

FOR OFFICIAL USE

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Total Marks

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X028/302

NATIONAL
QUALIFICATIONS
2008

TUESDAY, 10 JUNE
1.00 PM – 4.00 PM

MECHATRONICS
HIGHER

Worksheets for Q1, Q2, Q3,
Q9 and Q12

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

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Scottish Candidate number

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Number of seat

To be inserted inside the front cover of the candidate's answer book and returned with it.



Worksheet Q1(a)

Complete Table Q1(a) by entering the names of the elements labelled A to D.

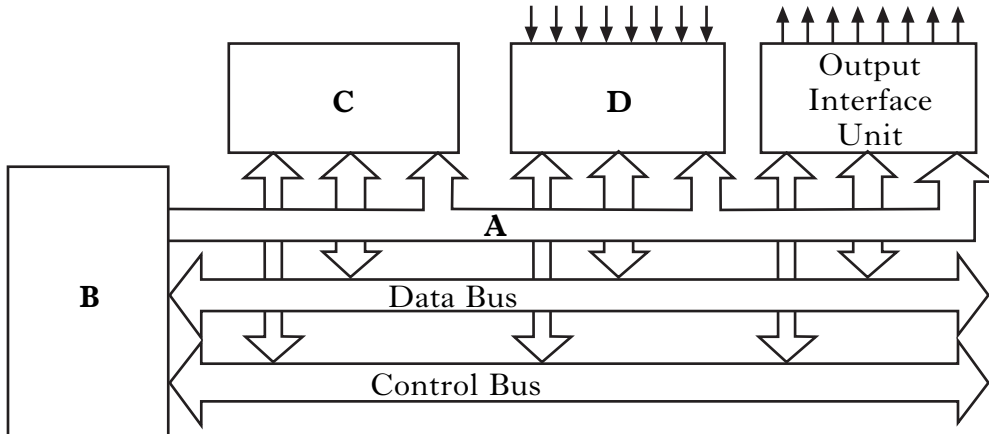


Figure Q1(a)

Label	Name of element
A	
B	
C	
D	

Table Q1(a)

Worksheet Q2(a)

Complete Table Q2(a) by filling in the appropriate joint movement for the Cartesian and Revolute robots.

Robot	Joint 1	Joint 2	Joint 3
Polar	Rotary	Rotary	Linear
Cartesian	Linear		
Revolute	Rotary		

Table Q2(a)

Worksheet Q3(b)

Identify the missing name of the code represented and fill in each of the **four** missing code values.

Decimal	Code Name =	BCD
0	0000	0000 0000
1	0001	0000 0001
2	0010	0000 0010
3	0011	0000 0011
4	0100	
5		0000 0101
6	0110	0000 0110
7	0111	0000 0111
8	1000	0000 1000
9	1001	0000 1001
10		
11	1011	0001 0001
12	1100	0001 0010
13	1101	0001 0011
14	1110	0001 0100
15	1111	0001 0101

Table Q3(b)

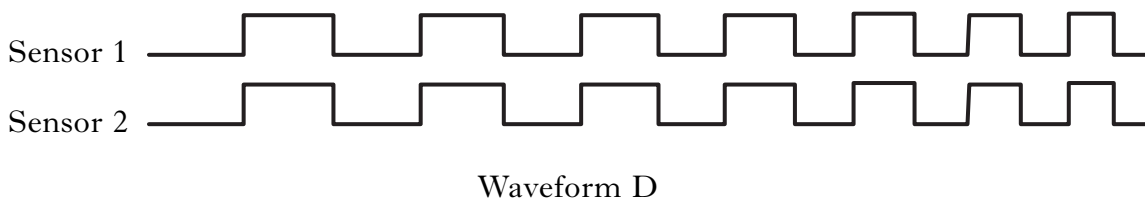
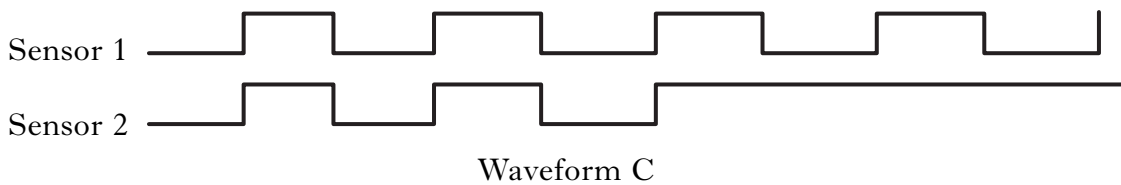
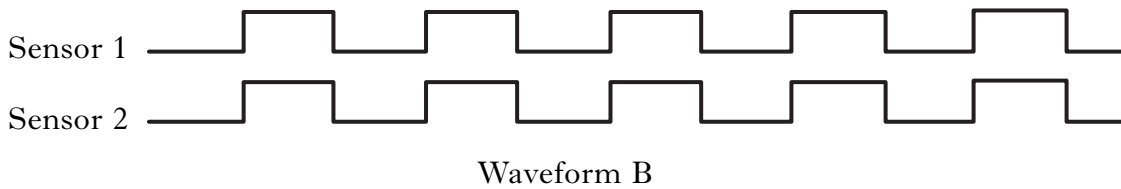
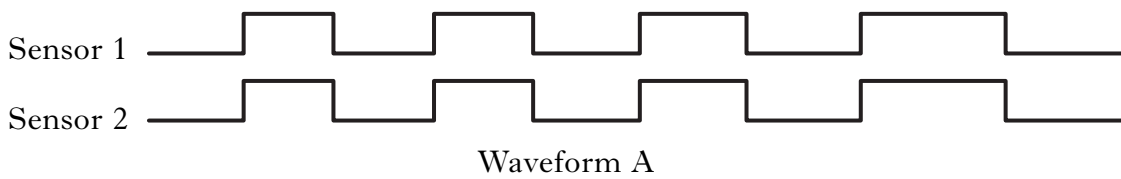
[Turn over

