VIB : Vibration sources and Fourier Analysis

Number of participants: 30

1. I have watched the video on vibration sources before coming to the class

25 respondents

Yes	48%	12 votes
No	16%	4 votes
Partly (I fell asleep)	36%	9 votes

2. After watching the video I think that

0 correct answer
out of 21 respondents

I understood most of the content	24%	5 votes
I understood the general concepts but did not grasp the mathematics	62%	13 votes
I did not understand the concepts nor the mathematics	24%	5 votes

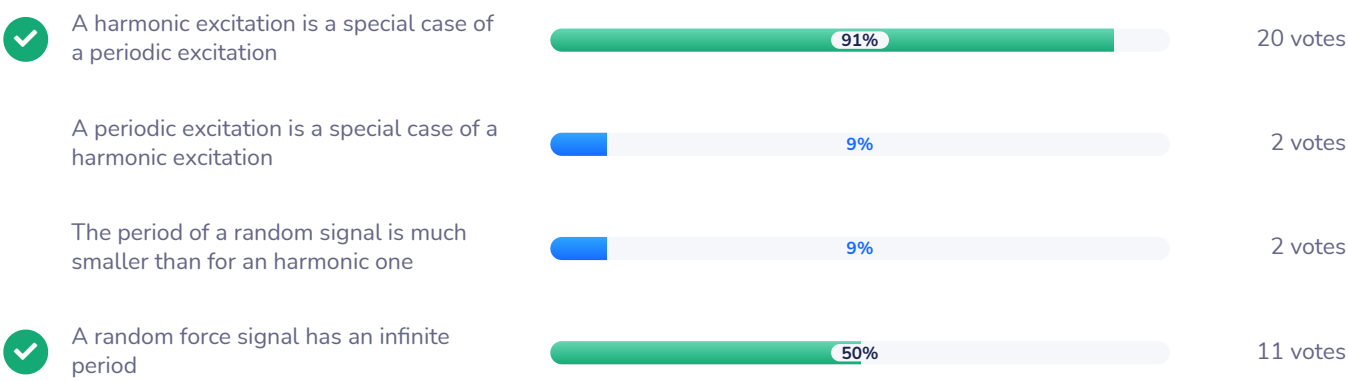
3. The following are examples of free mechanical vibrations

8 correct answers
out of 24 respondents

A bell ringing	75%	18 votes
A worker using a jack hammer	50%	12 votes
The bar of a football goal vibrating after being hit by a ball	75%	18 votes
Vibrations due to a spinning washing machine	33%	8 votes

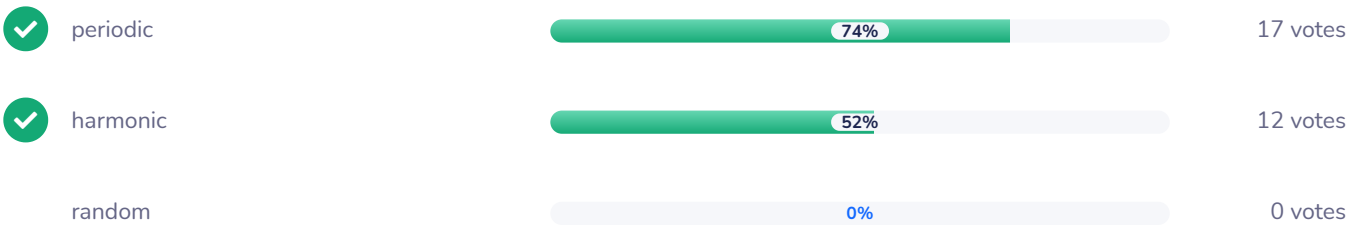
4. Which of the following statements are true ?

