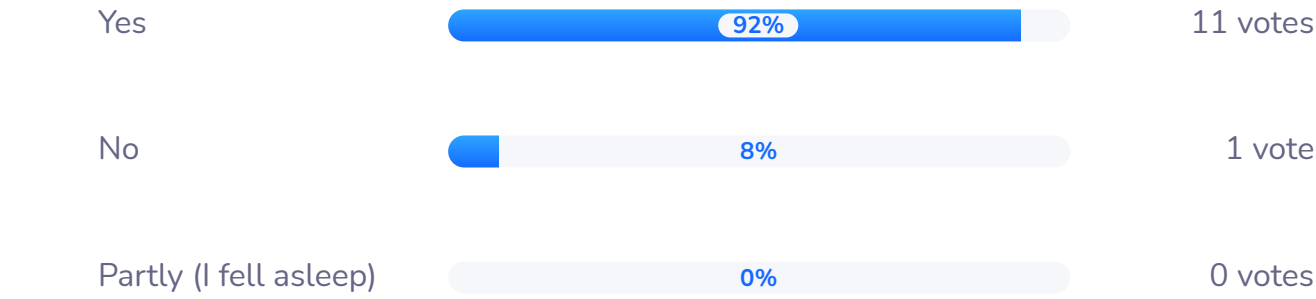
DOS : Vibration sources and Fourier Analysis

Number of participants: 14

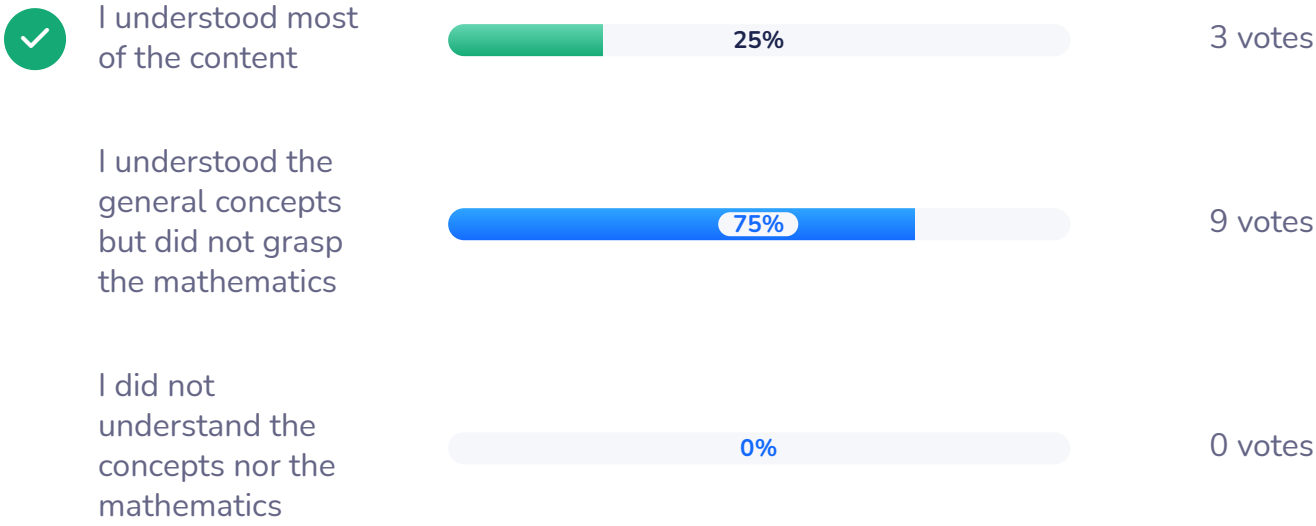
1. I have watched the video on vibration sources before coming to the class

