

1. (a) Justify the use of the binary number system in computer systems. [2]
- (b)
  - i. Convert  $88_{10}$  to unsigned 8-bit binary. [3]
  - ii. Show how  $28_{10}$  can be subtracted from  $88_{10}$  using two's complement. [3]
  - iii. Convert  $1111110101010100_2$  to hexadecimal. [3]
  - iv. Convert  $1463_{10}$  to octal. [3]
  - v. Calculate the difference between  $1463_{10}$  and  $2545_8$  in two's complement. [6]
- (c)
  - i. Explain floating point representation. Your answer should outline the advantages and disadvantages of floating point representation. [3]
  - ii. Convert  $4.625_{10}$  to an 8-bit wide fixed point binary representation. Comment on the range of your fixed point representation. [2]