11 correct answers
out of 22 respondents



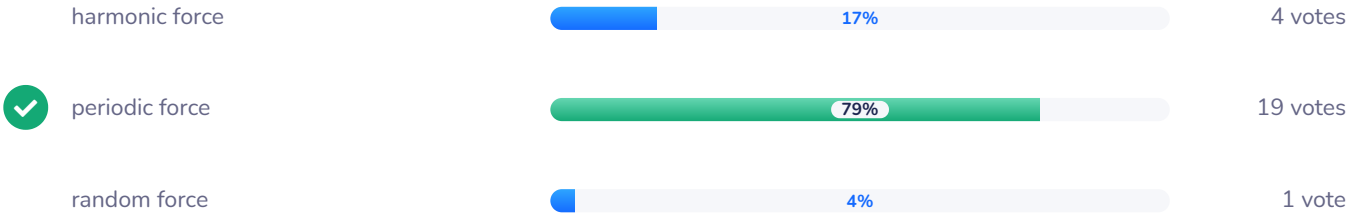
5. A rigid rotating machine induces a force that is

6 correct answers
out of 23 respondents



6. Any rotating machine produces a

19 correct answers
out of 24 respondents



7. When the rotational speed of a machine increases, the frequency of the forces produced

11 correct answers
out of 22 respondents

✓	Increases proportionally	50%	11 votes
	Decreases proportionally	5%	1 vote
	Increases with the square of the rotational speed	45%	10 votes
	Decreases with the square root of the rotational speed	0%	0 votes

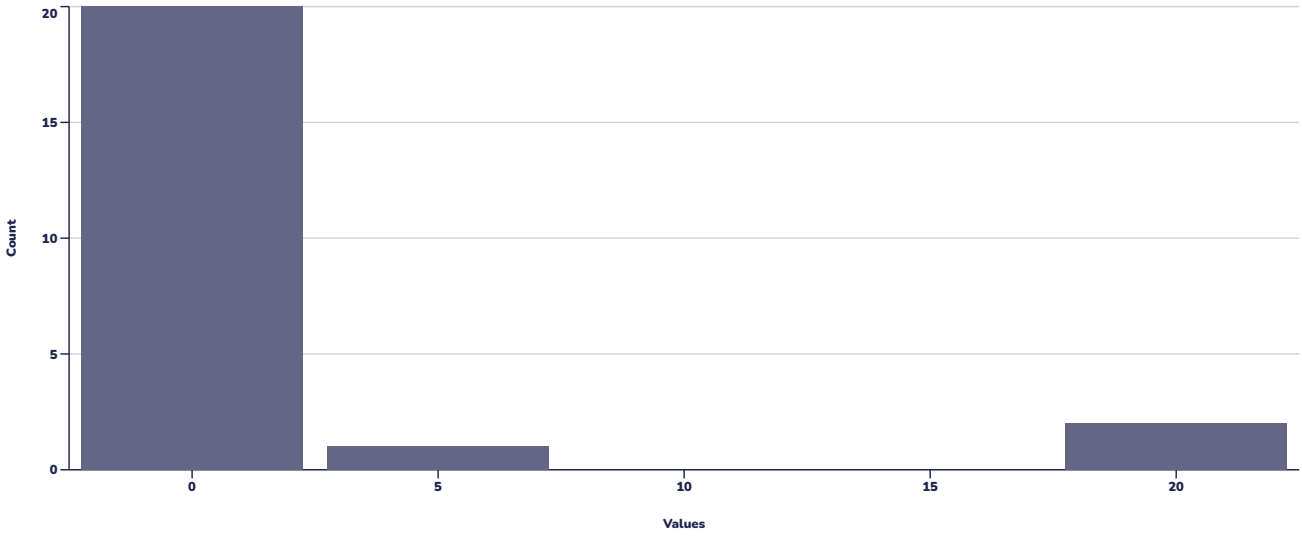
8. The force applied by a pedestrian walking or running at constant speed on a bridge is

15 correct answers
out of 20 respondents

	harmonic	20%	4 votes
✓	periodic	75%	15 votes
	random	5%	1 vote

9. The main frequency of excitation for walking pedestrians is around

19 correct answers
out of 23 respondents



1e-20	3.36	20	2	5.21	27.09
Minimum	Mean	Maximum	Median	Standard deviation	Variance

