Sekolah:	**SEKOLAH KEJURUTERAAN ELEKTRIK**	
Nama Matapelajaran: MAKMAL TAHUN 3	Semakan	: 4
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Kod Matapelajaran : SKEL 3742	Pindaan Terakhir	: 3 February 2020
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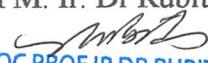# UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SKEL 3742

SEKOLAH KEJURUTERAAN ELEKTRIK
FAKULTI KEJURUTERAAN
UNIVERSITI TEKNOLOGI MALAYSIA
JOHOR BAHRU

ADVANCED ELECTRONIC LAB
STUDENT PACK

Active Filter
(Biomedical Electronics Option)

Prepared by:		Certified by	: Director of Program Electronics and Computer Engineering (ECE)
	Mdm. Norhafizah Ramli Dr. Zaharah Johari Mr. Camallil Omar Mr. Johari Kasim		
Signature		Name	: PM. Ir. Dr Rubita Sudirman
Stamp	**NORHAFIZAH RAMLI** Senior Lecturer Electronics and Computer Engineering School of Electrical Engineering Faculty of Engineering Universiti Teknologi Malaysia 81310 Johor Bahru, Johor	Signature Stamp	**ASSOC PROF IR DR RUBITA SUDIRMAN** Director Electronic & Computer Engineering School of Electrical Engineering, Faculty of Engineering Universiti Teknologi Malaysia 81310 UTM Johor Bahru, Johor (+6)...my
Date	3 February 2020	Date	: 6 February 2020

Active Filter

Project Introduction:

Filters are circuit that can pass signals within a band of frequencies while rejecting or blocking signal of frequencies outside of this band. A low-pass filter transmits signal with low frequencies but stops high frequencies signals, and vice versa for a high-pass filter. An active filter is designed using operational amplifiers, capacitors and resistors. Active filters are advantages over passive filters such that it eliminates the inductors, which are bulky and expensive especially at low cut-off frequencies. Some of the advantageous of an active filter are flexible voltage gain, easy tuning of cut-off frequency, no loading effect, and cost effective since wide range of economical operational amplifiers are available and no inductor.

Project Objectives are:

1. To design an active filter for biomedical application based on the specification given.
2. To obtain the magnitude and a phase response of an active filters.
3. To evaluate the functionality and performance of the designed active filter when noise is embedded within an input signal.

Project Tasks:

Your team has been assigned to design an active filter for biomedical application with the specification given in Table 1. Based on the type of filter assigned to your team, you have three weeks to design, implement and test the required active filter that comply with the specifications. A technical report supported with the experimental results must be submitted at the end of project time. The collected data, analysis and plots of waveforms (frequency and time domain) and graphs should be well presented and discussed. The report must cover both theoretical and experimental voltage gains, cut-off frequencies, slopes of roll-off, phase angles at cut-off, and the ranges of phase angles. You also need to suggest the possible application of the filter.

Supporting Material:

1. Multiple feedback active circuit filter and its transfer function.

Table 1: Project Specifications

No.	Type of filter	Filter parameters			
		Min. order	Min. gain	Cut-off freq	Type
1	Notch Filter	2nd order	*	40 Hz	*
2	Notch Filter	2nd order	*	50 Hz	*
3	Notch Filter	2nd order	*	60 Hz	*
4	Bandpass Filter	2nd order	*	800 Hz and 2 kHz	*
5	Bandpass Filter	2nd order	*	1 kHz and 10 kHz	*
6	Bandpass Filter	2nd order	*	2 kHz and 20 kHz	*

* You may choose any voltage gain or type of filter response (Butterworth, Chebyshev, Bessel) most suitable to design.

Technical Report Guideline:

1. The report should use an IEEE journal format. Please download report template from http://3yearlab.fke.utm.my/ or http://www.fke.utm.my/facilities/teaching-laboratories/lab
2. All figures and tables must be cited in text with proper discussion.
3. Reference used in the report must be quoted/cited.
4. Please refer to the assessment criteria for your guidance in preparation of the report.
5. One hardcopy of the report should be submitted to the Advanced Electronics laboratory within one week after the last lab's session (4th Week). Please make sure to sign submission form available in the lab.
6. A softcopy of the report in pdf format should be emailed to **advlab@fke.utm.my**. Please name the file as ***"AELAB_GroupName_ActiveFilter.pdf".***
7. Email Subject: Report Submission for ***Your Supervisor's Name***.