

8(a)	1 mark for each shaded section						
	Instruction address		ACC	Memory address			
				80	81	82	83
				10	8	80	81
	200	8					
	201	9					
	202						9
	203	10					
	204						
	206	9					
	207	19					
	208						
	210				19		
8(b)(i)	1 mark for: OR B0000 0001 // OR #1 // OR &1						
8(b)(ii)	1 mark for: 1010 1011						
8(b)(iii)	1 mark for: 0000 0011						

7(a)(i)	1 mark for 0010 1000
7(a)(ii)	1 mark for 1111 0011
7(b)	1 mark for $\begin{array}{r} 1\ 1\ 1\ 1\ 0\ 1\ 0\ 1 \\ +_1 1\ 1\ 0\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 1 \\ \hline (1) 1\ 0\ 1\ 0\ 0\ 1\ 1\ 0 \end{array}$ Answer: (1) 1010 0110
7(c)	1 mark for showing binary subtraction (any method) Direct subtraction: $\begin{array}{r} 0\ 1\ 1\ 1\ 0\ 1\ 1\ 1\ 0\ 0 \\ -0\ 0\ 0\ 1\ 1\ 1\ 1\ 1\ 1\ 0 \\ \hline 0\ 1\ 0\ 0\ 0\ 1\ 1\ 0 \end{array}$ Adding the two's complement: $\begin{array}{r} 0\ 1\ 1\ 0\ 0\ 1\ 0\ 0 \\ +_1 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 0 \\ \hline (1) 0\ 1\ 0\ 0\ 0\ 1\ 1\ 0 \end{array}$ 1 mark for answer 0100 0110

7(a)	1 mark each: <table><tr><td></td><td>Instructions</td><td>ACC content</td></tr><tr><td>1</td><td>LDD 50 ADD #4 ADD 54</td><td>158</td></tr><tr><td>2</td><td>LDI 53 DEC ACC ADD 56</td><td>99</td></tr><tr><td>3</td><td>LDM #55 SUB #5</td><td>50</td></tr></table>		Instructions	ACC content	1	LDD 50 ADD #4 ADD 54	158	2	LDI 53 DEC ACC ADD 56	99	3	LDM #55 SUB #5	50
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2	LDI 53 DEC ACC ADD 56	99											
3	LDM #55 SUB #5	50											
7(b)	1 mark for each bullet point for the explanation 1 mark for correct instruction • A bit manipulation operation is required to set all the bits to zero • Compare the result of the masking with 0 • ... the result of comparison will be true if the register is cleared • AND B00000000 / #00 / &00												

5(a)	1 mark for each correct answer:																	
	<table><tr><th>Program Number</th><th>Code</th><th>ACC Content</th></tr><tr><td>1</td><td>LDI 15 SUB #1</td><td>11</td></tr><tr><td>2</td><td>LDD 14 ADD 11</td><td>13</td></tr><tr><td>3</td><td>LDM #11 ADD #3 SUB 16</td><td>2</td></tr><tr><td>4</td><td>LDR #2 LDX 14 ADD #2</td><td>14</td></tr></table>	Program Number	Code	ACC Content	1	LDI 15 SUB #1	11	2	LDD 14 ADD 11	13	3	LDM #11 ADD #3 SUB 16	2	4	LDR #2 LDX 14 ADD #2	14		
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5(b)	1 mark for each correct answer:																	
	<table><tr><th>Program Number</th><th>Code</th><th>ACC Content</th></tr><tr><td>1</td><td>XOR 29</td><td>0100 1001</td></tr><tr><td>2</td><td>AND #29</td><td>0000 0100</td></tr><tr><td>3</td><td>OR B11111111</td><td>1111 1111</td></tr></table>	Program Number	Code	ACC Content	1	XOR 29	0100 1001	2	AND #29	0000 0100	3	OR B11111111	1111 1111					
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