

“3-a-day” A-Level Exam Practice Unit 1 (018)

Question 1

- (f) A computer represents floating point binary numbers using a 6-bit mantissa and 4-bit exponent, both using two’s complement.

Add the following three numbers together and give the answer in the format described.

You must show your working.

010100 0010

011000 0001

100010 0010

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[6]

Question 2

Below are extracts from the ASCII and EBCDIC character sets.

ASCII

Denary Value	65	66	67	68	69	70	71	72	73	74	75	76	77
Character	A	B	C	D	E	F	G	H	I	J	K	L	M
Denary Value	78	79	80	81	82	83	84	85	86	87	88	89	90
Character	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

EBCDIC

Denary Value	193	194	195	196	197	198	199	200	201	...	209	210	211	212
Character	A	B	C	D	E	F	G	H	I	...	J	K	L	M
Denary Value	213	214	215	216	217	...	226	227	228	229	230	231	232	233
Character	N	O	P	Q	R	...	S	T	U	V	W	X	Y	Z

- (a) Explain, referring to ASCII and EBCDIC, what would happen if computers were to use different character sets when communicating.

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[2]

Question3

Write a function that given the denary value of an EBCDIC uppercase letter, returns the denary value of an ASCII uppercase letter. If a value is entered that doesn't correspond to an uppercase EBCDIC letter the function should return -1

e.g.

`convert (201) returns 73`

`convert (209) returns 74`

`convert (78) returns -1`

`function convert (ebValue)`

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`endfunction`

[5]

The questions on this worksheet have been taken from the OCR A-Level Computer Science Practice Paper 1.1

Answer 1

- Calculate the first number as: 010.100
- Calculate the second number as: 01.1000
- Calculate the third number as: 100.010
- Add the three together to get (1)000.010
- Show carry bits. Discarding of leading one may be shown or implicit.
- Normalised result is:
010000 1111

(1 per -)

AO1.2

6

If candidate fails to discard the overflowing 1 they can still get marks 1-4.

Answer 2

a

- Characters from a computer using ASCII will be interpreted as different characters by a computer using EBCDIC.
 - Text will be incomprehensible.
- (1 per -)

AO1.2

2

Answer 3

- Value between 193 and 201 returns respective ASCII value between 65 and 73
 - Value between 209 and 217 returns respective ASCII value between 74 and 82
 - Value between 226 and 233 returns respective ASCII value between 83 and 88
 - Values less than 193 and greater than 233 return -1
 - Values between 202 and 208, and 218 and 225 return -1.
- (1 per -)

AO3.2

5

```
function convert(ebValue)
    if ebValue >= 193 and ebValue <= 201 then
        return ebValue - 128
    elseif ebValue >= 209 and ebValue <= 217 then
        return ebValue - 135
    elseif ebValue >= 226 and ebValue <= 233 then
        return ebValue - 143
    else
        return -1
    endif
endfunction
```

A program that returns a value 128 less for values between 193 and 208 would receive the first mark but not the last one. (The same principle applies for points 2 and 3)