12 respondents



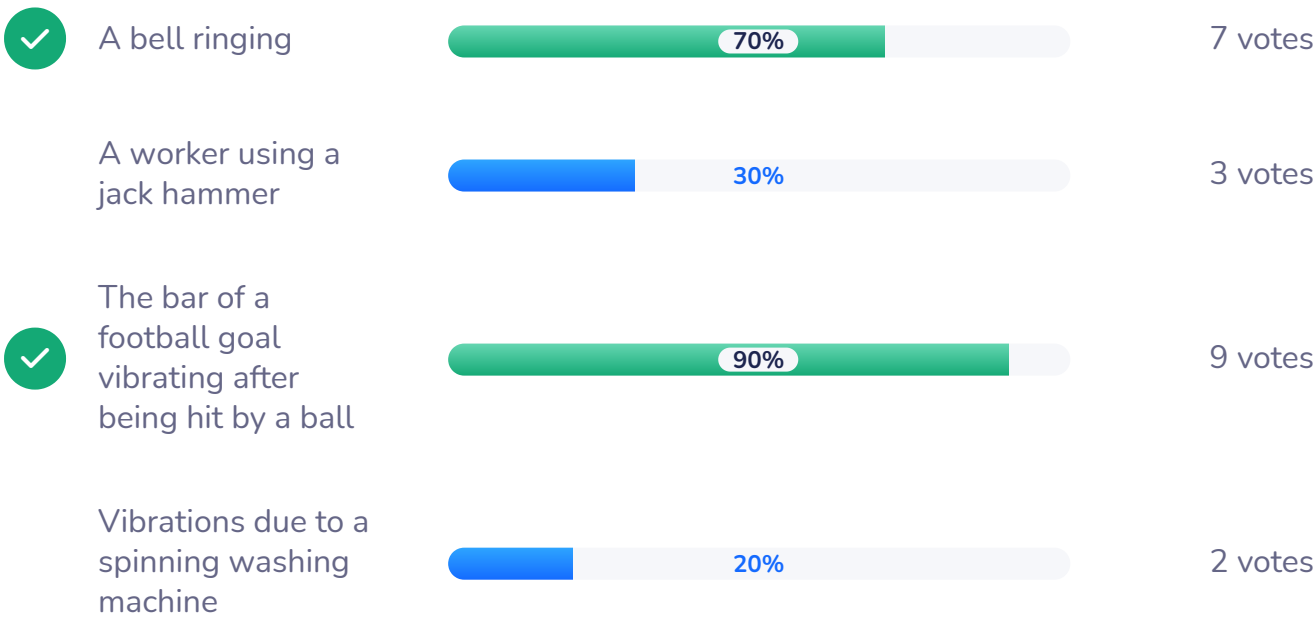
2. After watching the video I think that

3 correct answers
out of 12 respondents



3. The following are examples of free mechanical vibrations

4 correct answers
out of 10 respondents



4. Which of the following statements are true ?

8 correct answers
out of 12 respondents

✓	A harmonic excitation is a special case of a periodic excitation	83%	10 votes
	A periodic excitation is a special case of a harmonic excitation	17%	2 votes
	The period of a random signal is much smaller than for an harmonic one	0%	0 votes
✓	A random force signal has an infinite period	75%	9 votes

5. A rigid rotating machine induces a force that is

2 correct answers
out of 14 respondents

✓	periodic	64%	9 votes
✓	harmonic	43%	6 votes
	random	7%	1 vote

6. Any rotating machine produces a

9 correct answers
out of 12 respondents

	harmonic force	25%	3 votes
✓	periodic force	75%	9 votes
	random force	0%	0 votes

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

7 correct answers
out of 12 respondents

✓	Increases proportionally	58%	7 votes
	Decreases proportionally	0%	0 votes
	Increases with the square of the rotational speed	42%	5 votes
	Decreases with the square root of the rotational speed	0%	0 votes

