

Faculty:		FACULTY OF ELECTRICAL ENGINEERING	
Subject	: ELECTRICAL ENGINEERING LABORATORY	Review	: 3rd
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SKEL 3742

**SCHOOL OF ELECTRICAL ENGINEERING
FACULTY OF ENGINEERING
UNIVERSITI TEKNOLOGI MALAYSIA
JOHOR BAHRU CAMPUS**

**ADVANCED ELECTRONIC LABORATORY
STUDENT PACK**

Active Filter

Prepared by:	Approved by:
Mdm. Norhafizah Ramli Penyelaras Akademik Makmal Advanced Electronics Laboratory	Head of Program Electronics and Computer Engineering (ECED)
Signature & Stamp:	Name: PM. Ir Dr Rubita Sudirman
Date : 10 February 2020	Signature & Stamp: Date : 10 February 2020

<p>1.</p>	<p>Problem/Project Guide:</p> <p>(a) To complete the project tasks, student should perform the following tasks:</p> <ul style="list-style-type: none"> ▪ Understand the part of active filter in audio system application ▪ Obtain some information on the behavior, specifications, and applications of the assigned speaker. ▪ Study Active Filter types, response and characteristics. ▪ Understand the Active Filter design criteria. ▪ Understand Filter transfer function, damping factor, bandwidth, Q-factor, gain, etc. ▪ Simulate to investigate input/output waveforms, roll-off rate, voltage gain, magnitude and phase response. ▪ Identify methods to experimentally verify your active filter. ▪ Evaluate the functionality and performance of the active filter designed by injecting high frequency noise by using summing amplifier and observe the output waveforms before and after filtering by both simulation and experiment. ▪ Plot the frequency response to obtain the cut-off frequency, voltage gain, and roll-off rate. ▪ Plot the phase response to obtain the cut-off frequency and the ranges of phase angles. ▪ Compare the theoretical and the experimental values, percentage discrepancies and discuss possible cause of discrepancies. <p>(b) The students should accomplish their task within three weeks. Suggestion time-line for the problem solving is in the following Table 1.</p> <p style="text-align: center;">Table 1: Problem-Solving Time-line</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Activities</th> <th>Week 1</th> <th>Week 2</th> <th>Week 3</th> <th>Week 4</th> </tr> </thead> <tbody> <tr> <td>1. Understand/Identify/ Brainstorming (Prepare group proposal, list materials, allocate tasks).</td> <td style="background-color: #4F81BD;"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2. Submit individual report / Experiments/ Simulations and collect data.</td> <td></td> <td style="background-color: #4F81BD;"></td> <td></td> <td></td> </tr> <tr> <td>3. Evaluate the filter designed functionality, analyze and interpret data.</td> <td></td> <td></td> <td style="background-color: #4F81BD;"></td> <td></td> </tr> <tr> <td>4. Submit technical report.</td> <td></td> <td></td> <td></td> <td style="text-align: center;">♦</td> </tr> </tbody> </table> <p>Notes: Individual report should consist a brief report on out of lab work and not the work done in lab. Please refer to the assessment criteria for the individual report.</p> <p>Assessment criteria are standardized for all laboratories and will generally be the same for all laboratories. For further understanding about the assessment criteria, please refer to Third-year Specialized Laboratory Course Outline and Assessment document available at http://3yearlab.fke.utm.my/</p> <p>(c) Technical Report Writing Other than the <i>general guide</i> specified by the Laboratory Coordinator, the report must include:</p> <ul style="list-style-type: none"> ▪ Photographs of the actual circuit construction ▪ Circuit diagram with complete labelling ▪ Photographs of your group members <p>Part of the student assessment will include reporting of their weekly activities and the log book.</p> <p>d) What a group of lab students will do collectively (extract from http://3yearlab.fke.utm.my/home/)</p> <ul style="list-style-type: none"> • Each group will have an in-lab discussion, simulations and write a project proposal handed in at the end of the 1st lab session. • If time permits and allowed by supervisor, the group can start the in-lab work during the 1st lab session. • Each group will conduct the experiment, test and collect data on their project during the 2nd lab session. • Each group will analyze and interpret data during the 3rd lab session. At the end of the third lab session, each group will demonstrate their experimental work to the supervisor. 	Activities	Week 1	Week 2	Week 3	Week 4	1. Understand/Identify/ Brainstorming (Prepare group proposal, list materials, allocate tasks).					2. Submit individual report / Experiments/ Simulations and collect data.					3. Evaluate the filter designed functionality, analyze and interpret data.					4. Submit technical report.				♦
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2.	Equipments / Facilities:
	<p>Refer to the Lab's assistant engineer and/or the following website:</p> <ul style="list-style-type: none"> • http://www.fke.utm.my/facilities/ • http://www.fke.utm.my/facilities/teaching-laboratories/ (Advanced Electronics Laboratory)
3.	Components List:
	<p>Use standard component available in the laboratory or component store.</p>
4.	Software:
	<ul style="list-style-type: none"> (a) Multisim Electronics Workbench, Pspice, or any other suitable software. (b) Report writing use Microsoft office word processing. (c) Graph for data plotting use Microsoft Office Excel or Matlab software.
5.	References:
	<ul style="list-style-type: none"> • J. Kasim, C. Omar, A.H Ahmad: 'Sistem Elektronik', Edisi Kedua, 2006. • Sergio Franco: 'Design with Operational Amplifier and Analog Integrated Circuits', McGraw Hill. • D.A Neamen: 'Electronic Circuit Analysis and Design', McGraw Hill, 2001 or newer. • Robert L. Boylestad and Louis Nashelsky: 'Electronic Devices and Circuit Theory', Pearson international Edition • T.F Bogart., J.S. Beasley, G. Rico: 'Electronic Devices and Circuits', 6th Edition, Prentice Hall 2004 or newer. • T.L Floyd: 'Electronic Devices' 8th Edition, Prentice Hall, 2007 or newer.