Question 1

a) In 80x86 machine code, what does the SCASB instruction accomplish?

[2 Marks]

b) What is the purpose of the D-flag in the 80x86 processor when manipulating Strings?

[4 Marks]

c) What is a subroutine? Outline the structure of a subroutine in 80x86 assembler.

[4 Marks]

d) What are the two principal instructions used to place and retrieve data from the stack?

[2 Marks]

e) Draw the truth tables for an AND, OR and XOR gate.

[6 Marks]

f) What is meant by the terms Little endian and Big endian?

[2 marks]

g) The interaction between Fast CPU's and slower Memory, may mean that the CPU does not get its data for several machine cycles. What two simple solutions can be applied to address this problem?

[2 Marks]

h) Write short notes on Cache memory, describing the levels and use.

[8 Marks]

Question 2

a) What happens to the data when a file is deleted? Outline the changes that are made to the File Allocation Table and directory entry during the deletion process.

[10 Marks]

b) The following structures are found on disk storage media. Write a brief definition of each:

i. Slack Space?		[2 Marks]
ii. Cluster?		[1 Mark]
iii. Sector? What is its normal size in bytes?		[2 Mark]
iv. Unallocated space?		[1 Mark]

c) The data below is a hex dump of a directory entry for the file MSDOS.SYS. Offset x5A and x05B points to the value in the File Allocation Table that relates to this file's storage on the disk.

```
x000001F0 x000   44 49 53 47 4F 20 20 20 20 20 20 08 00 00 00 00   DISGO        .....
496       x010   00 00 00 00 00 00 E1 4D 05 39 00 00 00 00 00 00   ......áM.9......
          x020   49 4F 20 20 20 20 20 20 53 59 53 07 00 86 AB 62   IO      SYS..I«b
          x030   FF 38 8A 39 00 00 00 62 7A 23 02 00 34 47 03 00   ÿ8I9...bz#..4G..
          x040   4D 53 44 4F 53 20 20 20 53 59 53 07 00 32 AF 62   MSDOS   SYS  2¯b
          x050   FF 38 8A 39 00 00 00 62 7A 23 6B 00 09 00 00 00   ÿ8I9.   bz#k .....
          x060   43 4F 4D 4D 41 4E 44 20 43 4F 4D 07 00 43 AF 62   COMMAND COM..C¯b
          x070   FF 38 8A 39 00 00 00 62 7A 23 6C 00 74 6E 01 00   ÿ8I9...bz#l.tn..
          x080   48 49 4D 45 4D 20 20 20 53 59 53 20 00 25 CB 62   HIMEM   SYS .%Ëb
          x090   FF 38 38 3A 00 00 00 62 7A 23 9A 00 A7 81 00 00   ÿ88:...bz#I.§I..
          x0A0   4D 53 43 44 45 58 20 20 45 58 45 20 00 30 CB 62   MSCDEX  EXE .0Ëb
          x0B0   FF 38 41 3A 00 00 00 62 7A 23 AB 00 81 63 00 00   ÿ8A:...bz#«.Ic..
          x0C0   E5 45 47 45 44 49 54 20 45 58 45 20 00 91 CB 62   åEGEDIT EXE .´Ëb
          x0D0   FF 38 92 39 00 00 00 62 7A 23 B8 00 00 9E 01 00   ÿ8´9...bz#...I..
          x0E0   53 43 41 4E 44 49 53 4B 45 58 45 20 00 5F CD 62   SCANDISKEXE ._Íb
          x0F0   FF 38 41 3A 00 00 00 62 7A 23 EC 00 11 2C 02 00   ÿ8A:...bz#ì....
          x100   E5 43 41 4E 44 49 53 4B 49 4E 49 20 00 07 D0 62   åCANDISKINI ..Ðb
          x110   FF 38 8A 39 00 00 00 62 7A 23 32 01 A4 1C 00 00   ÿ8I9...bz#2.¤...
```

The File Allocation Table

```
x0A0   0051 0052 0053 0054 0055 0056 0057 0058 0059 005A 005B 005C 005D 005E 005F 0060
x0C0   0061 0062 0063 0064 0065 0066 0067 0068 0069 006A <eof> <eof> 006D 006E 006F 0070
x0E0   0071 0072 0073 0074 0075 0076 0077 0078 0079 007A 007B 007C 007D 007E 007F 0080
```

i) What is the value in the directory entry?

ii) If a cluster is defined as 2 sectors in size, how much disk space does this file take up?

iii) Explain how you arrived at your answer in (ii).

[4 Marks]

Question 3

a) What is the Host Protected Area (HPA) on a hard disk drive? What is it mainly used for?

[6 marks]

b) Outline the structure of a CD ROM disk.

[4 Marks]

c) There are 5 major components that make up the Von Neumann architecture.

List what the components are and draw an outline diagram.

[10 Marks]

Question 4

a) What kind of problem can arise if two devices attempt to use the system bus at the same time?

[2 Marks]

b) What are the three conditions that need to be satisfied in the critical section problem of process synchronization?

[3 Marks]

c) There are 5 different ways to create RAID systems. Describe 2 that you are familiar with.

[10 Marks]

d) The File System can be split into 5 layers. What are they?

[5 Marks]