Correct answer

Between 1 and 3

10. The discrete Fourier transform applies to

11 correct answers
out of 20 respondents

	any type of signal	40%	8 votes
	only random signals	5%	1 vote
✓	only periodic signals	55%	11 votes

11. The discrete Fourier transform computes amplitudes of sine and cosine functions at frequencies which are

2 correct answers
out of 18 respondents

✓	multiples of the fundamental angular frequency = 2pi/T	72%	13 votes
	odd multiples of the fundamental frequency = 2pi/T	6%	1 vote
✓	multiples of the fundamental frequency = 1/T	44%	8 votes

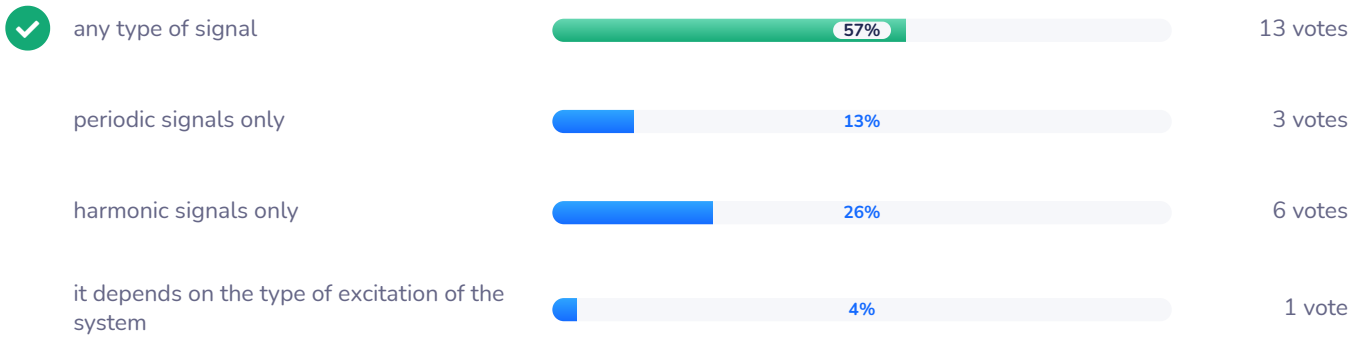
12. It is interesting to transform an excitation signal from the time domain to the frequency domain because

20 correct answers
out of 21 respondents

✓	It provides information about the main frequencies of excitation which could cause structural resonance	95%	20 votes
	The signal is more compact in the frequency domain	0%	0 votes
	It is easier to add signals in the frequency domain	5%	1 vote

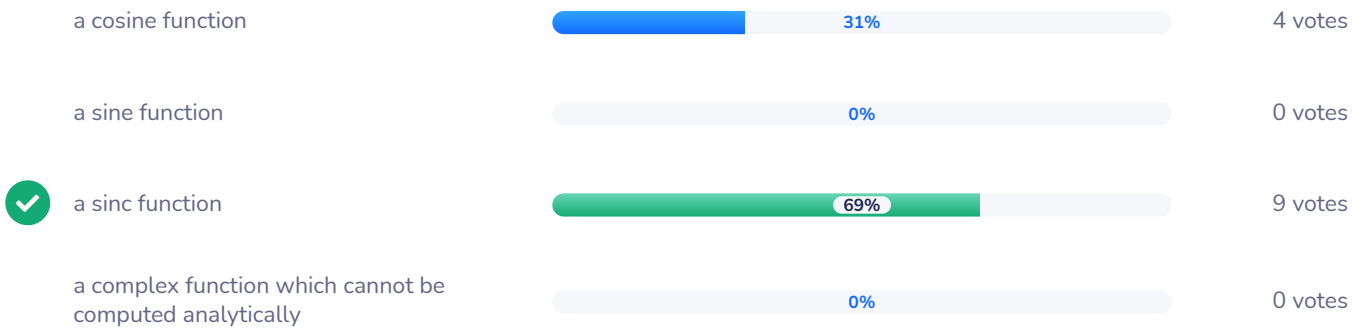
13. The continuous Fourier transform applies to

