SKILLS.com
Skills competitions for VET development

Skills competitions

ELECTRONICS PROTOTYPING

SHEET ASSESSMENT SHEET

Assessment criteria			
Module	**Name**		**Points**
A	Electronic circuit assembly		30,00
B1 and B2	Design and manufacture of electronic circuits		40,00
C	Programming of electronic circuits		30,00
		Total:	100,00

Assessment criteria **Module A** **- Electronics assembly**			**ZSM Słupsk**	**Mechatronicist Warsaw**	**ZSP Opoczno**	**ZSE Rzeszów**	**ZSE Radom**	**CKZ Nowa Sól**	
Lp	**Result**	**Maximum number of points**	**Aleksander Juszkowski**	**Zbigniew Tarnowski**	**Michał Nojek**	**Bartłomiej Sieńko**	**Filip Krakowiak**	**Dawid Pędziwiatr**	**Maximum number of points for task A**
			Points obtained						**30,00**
1	Preparation of the workstation in accordance with health and safety and ergonomic principles	1							
2	Observance of health and safety rules at work	2							
3	Correctly solder the electrical components of the chronic inductive components (coil, relay, transformer) - 3 pcs. (1 point for each element)	3							
4	Correctly solder electrical components - integrated circuits - 6 pcs. (1 point for each element)	6							
5	Correctly solder other electrical components - 32 pcs. (0.25 pts. for each element)	8							
6	Correctly solder surface mounted electrical components - 28 items. (0.25 points per element)	7							
7	Cleaning the PCB after work is completed	2							
8	Tidying up the workplace at the end of the task	1							
	Total number of points for module A	**30**							

Assessment criteria Module B1 - Design and performance of electronic circuits			ZSM Słupsk	Mechatronik Warszawa	ZSP Opoczno	ZSE Rzeszów	ZSE Radom	CKZ Nowa Sól	
Lp	**Result**	**Maximum number of points**	**Aleksander Juszkowski**	**Zbigniew Tarnowski**	**Michał Nojek**	**Bartłomiej Sieńko**	**Filip Krakowiak**	**Dawid Pędziwiatr**	**Maximum number of points for task B1**
I	**Determined values of the filtra parameters (Table 2)**		**Points obtained**						**21,00**
1	Lower limit frequency 102,67 Hz ± 2 Hz	0,5							
2	Upper cut-off frequency 867,3 Hz± 2 Hz	0,5							
3	Lower frequency determined from frequency response characteristics	0,5							
4	$\delta = \left\lvert \frac{f_p - f_m}{f_m} \right\rvert * 100\%$ Upper frequency determined from the frequency response	0,5							
5	$\delta = \left\lvert \frac{f_p - f_m}{f_m} \right\rvert * 100\%$	0,5							
6	Upper frequency measurement error	0,5							
7	Centre frequency 298.4 Hz± 2 Hz	0,5							
8	Resistance of resistor R_1= 330Ω	0,5							
9	Resistance of resistor R_2= 680Ω	0,5							
10	Selected from series E12 capacitance C_1= 4.7 uF	0,5							
11	Calculated capacitor capacitance C_1= 4,8 uF	0,5							
12	Selected capacitance of capacitor $C_2$from series E12= 270 nF	0,5							
13	Calculated capacitance of capacitor C_2= 260 nF	0,5							
14	Selected input voltage value from the transient characteristic linearity section, e.g: 1V	0,5							
15	Calculated pass-bandwidth 764.63 Hz ± 5 Hz	0,5							
16	Calculated filter quality 0,39 (dimensionless - Hz/Hz)	0,5							
17	Answer to question 3c - The pass band centre frequency is the frequency least attenuated by the filter - T/N	1							

II	**Assembly of the filter system**							
1	Drilled holes for BNC sockets on PCB fields	0,5						
2	Soldered resistors R_1= 330Ω and $R_{(2)}$= 680Ω	0,5						
3	Soldered capacitors C_1=4.7 µF and C_2= 260nF	0,5						
4	Soldered BNC-G/PCB sockets	0,5						
5	Properly made electrical connections via DY 0.5 mm^2cable	1						
6	Coaxial cables 50± 5 cm	0,5						
7	Correct fitting of F-connectors at the ends of the coaxial cable compressed	0,5						
8	Quality of the filter system 0 - 2 points	2						
III	**RC filter measurements**							
1	Genera- tor and oscilloscope correctly connected to BNC sockets	0,5						
2	A sinu- soid waveform is set on the generator	0,5						
3	Correctly determined transient characteristics	1						
4	Frequency response determined correctly (any scale accepted on the axes)	1						
5	Logarithmic scale on the frequency axis is used on the frequency characteristics	1						
6	On the frequency response, a decibel scale is used on the gain axis.	1						
7	The limiting frequencies are marked on the frequency response	1						
	Total number of points for module B1	**21**						

