

VIBRATION LAB BMM3553 COOPERATIVE LEARNING 2017-2018

This open ended laboratory valued 20% from overall assessment in the Mechanical Vibrations BMM3553. The OBJECTIVE of the assignment is for each group to devise a teaching experiment using virtual instrumentation where the any subsequent person conducting the experiment will acquire the understanding of the topic concerned.

OUTCOMES

1. By the end of the semester the following OUTCOME is expected:
 - A complete instructor LAB SHEET and REPORT (consists of Introduction, Objectives, Theory, Experimental Procedures, Results, Calculations, Discussions and Conclusions)
 - VIRTUAL INSTRUMENT (DasyLab) used to conduct the experiment. Other software such as Excel, Matlab, etc, can be used to support DasyLab.
2. **A complete Lab Sheet shall be submitted on the 8th week.** The development of the virtual instrumentation also will be reviewed at this stage. **Lab Sheet will carry 10% out Of 20% Marks.**
3. **A complete Lab Report shall be submitted on the 14th week. Lab Report will carry 10% out Of 20% Marks.**
4. In addition, **every group must write a page of the activities done in every lab session (typed/handwritten).** Point entries are sufficient but must be logical in words length for 1 hour lab. **During week 14, a compilation of 14 sheets of these entries must be submitted together with Lab Report.**
5. **Make sure all group members name are on the Lab Sheet and Lab Report.** Otherwise, no mark for that individual who is missing his/her name.

BACKGROUND

In the past, a student would enter a lab and finds a lab sheet. He will perform the experiment guided by the lab sheet and subsequently generate a report. An innovative approach is to let the student design his own lab sheet which would require him to set his own objective and scope of the experiment with the view of whoever conducting his experiments would gain the knowledge expected from the exercise. If performed properly, the benefits obtained from the later person will easily outweigh the former. It is from the simple fact that the student needs to know what he expects the person conducting his experiment to acquire.

SCHEDULES

1. Learning Virtual Instruments (DasyLab) and Signal Analysis (4hrs)
2. Lab work (10 hrs)

SOME TIPS:

The following are some of the facts on vibration that may help you to design your experiment:

1. One degree of freedom system contains one natural frequency. It follows that two-degree-of-freedom system contains two natural frequencies.
2. When a mass and spring system is subjected to an external dynamic load, passes through a stiffness-controlled region, resonance and isolation (mass-controlled region) as the frequency of excitation is varied from zero to high value.
3. Natural frequency is a function of mass and stiffness of the system. When the system is excited by a dynamic force whose frequency of excitation equals to the natural frequency, resonance occurs.
4. Change in mass and stiffness of a system causes change in natural frequency. There is a mathematical relationship between mass, stiffness and natural frequency (ask your lecturer).
5. When a system vibrates freely, the frequency of vibration equals to the natural frequency of the system.
6. Decay rate and damping ratio can be obtained from the system response when it is displaced and release. Correlating the experimental time trace results with the analytical formulation, we are able to determine the natural frequency and damping.

EQUIPMENT REQUIRED

	ITEM
1	Data acquisition module
2	Accelerometers ,Tachometer and LVDTs
3	Digital Signal processing and Display
4	Virtual Instrument Software (DasyLab)