13 correct answers
out of 23 respondents



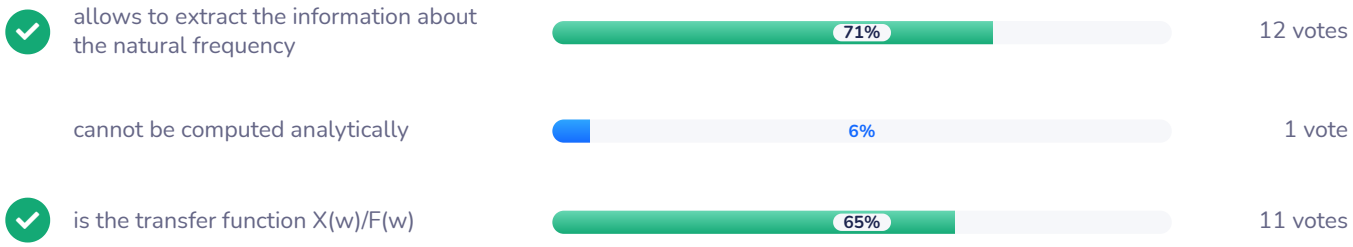
14. The continuous Fourier transform of a rectangle (pulse) is

9 correct answers
out of 13 respondents



15. For a SDOF system (and MDOF), the Fourier transform of the impulse response h(t)

6 correct answers
out of 17 respondents



16. Convolution in the time domain corresponds to

23 correct answers
out of 24 respondents

✓	multiplication in the frequency domain	96%	23 votes
	convolution in the frequency domain	4%	1 vote
	deconvolution in the frequency domain	0%	0 votes
	division in the frequency domain	0%	0 votes

17. The continuous Fourier transform of a sampled signal is

7 correct answers
out of 16 respondents

	Discrete and periodic	31%	5 votes
✓	Continuous and periodic	44%	7 votes
	Discrete with the same number of samples as the original signal	25%	4 votes

18. Aliasing happens when

19 correct answers
out of 22 respondents

	The sampling frequency is too high with respect to the frequency content of the signal	14%	3 votes
✓	The sampling frequency is too low with respect to the frequency content of the signal	86%	19 votes
	The sampling frequency is equal to the frequency content of the signal	0%	0 votes

19. YouTube (camera shutter speed and frame rate match helicopter`s rotor)

0 respondent

20. When using Fast Fourier Transform on sampled signals, you can increase the frequency resolution by

3 correct answers
out of 19 respondents

	decreasing the time step of the sampling signal, keeping the total measurement time constant	32%	6 votes
	increasing the time step of the sampling signal, keeping the total measurement time constant	53%	10 votes
✓	increasing the measurement time, whatever the time step of the sampling signal	16%	3 votes

21. When using DFT, the time step of the sample signal has an influence on

9 correct answers
out of 14 respondents

	The frequency resolution of the DFT	29%	4 votes
✓	The maximum frequency of the DFT	64%	9 votes
	It has no influence on the DFT	7%	1 vote

