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COURSE NAME:
(Acoustics)

Assignment Title:
(Acoustics Assignment)

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Introduction

This course will present the essential signal processing and acoustical modeling associated with audio systems used in broadcasting, communications, music recording, and video Foley production. Topics covered: details of digital waveform compression processes and formats; digital signal processing for audio filters, modulation, filters, compressors, harmonizers, and reverberation special effects; digital audio workstations; the history and types of microphones and guitar pickups; amplifier design types, including digital, transistor, and vacuum tube amplifier designs; and loudspeaker system design including measurements and cross-over design for vented and sealed cabinets. This course is well design for working in the audio industry by supporting practical applications of acoustics theory to audio-related applications but it will not address electrical design of devices such as amplifiers or transducers. However, it will explain the differences and common uses of devices and processes in audio engineering.

Multiple choice questions

1. Standing waves are produced in 10m long stretched string. If the string vibrates in 5 segments and wave velocity is 20m/s, its frequency is?

a) 2Hz

b) 4Hz

c) 5Hz

d) 10Hz

Answer: C

2. If vibrations of a string are to be increased by a factor 2, tension in the string must be made

a) Half

b) Twice

c) Four times

d) Eight times

Answer: C

3. The tension in the piano wire is 10N. What should be the tension in the wire to produce a note of double the frequency?

a) 5N

b) 20N

c) 40N

d) 80N

Answer: C

4. A string in a musical instrument is 50cm long and its fundamental frequency is 800Hz. If a frequency of 1000Hz is to be produced, then required length of string is?

a) 62.5cm

b) 50cm

c) 40cm

d) 37.5cm

Answer: C

5. The frequency of a tuning fork is 256. It will not resonate with a fork of frequency?

a) 256

b) 512

c) 738

d) 768

Answer: C

6. An organ pipe closed at one end has a fundamental frequency of 1500Hz. The maximum number of overtones generated by this pipe, which a normal person can hear is?

a) 12

b) 9

c) 6

d) 4

Answer: C

7. A tube closed at one end containing air produces a fundamental note of frequency 512Hz. If the tube is open at both ends, the fundamental frequency will be _____

a) 256Hz

b) 768Hz

c) 1024Hz

d) 1280Hz

Answer: C

8. A closed organ pipe and an open pipe of the same length produce four beats per second when sounded together. If the length of the closed pipe is increased, then the number of beats will _____

a) Increase

b) Decrease

c) Remain the same

d) First decrease then remain the same

Answer: A

9. At resonance air column of length 20cm resonates with a tuning fork of frequency 450Hz. Ignoring end correction, the velocity of sound in air is?

a) 720m/s

b) 820m/s

c) 920m/s

d) 360m/s

Answer: D

10. Statement: Sound wave cannot propagate through a vacuum but light can

Reason: Sound wave cannot be polarised but light can

a) Both statement and reason are true and the reason is the correct explanation of the statement

b) Both statement and reason are true but the reason is not the correct explanation of the statement

c) Statement is true but the reason is false

d) Both statement and reason are false

Answer: B

11. If fundamental frequency is 50 and the next successive frequencies are 150 and 250, then it is _____

a) A pipe closed at both ends

b) A pipe closed at one end

c) An open pipe

d) A stretched string

Answer: B

12. A stone thrown into still water creates a circular wave pattern moving radially outwards. If r is the distance measured from the centre to the pattern, the amplitude of the wave varies as _____

a) $r^{(-1/2)}$

b) $r^{(-1)}$

c) $r^{(-3/2)}$

d) $r^{(-2)}$

Answer: A

13. A siren emitting sound of frequency 800Hz is going away from a static listener with a speed of 30m/s. Frequency of the sound to be heard by the listener is (Take velocity of sound as 330m/s).

a) 733.3Hz

b) 644.8Hz

c) 481.2Hz

d) 286.5Hz

Answer: A

14. An observer standing by the side of a road hears the siren of an ambulance, which is moving away from him. If the actual frequency of the siren is 2000Hz, then the frequency heard by the observer will be _____

a) 1990Hz

b) 2000Hz

c) 2100Hz

d) 4000Hz

Answer: A

15. Statement: Sound wave cannot propagate fastest in solids.

Reason: Sound wave can propagate slightly in vacuum.

a) Both statement and reason are true and the reason is the correct explanation of the statement

b) Both statement and reason are true but the reason is not the correct explanation of the statement

c) Statement is true but the reason is false

d) Both statement and reason are false

Answer: C

16. With the propagation of a longitudinal wave through a material medium, the quantities transmitted in the propagation direction are _____

a) Energy, momentum and mass

b) Energy

c) Energy and mass

d) Energy and linear momentum

Answer: B

17. Which of the following statements is true?

a) Both light and sound waves can travel in the vacuum

b) Both light and sound waves in air are transverse

c) The sound waves in air are longitudinal while the light waves are transverse

d) Both light and sound waves in air are longitudinal

Answer: C

18. The velocity of sound in any gas depends upon _____

a) Wavelength of sound only

b) Density and elasticity of gas

c) Intensity of sound waves only

d) Amplitude and frequency of sound

Answer: B

19. A 5.5 metre length of string has a mass of 0.035kg. If the tension in the string in 77N, the speed of a wave on the string is?

a) 110m/s

b) 165m/s

c) 77m/s

d) 102m/s

Answer: A

20. Standing waves are produced in 10m long stretched string. If the string vibrates in 5 segments and wave velocity in 20m/s, the frequency is?

a) 5Hz

b) 10Hz

c) 2Hz

d) 4Hz

Answer: A

Conclusion

Topics focused on the mechanisms of sound production by stringed instruments (plucked, struck and bowed), percussion (drums, marimba) brass winds (lip reed, cylindrical bore, conical bore), woodwinds (flutes, single-reed, double reed). Related topics will include radiation properties, damping mechanisms, impedance measurements, and the coupling between acoustics and structural components, ethnic variations on classical instruments were discussed. An understanding of the fundamentals of acoustics and vibration was assumed as prerequisite for the course. Aero acoustics is concerned with how noise is generated by the movement of air, for instance via turbulence, and how sound propagates through the fluid air. Aero acoustics plays an important role in understanding how noise is generated by aircraft and wind turbines, as well as exploring how wind instruments work

Bibliography

- World Health Organisation (2011). Burden of disease from environmental noise (PDF). WHO. ISBN 978-92-890-0229-5.
- ^ Barron, Michael (2009). Auditorium Acoustics and Architectural Design. Taylor & Francis. ISBN 978-0419245100.