Assessment criteria Module B2 - Design and performance of electronic circuits			ZSM Słupsk	Mechatronik Warszawa	ZSP Opoczno	ZSE Rzeszów	ZSE Radom	ZSEZ Nowa Sól		
Lp	**Result**	**Maximum number of points**	**Aleksander Juszkowski**	**Zbigniew Tarnowski**	**Michał Nojek**	**Bartłomiej Sieńko**	**Filip Krakowiak**	**Dawid Pędziwiatr**	**Maximum NUMBER OF points for task B2**	**Maximum NUMBER OF points for task B1 and B2**
I	**Determined values of the filtra parameters (Table 2)**		**Points obtained**						**19,00**	**40,00**
1	Lower limit frequency 159 Hz ± 2 Hz	0,5								
2	Cut-off frequency upper 413,2 Hz ± 2 Hz	0,5								
3	Lower frequency determined from the frequency response	0,5								
4	$\delta = \left\|\frac{f_p - f_m}{f_m}\right\| * 100\%$ Upper frequency determined from the frequency response	0,5								
5	$\delta = \left\|\frac{f_p - f_m}{f_m}\right\| * 100\%$ Measurement error of lower frequency	0,5								
6	Upper frequency measurement error	0,5								
7	Centre frequency 256.3 Hz± 2 Hz	0,5								
8	Resistance of resistor R_1= 100Ω	0,5								
9	Resistance of resistor R_2= 820Ω	0,5								
10	Capacitor capacitance C_1= 10 uF, selected from series E12	0,5								
11	Series E12 selected capacitor capacity C_2= 470 nF	0,5								
12	Selected input voltage value from the range of linearity of the transient characteristics, e.g: 1V	0,5								
13	Calculated pass-bandwidth 254.2 Hz ± 5 Hz	0,5								
14	Calculated filter quality 1.01 (nondimensional - Hz/Hz)	0,5								
15	Answer to question 4d - Pass band centre frequency is similar but incompatible because series E12 rigidly dictates system para- meters - Y/N	1								

16	Answer to question 4e - To increase selectivity, the elements in series E12 - R and C can be combined in series or in parallel, choosing values close to the ob- figured. Selectivity is a characteristic of the filter: the higher it is, the more selective the filter is, i.e. it lets frequencies very close to the resonant frequency through. The smaller it is, the more distant frequency signals are filtered through - T/N	1						
II	**Fıltra system assembly**							
1	Quality of the prepared PCB (soldering) 0 - 2 pts	2						
2	Soldered resistors R_1= 100Ω and $R_{(2)}$ = 820Ω	0,5						
3	Soldered capacitors C_1=10 µF and C_2= 470nF	0,5						
4	Properly made electrical connections via DY 0.5mm^{2}cable	1						
5	Quality of the redesigned filter system 0 - 2 points	2						
III	**RC fılter measurements**							
1	Correctly determined transient characteristics	0,5						
2	Correctly determined frequency response (any scale accepted on the axes).	0,5						
3	Logarithmic scale applied on the frequency response on the frequency axis.	1						
4	The frequency response uses a decibel scale on the gain axis.	1						
5	On the frequency characteristics the limiting frequencies are marked	1						
	Total number of points for module B2	**19**						

Assessment criteria Module C - Programming of electronic circuits			ZSM Słupsk	Mechatronicist Warsaw	ZSP Opoczno	ZSE Rzeszów	ZSE Radom	CKZ Nowa Sól	
Lp	**Result**	**Maximum number of points**	**Aleksander Juszkowski**	**Zbigniew Tarnowski**	**Michał Nojek**	**Bartłomiej Sieńko**	**Filip Krakowiak**	**Dawid Pędziwiatr**	**Maximum NUMBER OF points for task C**
			Points obtained						**30,00**
1	**Assembling the robot**								
1.1	Correct tool handling	2							
1.2	Correct assembly of the robot skeleton	2							
1.3	Correctly assemble the servos (0.5 points each)	2							
1.4	Fit the Uno R3 and shield joysticks	2							
1.5	Completion of the task in less than 1 hour (1 point for 5 minutes)	2							
2	**Programming a robot to control a joystick**								
2.1	The robot responds to signals given by the joystick (1 point for the joystick)	2							
2.2	The robot responds correctly to joystick movements (1 point for the joystick)	2							
2.3	The three elements have been moved 5 cm away from the free position	3							
2.4	Participant complied with basic health and safety and ESD protection rules	2							
2.5	The task was completed in less than 1 hour	1							
3	**Programming the robot to automate task**								
3.1	Correctly positioned the robot and the blocks on the test set-up	2							
3.2	The robot correctly moves the blocks and builds a tower out of them, when the sequence in which the blocks are to be moved is entered (1 point for each block).	3							
3.3	The robot correctly moves the blocks and builds a tower out of them when the written sequence in which the blocks are to be moved is incomplete (1 point for each block).	3							
3.4	The test task is completed correctly in the first attempt.	1							
3.5	The task was completed in less than 1 hour	1							
	Sum of points for module C	**30**							