4040/402 NATIONAL QUALIFICATIONS 007 MONDAY, 30 APRIL 2.35 PM - 4.05 PM Fill in these boxes and read what is printed below. Full name of centre Forename(s)	KU RNA Total Marks
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Fill in these boxes and read what is printed below. Full name of centre Forename(s)	TECHNOLOGICAI
Fill in these boxes and read what is printed below. Full name of centre Forename(s)	STUDIES
Fill in these boxes and read what is printed below. Full name of centre Forename(s)	STANDARD GRADE
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Full name of centre 1 Forename(s) 5	
Forename(s)	Fown
Forename(s)	
Forename(s)	
	Surname
Date of birth	Number of seat
1 Answer all the questions.	
2 Read every question carefully before you answer.	
3 Write your answers in the spaces provided.	
4 Do not write in the margins.	
 5 Do not sketch in link. 6 All dimensions are given in millimetres 	
7 Show all working and units where appropriate.	
8 Reference should be made to the Standard Grade (2006 edition) which is provided.	and Intermediate 2 Data Booklet
9 Before leaving the examination room you must give the	his book to the invigilator. If you do
not, you may lose all the marks for this paper.	

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		NOT TE IN IIS IGIN
A DVD is ejected from a games console using the gear system shown below.	KU	RNA
B		
(a) State the name of the parts of the gear system.		
	2	
B	0	
 (b) State the type of input motion and output motion of the gear system shown above. Input Motion 	2 1	
Output Motion[Turn over	0	



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4.	A w	ashing	g machii	ne is operated by a microo	controller.	DO N WRIT TH MARO	IOT E IN IS GIN RNA
	The prog mot	e drur gramn or's sp	n moto ning te peed.	r is connected in Pin 7 chnique is used to co	and a common ontrol the drum		
	(<i>a</i>)	Com	nplete tl ments a	he initialisation for the nd the Data Booklet.	PBASIC program with reference to the		
		init:			'set pins 7–4 as outputs, rest inputs		2
					'define counter address b0		1 0
	(<i>b</i>)	(i)	Compl referen	lete the PBASIC sequence to the comments and t	te to control the drum motor's speed with the Data Booklet.		
			speed:		'set for next loop to 200		
					'switch on drum motor (pin 7)		
					'5 ms delay		
					'switch off drum motor (pin 7)		
				pause 10	'10 ms delay		5 4
					'loop until completed		3 2
				return	'return to main program		1 0
		(ii)	State t the pro	he full name of the tech ogram above.	nnique used to control the motor speed in	1	
						0	

				DO N WRIT TH MAR	DO NOT WRITE IN THIS MARGIN		
4.	(b)	(cor	ntinued)	KU	RNA		
		(iii)	Describe, with the aid of a sketch, how this technique is used to control the speed of a motor.	3 2 1 0			
			[Turn over				







, mi	ed)	KII	RN
The circi	it diagram shows two forms of air, pilot and main air.		
(b) Des	cribe the difference between the two types.	2 1	
For safet The piste	y reasons, it was decided to slow the piston on Cylinder B as it outstrokes . on should still instroke quickly.	U	
(c) (i)	State the name of the pneumatic component which could be added to the circuit to slow the outstroke of the piston on Cylinder B.	1	
(ii)	Draw the symbol for this component below.		
(iii)	Mark (X) on the circuit where this component should be inserted.	2 1 0	
To furth Cylinde :	er improve the circuit, it was decided to include a time delay before A instrokes.		
(<i>d</i>) (i)	State the name of the two components required to produce a pneumatic time delay.		
	1	2 1 0	
	2		1
(ii)	2State how the length of the time delay could be varied.	1 0	
(ii) (e) Sta	2 State how the length of the time delay could be varied.	1 0 1 0	

			DO NOT WRITE IN THIS MARGIN				
An auto	omatic door in a	n office complex	is operated by a	n motor (M) wh	ich is	KU	RNA
The Bee	ed by three inputs	s. or the system is M	$(-(\Lambda \bullet \mathbf{R}) + \mathbf{C})$ who	FO .			
The Doc			$\mathbf{I} = (\mathbf{A}^{T}\mathbf{D})^{T}\mathbf{C},$ where	IC.			
		A is a darki	ness sensor;				
		B is a press	ure pad;				
		C is an insi	de switch;				
			oor motor.				
(a) (1)) Complete the t	ruth table for the	system.				
	A (1 when dark)	B (1 when pressed)	C (1 when pressed)	Μ			
	0	0	0	0			
	0	0	1	1			
	0	1	0				
	0	1	1				
	1	0	0	0			
	1	0	1	1			
	1	1	0				3
	1	1	1	1			
(ii)) State, with rear required to bui	ference to the Da ld the circuit.	ata Booklet, the f	full name of th	e ICs		
	IC Number 74	08					
	Full Name:						
	IC Number 74	32				2	
	Full Name:					0	
(iii) State the name	of the family which	ch these ICs belon	g to.		1	
						0	
(iv) State the suppl	y voltage (V_{cc}) fro	om which this fami	ly of ICs operate.			

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1 0



DO NOT WRITE IN THIS MARGIN

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8. A disco light box is controlled by a microcontroller.

Different coloured lights are reflected by a rotating mirror. The mirror's position is sensed by a rotary potentiometer (POT).

Part of the PBASIC control program and details of the input and output connections are shown below.



Input Connection	Pin	Output Connection
	7	Motor Clockwise
	6	Motor Anticlockwise
	5	Red Light
	4	Yellow Light
	3	
	2	
	1	
SensorA (POT)	0	

cw: if sensorA>150 then acw let pins = %10100000 pause 10 let pins = %10000000 pause 10 goto cw

acw: if sensorA<30 then cw let pins = %01010000 pause 10 let pins = %01000000 pause 10 goto cw 'test potentiometer position 'motor clockwise, red on '10 ms delay 'motor clockwise '10 ms delay 'jump to label cw

'test potentiometer position
'motor anticlockwise, yellow on
'10 ms delay
'motor anticlockwise
'10 ms delay
'jump to label cw

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8.

9.	Elec	tricity can be generated from both finite and renewable sources.	KU	RNA		
	The win	Government is promoting the use of renewable sources such as tidal, solar and d .				
	<i>(a)</i>	Explain one disadvantage which must be considered when using each of these sources. Each disadvantage may be used only once.				
		Tidal				
		Solar	3 2			
		Wind	1 0			
	<i>(b)</i>	State two other examples of renewable energy sources.				
		1	2			
		2	1 0			
	(<i>c</i>)	State two examples of finite energy sources.				
		1	2			
		2	0			

[END OF QUESTION PAPER]