Worksheet Q9(b)

Four waveform diagrams illustrate various sensor outputs when the car is moving forward in a straight line. Complete the Table Q9(b) to indicate the waveform that shows:

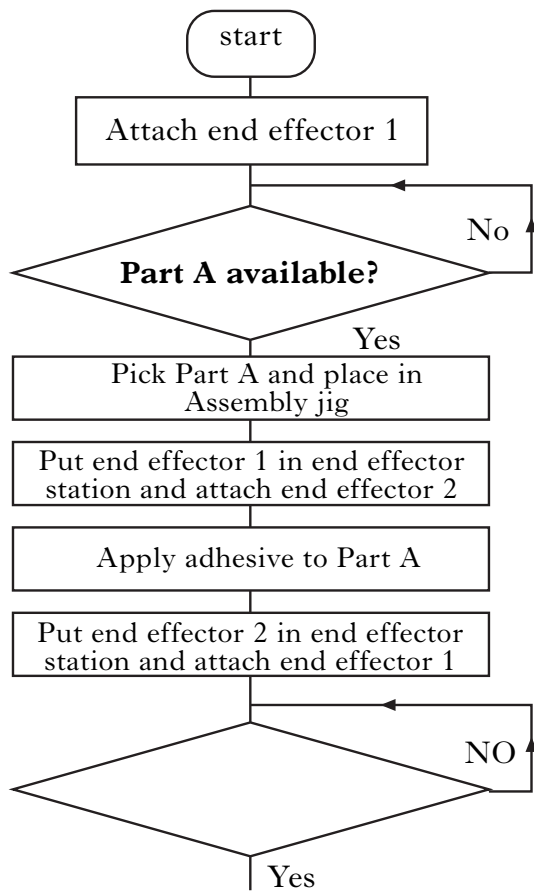
Car Movement	Waveform showing sensor outputs (A, B, C or D)
i. Constant speed	
ii. Car accelerating	
iii. One wheel locking	

Table Q9(b)



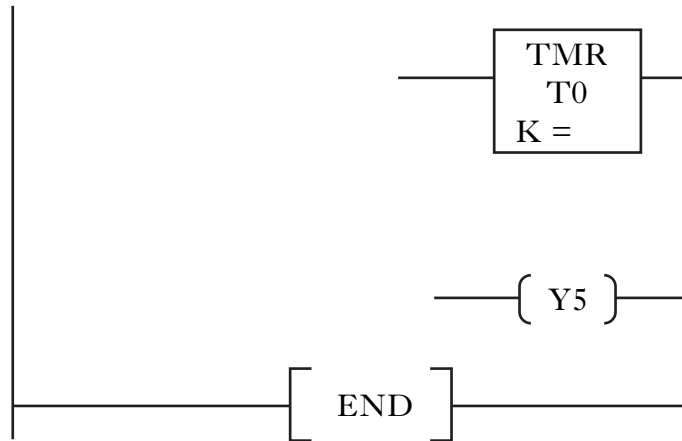
Worksheet Q12(a)

Complete the **Flowchart Q12(a)** to describe the sequence for the creation of one complete tested assembly.



Worksheet Q12(c)

Complete the Ladder Diagram Q12(c). The completed ladder diagram should show a Timer (T0), activated by the robot using contact X4, that would timeout after 30 seconds. When the timer times out, Timer contact T0 then activates output Y5.



Ladder Diagram Q12(c)

[END OF WORKSHEETS]

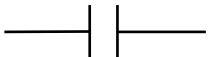


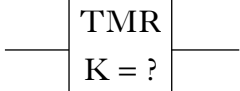

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PLC Datasheet Q5, Q12

PLC Programming Details for Ladder Diagram Programming

Functions

<i>Function type</i>	<i>Function symbol</i>	<i>Function name</i>	<i>Function operand (see following table)</i>
Input		Normally open contact (NO)	X, Y, M, T
Input		Normally closed contact (NC)	X, Y, M, T
Output		Output	M, Y
Timer		Timer	
End			

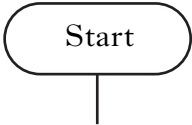
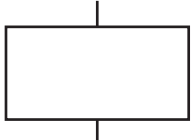
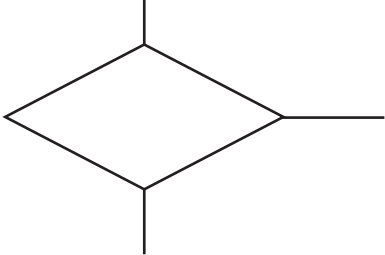
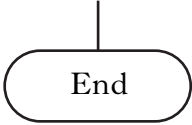
Operands

<i>Operand</i>	<i>Range</i>	<i>Type</i>
X	0 – 7	Input (I/P) terminal contact
Y	0 – 7	Output (O/P) terminal contact
M	0 – 49	Memory/auxiliary contact
T	0 – 49	Timer (see below)
K	Any integer value multiplier of 0.1 s	Constant

The timer functions begin a timeout for the set duration of time. When timeout occurs, the timer contact(s) are activated. If continuity of the timer rung is broken during timeout, the timeout will immediately reset.

Flowchart Symbol Sheet Q8, Q11, Q12

The following table shows a selection of Flowchart symbols suitable for use in answering the questions.

<i>Symbol</i>	<i>Use</i>
	Starting Point for the flowchart
	Process / Action Box
	Decision Box
	Ending Point(s) for the flowchart