

## 2<sup>nd</sup> Make Up Test 2020. 05. 19.

1. A piano string having a mass per unit length equal to  $1.25 \cdot 10^{-3}$  kg/m is under a tension of 1350 N. Find the speed of a wave traveling on this string.

- a. 1320 m/s      b. 780 m/s      c. 1040 m/s      d. 520 m/s      e. none of them

2. The sound level at a distance of 2.00 m from a source is 140 dB. At what distance will the sound level be 100 dB ?

- a. 3,40 m      b. 20 m      c. 30 m      d. 200 m      e. none of them

3. A train is moving parallel to a highway with a constant speed of 20.0 m/s. A car is traveling in the same direction as the train with a speed of 40.0 m/s. The car horn sounds at a frequency of 510 Hz, and the train whistle sounds at a frequency of 400 Hz. When the car is behind the train, what frequency does an occupant of the car observe for the train whistle? ( $v_s = 340$  m/s.)

- a. 480 Hz      b. 422 Hz      c. 420 Hz      d. 375 Hz dB      e. none of them

4. A 1.20-kg iron horseshoe initially at  $600$  °C is dropped into a bucket containing 20.0 kg of water at  $25.0$  °C. What is the final temperature? (Ignore the heat capacity of the container, and assume that a negligible amount of water boils away.)  $c_{\text{iron}} = 450$  [SI]

- a.  $78,4$  °C      b.  $40,4$  °C      c.  $323,3$  °C      d.  $28,71$  °C      e. none of them

5. Two pulses traveling on the same string are described by

$$y_1 = \frac{5}{(3x - 4t)^2 + 2} \qquad y_2 = \frac{-5}{(3x + 4t - 4)^2 + 2}$$

At what point do the two pulses always cancel?

- a.  $x = 2$  m      b.  $x = 0,66$  m      c.  $x = 4$  m      d.  $x = 2$  m      e. none of them

6. Just 36.00 g of water is placed in a 5.00-L pressure cooker and heated to  $427$  °C. What is the pressure inside the container?

- a. 2,83 atm      b. 35,25 atm      c. 23,27 atm      d. 2,5 atm      e. none of them

7. Standing at a crosswalk, you hear a frequency of 720 Hz from the siren of an approaching ambulance. After the ambulance passes, the observed frequency of the siren is 642 Hz. Determine the ambulance's speed from these observations. (Use  $v = 340$  m/s.)

- a. 75 km/h      b. 56 km/h      c. 83 km/h      d. 72 km/h      e. none of them

8. A water hose 2.50 cm in diameter is used by a gardener to fill a 30.0-L bucket. The gardener notes that it takes 1.00 min to fill the bucket. A nozzle with an opening of cross-

sectional area  $0.500 \text{ cm}^2$  is then attached to the hose. The nozzle is held so that water is projected horizontally from a point  $1.00 \text{ m}$  above the ground. Over what horizontal distance can the water be projected?

- a.  $6,86 \text{ m}$       b.  $8,85 \text{ m}$       c.  $4,52 \text{ m}$       d.  $3,12 \text{ m}$       e. none of them

9. A student holds a tuning fork oscillating at  $400 \text{ Hz}$ . He walks toward a wall at a constant speed of  $2 \text{ m/s}$ . (a) What beat frequency does he observe between the tuning fork and its echo? (Use  $v = 340 \text{ m/s}$ .)

- a.  $9,47 \text{ Hz}$       b.  $2,08 \text{ Hz}$       c.  $2,35 \text{ Hz}$       d.  $4,73 \text{ Hz}$       e. none of them

10. A copper wire and a lead wire are joined together, end to end. The compound wire has an effective coefficient of linear expansion of  $20.0 \times 10^{-6} (1/^\circ\text{C})$  ! What fraction of the length of the compound wire is copper?

- a.  $0,35$       b.  $0,14$       c.  $0,45$       d.  $0,75$       e. none of them

11. A  $2.00\text{-mol}$  sample of hydrogen gas is heated at constant pressure from  $300 \text{ K}$  to  $600 \text{ K}$ . Calculate the work done on the gas.

- a.  $3576 \text{ J}$       b.  $12415 \text{ J}$       c.  $4986 \text{ J}$       d.  $7479 \text{ J}$       e. none of them

12. Water is filled to a height  $2 \text{ m}$  behind a dam of width  $20 \text{ m}$ . Determine the resultant force exerted by the water on the dam.

- a.  $4,4 \times 10^6 \text{ N}$       b.  $4,00 \times 10^5 \text{ N}$       c.  $10^5 \text{ N}$       d.  $2 \times 10^4 \text{ N}$       e. none of them

13. What must be the contact area between a suction cup (completely exhausted) and a ceiling if the cup is to support the weight of an  $80.0\text{-kg}$  student?

- a.  $7,74 \times 10^{-3} \text{ m}^2$       b.  $598,4 \text{ cm}^2$       c.  $17,06 \text{ cm}^2$       d.  $0,589 \text{ m}^2$       e. none of them

14. A piece of aluminum with mass  $0.50 \text{ kg}$  and density  $2700 \text{ kg/m}^3$  is suspended from a string and then completely immersed in a container of water. Calculate the tension in the string after the metal is immersed.

- a.  $3,08 \text{ N}$       b.  $6,16 \text{ N}$       c.  $5.00 \text{ N}$       d.  $4,13 \text{ N}$       e. none of them

15. A refrigerator has a coefficient of performance equal to  $3.00$ . The refrigerator takes in  $153 \text{ J}$  of energy from a cold reservoir in each cycle. Find the energy expelled to the hot reservoir in each cycle!

- a.  $459 \text{ J}$       b.  $102 \text{ J}$       c.  $204 \text{ J}$       d.  $51 \text{ J}$       e. none of them

16. A sinusoidal wave is traveling along a rope. The oscillator that generates the wave completes  $70.0$  vibrations in  $20.0 \text{ s}$ . Also, a given maximum travels  $450 \text{ cm}$  along the rope in  $10.0 \text{ s}$ . What is the wavelength?

- a.  $0,128 \text{ m}$       b.  $1,575 \text{ m}$       c.  $0,533 \text{ m}$       d.  $0,023 \text{ m}$       e. none of them

17. A large storage tank, open at the top and filled with water, develops a small hole in its side at a point 20.0 m below the water level. If the rate of flow from the leak is equal to  $1.00 \cdot 10^{-3} \text{ m}^3/\text{min}$ , determine the speed at which the water leaves the hole.

- a. 16,2 m/s      b. 19,8 m/s      c. 8,0 m/s      d. 15,5 m/s      e. none of them

18. A wave is described by  $y = (0.15 \text{ m}) \sin(0.4x - 50t)$ , where  $x$  is in meters, and  $t$  is in seconds. Determine the speed of the wave.

- a. 7,5 m/s      b. 375 m/s      c. 20 m/s      d. 125 m/s      e. none of them

19. How much energy is required to change a 25.0-g ice cube from ice at  $-10.0^\circ\text{C}$  to steam at  $110^\circ\text{C}$ ?

- a.  $7,6 \cdot 10^4 \text{ J}$       b.  $1,22 \cdot 10^5 \text{ J}$       c.  $1,02 \cdot 10^5 \text{ J}$       d.  $5,7 \cdot 10^4 \text{ J}$       e. none of them

20. A cube of wood having an edge dimension of 8.0 cm and a density of  $650 \text{ kg/m}^3$  floats on water. What is the distance from the horizontal top surface of the cube to the water level?

- a. 6,5 cm      b. 1,25 cm      c. 2,80 cm      d. 3,50 cm      e. none of them