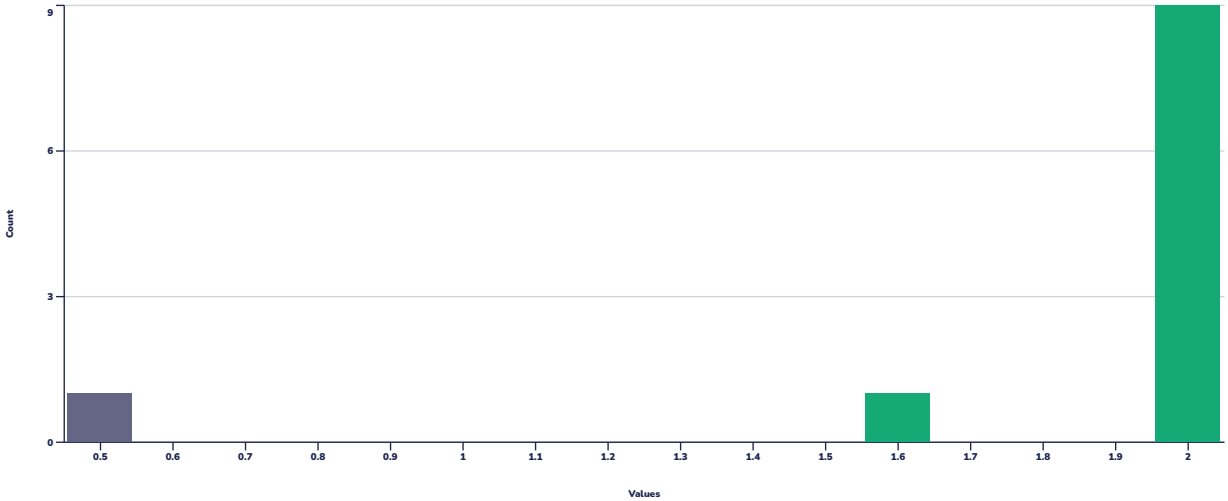
8. The force applied by a pedestrian walking or running at constant speed on a bridge is

10 correct answers
out of 12 respondents

	harmonic	17%	2 votes
✓	periodic	83%	10 votes
	random	0%	0 votes

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

10 correct answers
out of 11 respondents



0.5	1.83	2	2	0.44	0.19
Minimum	Mean	Maximum	Median	Standard deviation	Variance

Correct answer

Between 1 and 3

10. The discrete Fourier transform applies to

12 correct answers
out of 12 respondents

	any type of signal	0%	0 votes
	only random signals	0%	0 votes
✓	only periodic signals	100%	12 votes

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

3 correct answers
out of 10 respondents

✓	multiples of the fundamental angular frequency = 2pi/T	100%	10 votes
	odd multiples of the fundamental frequency = 2pi/T	0%	0 votes
✓	multiples of the fundamental frequency = 1/T	30%	3 votes

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

8 correct answers
out of 11 respondents

✓	It provides information about the main frequencies of excitation which could cause structural resonance	73%	8 votes
	The signal is more compact in the frequency domain	18%	2 votes
	It is easier to add signals in the frequency domain	9%	1 vote

13. The continuous Fourier transform applies to

9 correct answers
out of 9 respondents

✓	any type of signal	100%	9 votes
	periodic signals only	0%	0 votes
	harmonic signals only	0%	0 votes
	it depends on the type of excitation of the system	0%	0 votes

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

5 correct answers
out of 9 respondents

	a cosine function	0%	0 votes
	a sine function	11%	1 vote
✓	a sinc function	56%	5 votes
	a complex function which cannot be computed analytically	33%	3 votes

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

0 correct answer
out of 9 respondents

✓	allows to extract the information about the natural frequency	22%	2 votes
	cannot be computed analytically	0%	0 votes
✓	is the transfer function X(w)/F(w)	78%	7 votes

16. Convolution in the time domain corresponds to

7 correct answers
out of 7 respondents

✓	multiplication in the frequency domain	100%	7 votes
	convolution in the frequency domain	0%	0 votes
	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

3 correct answers
out of 7 respondents

	Discrete and periodic	43%	3 votes
✓	Continuous and periodic	43%	3 votes
	Discrete with the same number of samples as the original signal	14%	1 vote

