFree* functions?

(2 marks)

c) How does thread scheduling work in the Windows operating system. In your answer make sure to mention:

i. Thread priority value ranges.
ii. Thread *starvation*.
iii. *Base* and *relative* priorities.
iv. Priority '*boosting'*.
v. Any API calls required to change the priority of a thread.

(8 marks)

[Total: 25 marks]

Question 3

a) How are *accelerators* created, loaded and trapped in the message loop of a window?

(8 marks)

b) What is a *mapping mode*? In your answer give an example of three mapping modes and describe how a mapping mode is set for a device context.

(3 marks)

c)

i. How is a *timer* created and associated with a window?
ii. Timer code can either reside in its own callback function or in the main callback function. How can this property be set by a programmer?
iii. How can a timer be paused?

(6 marks)

d) Write short notes on the following:

i. *Device Contexts*.
ii. *WM_COMMAND*.
iii. *lpszMenuName* (in the Window Class structure).
iv. *Virtual Address Spaces*.

(8 marks)

[Total: 25 marks]