UNIT 2.

DOPPLER EFFECT MCQs

1.An increase or decrease in the frequency of sound, light, or other waves as the source and observer move towards or away from each other is known as?
a. Doppler effect
b. Photoelectric effect
c. Hall effect
d. Butterfly effect

ANS-a

2.Doppler effect is observed in which type of waves?
a. longitudinal waves
b. transverse waves
c. both of these
d. none of these

ANS-c

3.What is the use of Doppler effect?

a. astronomy
b. sirens
c. radar
d . all of these

ANS-d

4.There is a source that is moving towards an observer that is stationary with a speed of 10m/s. Given the source has a frequency of 10Hz what do you think will be the wavelength of sound that is heard by the observer. Also, the speed of sound = 330m/s.
a.30m
b.36m
c.33m
d.32m

ANS-d

5.Doppler shift in frequency is independent of
a. Velocity of the observer
b. Velocity of the source
c. The distance from the source to the listener
d. The frequency of the wave

ANS-c

6.What type of wave is affected by the Doppler effect

a. Water wave
b. Sound wave
c. Radio wave
d. Ultraviolet wave

ANS-b

7.In the Doppler effect, blue shift and red shift refer to which type of wave
a. Sound
b. Water
c. Light
d. Radio wave

ANS-c

8.State what will happen to the speed of sound when the source of sound moves towards an
observer
a. Remains the same
b. Decreases
c. Increases
d. Depends on what speed the source is moving

ANS-a

9, According to Doppler effect, which of the following changes apparently ?
a. loudness
b. pitch
c. amplitude
d. velocity

ANS-b

10.The Doppler effect is applicable for
a. Light waves only
b. Sound waves only
c. Both light and sound waves
d. None of the above

ANS-c

11.Doppler's effect will not be applicable when the velocity of sound source is
a. Less than the velocity of sound
b. Greater than the velocity of sound
c. Zero
d. None of the above

ANS-b

12.In Doppler Effect when the source is moving towards a observer at rest, the correct equation is:

$$f' = f\left(\frac{v}{v + v_s}\right)$$

a.

$$f' = f\left(\frac{v}{v - v_s}\right)$$

b.

$$f' = f\left(\frac{v + v_s}{v - v_s}\right)$$

c.

d.None of the above

ANS-b

13.In which of the following cases a listener experiences Doppler effect?
a. The listener and the source of sound are stationary
b. The listener and source of sound are moving with same velocity
c. The listener is moving towards the source of sound
d. None of the above

ANS-c

14.How does the frequency and wavelength of a wave source change when it moves away from an observer?
a. The wavelength decreases whilst the frequency increases
b. The wavelength increases whilst the frequency decreases
c. The wavelength decreases and the frequency decreases
d. The wavelength increases and the frequency increases

ANS-b

15.If a police car is travelling away from an observer and its siren is on, how will the wavelength be different to when the car is moving towards the observer?
a. Shorter
b. Longer
c. The same
d. Impossible to tell

ANS-b

16.If a police car is travelling towards an observer and its siren is on, will the frequency of the siren be higher, lower or the same as when the car is moving away from the observer?
a. Lower
b .Higher
c. The same
d. Impossible to tell

ANS-b

17. **You are jogging on the sidewalk at a rate of** 3ms**. A police car behind you is patrolling at a rate of** 4ms **when it turns on its siren. If the siren has a frequency of** 10000Hz**, is the frequency you perceive higher or lower than the frequency emitted?**
Possible Answers:

a. Neither higher nor lower because the doppler effect only affects sounds at lower frequencies

b. Lower because the overall distance between you and the siren is increasing

c. Higher because the overall distance between you and the siren is decreasing

d. Higher because the siren is traveling the same direction as you

e. Lower because you are running slower than the police car

ANS-c.Higher because the overall distance between you and the siren is decreasing

18. **The source of a sound moves away from the listener. The listener has the impression that the source is _____ .**
Possible Answers:

a. higher in tone

b. lower in velocity

c. higher in amplitude

d. lower in pitch

ans d. lower in pitch

19. **A sound source with a frequency of 790Hz moves away from a stationary observer at a rate of 15m/s. What frequency does the observer hear?**

The speed of sound is 340m/s.

a.775Hz

b.655Hz

c.757Hz

d.826Hz

ans :c

Explanation:

In this scenario the Doppler effect is described by the following equation.

$$fo = fs\frac{(v + vo)}{(v + vs)}$$

Using the values from the problem, we know that v_o is zero and v_f is 15m/s. v is 340m/s and f_s is 790Hz.

$$fo = 790Hz\frac{(340m/s + 0m/s)}{(340m/s + 15m/s)} = 757Hz$$

20. . A source of sound moving toward the stationary observer at 20 m/s. The frequency of the source of the sound = 380 Hz. The speed of the sound waves in air = 400 m s⁻¹. What is the frequency of the sound waves heard by the observer?
Known :
The speed of the source of the sound (v_{source}) = 20 m/s
The speed of observer (v_p) = 0
The frequency of the source of the sound (f) = 380 Hz
The speed of the source of the sound waves (v) = 400 m s⁻¹
Wanted: The frequency of the sound waves heard by the observer

$$f' = f\left(\frac{v + v_{obs}}{v - v_{source}}\right) = 380\left(\frac{400 + 0}{400 - 20}\right) = 380\left(\frac{400}{380}\right) = 400\, hz$$

21. A train with a frequency 'f'. What will be the frequency heard by a person sitting in the train? Speed of the train is 'v'.

a) f

b) f(330+v)/330

c) fv/(330-v)

d) fv/(330+v)

Answer: a

Explanation: There is no relative motion between the source and observer, thus the frequency heard by the person will be the original frequency of the whistle.

22. A source moves towards a stationary observer with a speed of 10m/s. If the frequency of the source is 10Hz what will be the wavelength of sound heard by the observer? Speed of sound = 330m/s.

a) 32m

b) 34m

c) 33m

d) 31m

Answer: a

Explanation: Apparent frequency F = f(330+v0)/(330-vs)

= 10(330)/(330-10) = 10.31Hz.

Wavelength = 330/F

= 330/10.31

= 32.007m = 32m.

23. . If both the source of sound and observer are moving, the apparent frequency will be different from the actual frequency. True or False?

a) True

b) False

Answer: b

Explanation: If relative motion between source and observer is zero there will be no change in frequency heard by the observer. Apparent frequency only varies in case of relative motion. So the given statement is false.