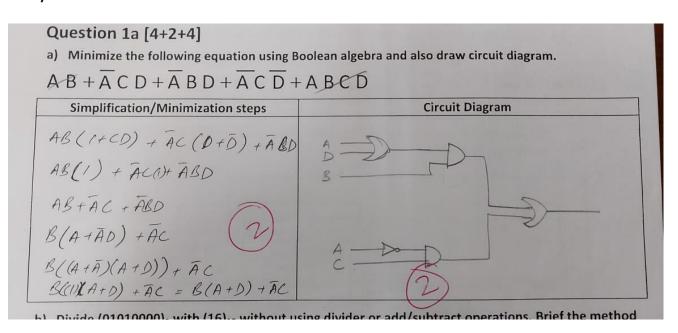
## **Question 1**

a)



- b) Shift right 4 times [2 marks]
- c) 0 10001011 011110000110000000...00

$$6.022 \times 10^3 = 6022$$

6022 = 1011110000110 in binary = 1.011110000110 x  $2^{12}$ 

Exponent = 12 + 127 = 139 = 10001011

For exponent - 2 marks

For Signification - 2 marks

If No normalization -- -1

## **Question 2**

- a. 101011 00101 00010 000...0011100 2 marks
  If only opcode is correct, **0.5**
- b. Mux before mem 2 marksSubtract values of Rs and memory read 1 marks

BEM signal and zero flag should be ANDed **1 marks** Mux before PC for PC+4, PC+offset etc **2 marks** 

c. 0.25 marks for each correct signal value

0

0

1

0

Χ

Χ

0

New control 1

## **Question 3**

- a. 9 cycles 2 marks Close enough might get 0.5
- b. Total marks 3

1 incorrect ...... -1 marks

2 incorrect ..... -2 marks

2 correct ..... 1 marks

Instruction Fetch	SW
Instruction Decode	Add
Execution	LW
Memory Stage	Sub
Write back	Add

c. PC+4 .... **1 marks** 

Value of RT .... 1 marks

Value of Rs + offset bits ... 1 marks

Signal bits .... 2 marks

0.25 for each signal [any 8 should be correct]

ALUOP 00

RegDst 0

ALUSrc 1

Memread 1

MemWrite 0

Branch 0

Mem to Reg 1

Reg write 1

PCSrc 0