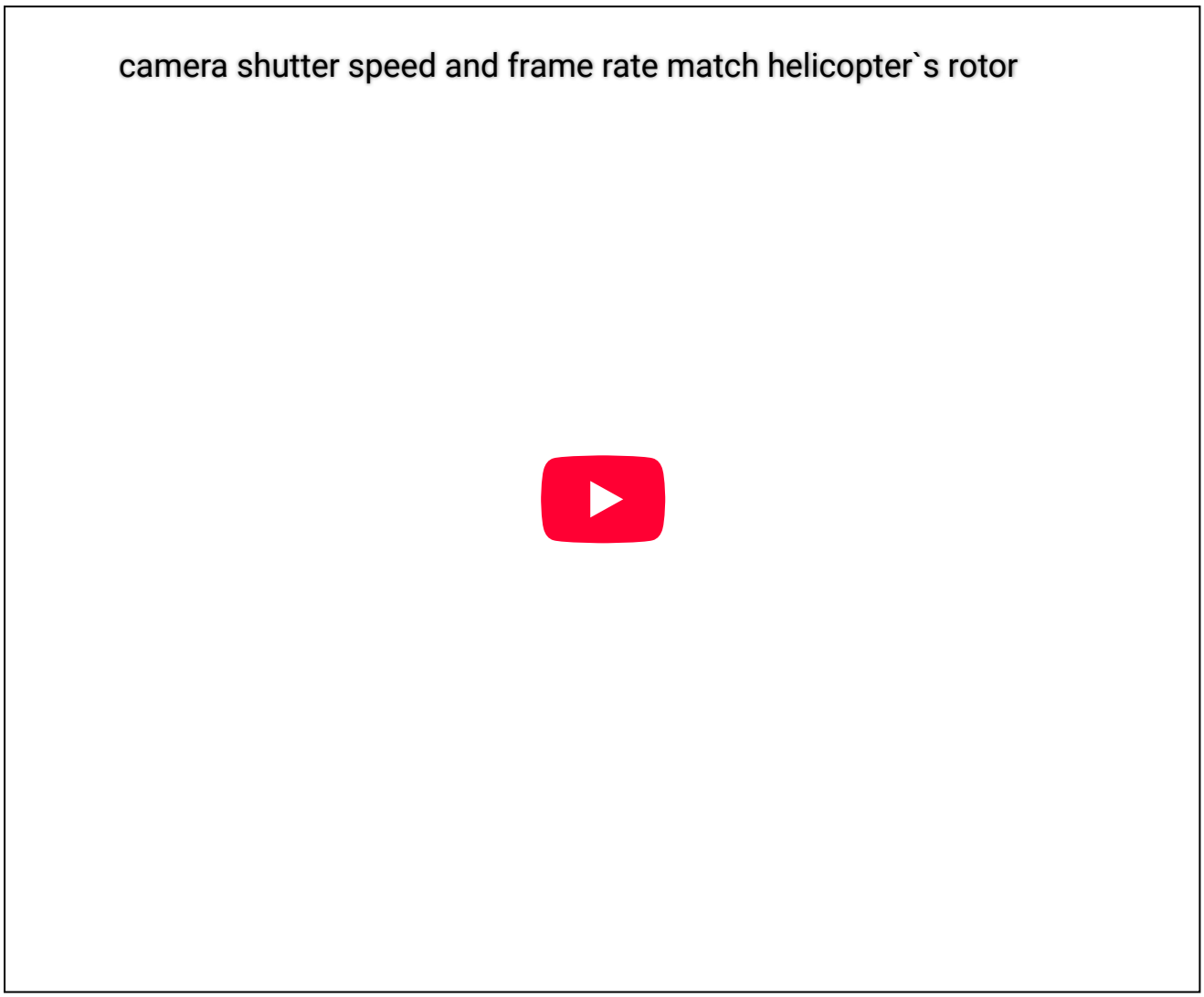
18. Aliasing happens when

0 correct answer
out of 0 respondent

	The sampling frequency is too high with respect to the frequency content of the signal	0%	0 votes
✓	The sampling frequency is too low with respect to the frequency content of the signal	0%	0 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

1 correct answer
out of 3 respondents

	decreasing the time step of the sampling signal, keeping the total measurement time constant	67%	2 votes
	increasing the time step of the sampling signal, keeping the total measurement time constant	0%	0 votes
✓	increasing the measurement time, whatever the time step of the sampling signal	33%	1 vote

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

0 correct answer
out of 0 respondent

	The frequency resolution of the DFT	0%	0 votes
✓	The maximum frequency of the DFT	0%	0 votes
	It has no influence on the DFT	0%	0 votes

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

4 correct answers
out of 9 respondents

	200 Hz	33%	3 votes
✓	100 Hz	44%	4 votes
	It depends on the length of the measurement	22%	2 votes