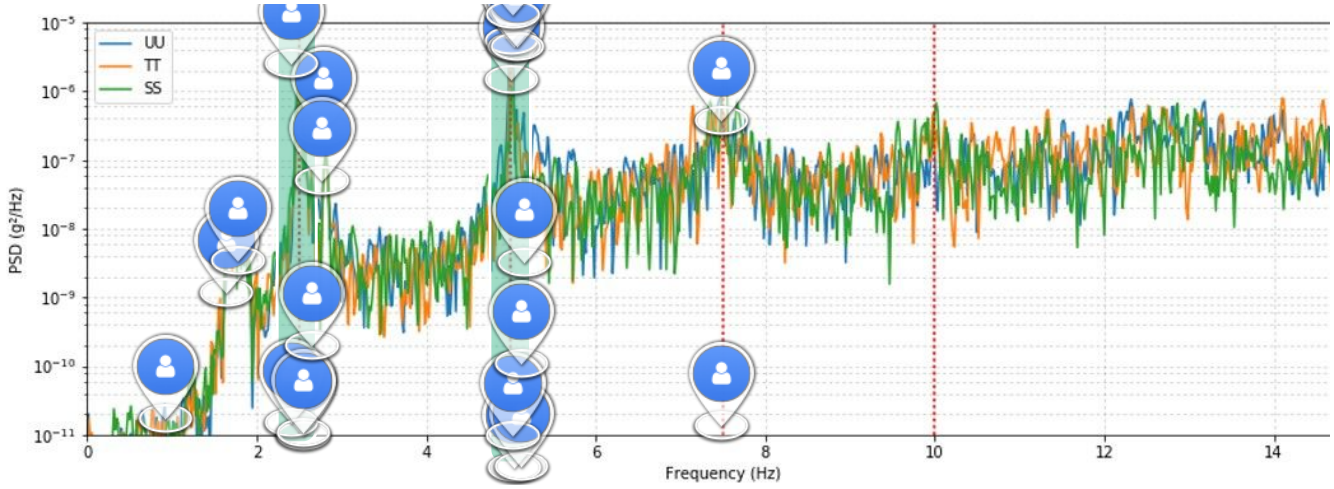
22. Suppose the sampling frequency of the accelerometer on your smartphone is 200 Hz. Up to what frequency can you measure acceleration signals ?

15 correct answers
out of 18 respondents

	200 Hz	11%	2 votes
✓	100 Hz	83%	15 votes
	It depends on the length of the measurement	6%	1 vote

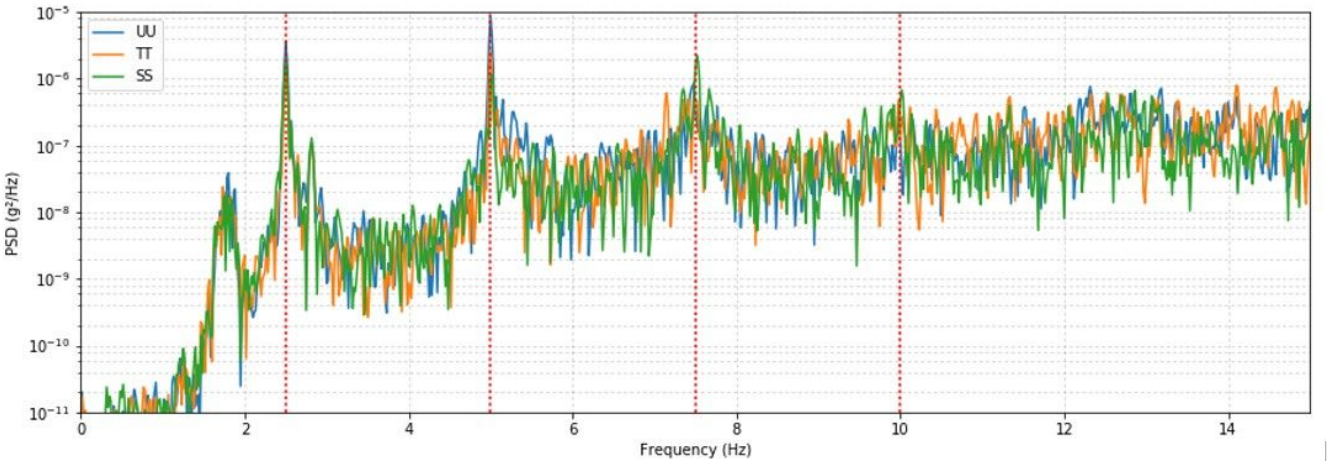
23. Following acceleration measurements show a real world structure responding to a particular vibration. Can you identify the frequency at which the highest loads are coming from?

22 respondents



24. Where do you think these frequencies are coming from?

18 respondents



- Engine
- Washing machine
- People walking, cars
- resonance
- USA □□
- Walking
- Earthquake
- Bridges
- Vibrations
- Switzerland
- Running pedestrian
- DOFs
- Noise
- The elasticity of the material

walking people

Earthquakes

Motor

Walking or running

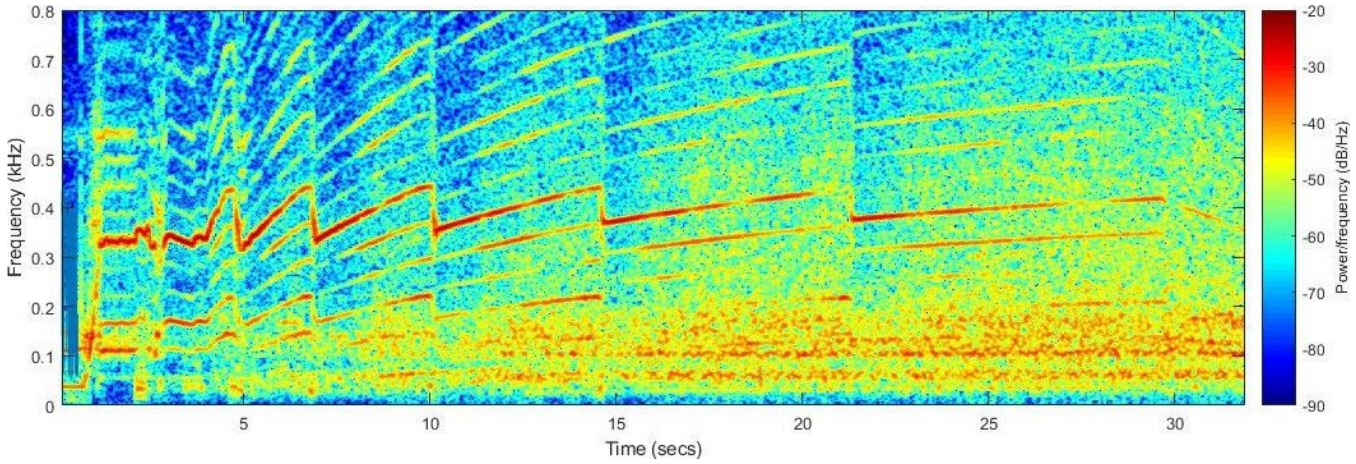
25. VID_20190503_223348.mp4

0 respondent

We see people dancing and jumping to music.

26. This time-frequency plot, or waterfall plot, shows how the Fourier spectrum of an excitation source can vary over time. Do you have an idea which machine this is from?

27 respondents



Thank you see ya

廠商說要買給誰做了

健健康康

為你你是女生

應該不會太甜甜布蘭

一個窈窕淑女在你身上

這樣會長一些事先申請案一般是

تسعيغثائغغيت

تقعيعياثث

اثغبايزيغتيزي

غفيتيني ما شاء ما في الا انت

غير انه لم يحدث في الوقت نفسه في الوقت الحالي مع اي من الدول التي كانت وراء ذلك بسبب الازمة التي حصلت على صعيد العلاقات الثنائية في مختلف انحاء الشرق الادنى منذ العام الحالي وحتى عام الفين من القرن العشرين في القرن التاسع عشرة من القرن العشرين الى ما يزيد عن نصف مليون شخص في العام نفسه في العام الحالي في حين ان هذه النسبة هي اكثر مما كان من المتوقع في عام تقريبا في عام من العام الجاري ان هناك نحو نحو ثلاثة الاف شخص من اصل عشرة في عام واحد فقط في العام الحالي فان ما نسبته حوالي مليار يورو في عام من العام الجاري ان هناك

I love accelerometers, it’s my third favorite instrument

اساساها يا عمري انا احبك موت يا قلبي

HELLO WORLD

Help

SOS

Moteur

Car Engine

I only see blue, Green and red ... dont see the machine

Engine

Washing machine

Motor

Engine

Engine

Engine speeding

A car changing gears