

**PART A: MULTIPLE CHOICE (10 MARKS)**

Choose the best response in each case and place your answer in the appropriate space on your answer sheet.

- The particles of the medium are in periodic motion parallel to the direction of propagation of the energy. Which of the following terms is defined by the statement above?
  - longitudinal
  - torsional
  - transverse
  - none of the above
- The period of an ideal pendulum depends on:
  - the length of the pendulum only.
  - the amplitude of the swing only.
  - the mass of the bob only.
  - both the amplitude and the mass.
- A simple pendulum of length 50 cm vibrates with an amplitude of 4.0 cm. In three cycles, the pendulum bob moves:
  - 8.0 cm
  - 16 cm
  - 32 cm
  - 48 cm
- A transverse wave has an amplitude of 0.9 m. What is the vertical distance between the top of the crest and the bottom of the trough?
  - 0.9 m
  - 1.2 m
  - 1.8 m
  - 2.4 m
- For a transverse wave, one wavelength can be measured:
  - from one crest to the next.
  - from one trough to the next.
  - from the beginning of one crest to the end of the adjacent trough.
  - all of the above.
- Calculate the wavelength of an earthquake wave if its frequency is 1.4 Hz and its speed is 3.8 km/s.
  - 2.4 km
  - 2.7 km
  - 3.1 km
  - 5.2 km
- A sound wave has a wavelength 0.800 m and a speed of 0.36 km/s. The frequency of the sound wave is:
  - 900 Hz
  - 450 Hz
  - 0.90 Hz
  - 0.45 Hz
- As the frequency of a source decreases, the wavelength of a periodic transverse wave:
  - increases, but the speed of the wave remains constant.
  - increases, and the speed of the wave increases.
  - decreases, but the speed of the wave remains constant.
  - decreases, and the speed of the wave decreases.
- When a crest travelling in one direction on a rope meets a crest travelling in the opposite direction, the result is:
  - a standing wave.
  - a loop.
  - constructive interference.
  - destructive interference.
- Waves of wavelength 24 cm and amplitude 3.0 cm are used to create a standing wave. The distance from one node to the next in the pattern is:
  - 3.0 cm
  - 6.0 cm
  - 12 cm
  - 24 cm

**PART B: MATCH (5 MARKS)**

Match the definition from the 1<sup>st</sup> column to the best term in the 2<sup>nd</sup> column and place the matching letter in the appropriate space on your answer sheet.

- |   |                    |
|---|--------------------|
| 1. Transfer of energy from one object to another having the same natural frequency.                         | A) amplitude       |
| 2. The distance between adjacent points on a wave that are in phase.  | B) antinode        |
| 3. Transfer of energy over a distance in the form of a disturbance.   | C) frequency       |
| 4. Motion that occurs when the vibration, or oscillation, of an object is repeated in equal time intervals. | D) node            |
| 5. The number of seconds per cycle.   | E) period          |
|   | F) periodic motion |
|   | G) resonance       |
|   | H) standing wave   |
|   | I) wave            |
|   | J) wavelength      |

**PART A: MULTIPLE CHOICE (10 MARKS)**

1	2	3	4	5	6	7	8	9	10
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**PART B: MATCH (5 MARKS)**

1	2	3	4	5
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**PART C: SHORT ANSWER (25 MARKS)**

Answer the following questions in the space provided.

{8} 1. Complete the following table.

	Speed (m/s)	Frequency (Hz)	Period (s)	Wavelength (m)
a			$1.5 \times 10^5$	3000
b	$4.0 \times 10^7$			$2.5 \times 10^3$
c	850	25		
d			0.050	125

{13} 2. Match the lettered components with their correct label. Not all the items listed below will be used!

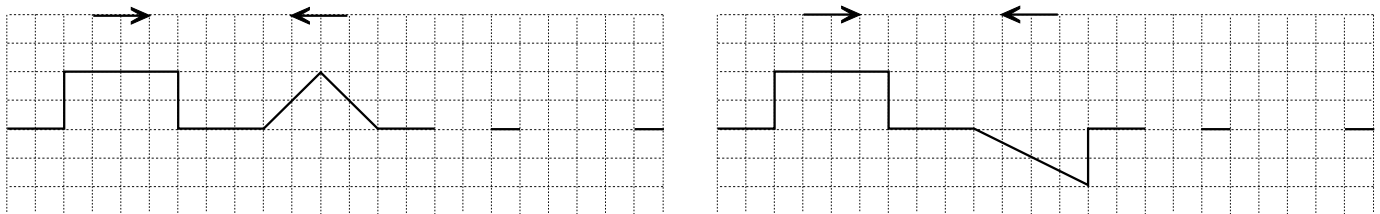
**Title: A**

**Title: E**

**Title: K**

\_\_\_ amplitude      \_\_\_ crest (not B)      \_\_\_ longitudinal wave      \_\_\_ rest axis      \_\_\_ transverse wave  
 \_\_\_ antinode (not G)      \_\_\_ fixed end      \_\_\_ node      \_\_\_ standing wave      \_\_\_ trough  
 \_\_\_ compression      \_\_\_ free end      \_\_\_ rarefaction      \_\_\_ torsional wave      \_\_\_ wavelength

{4} 3. Use the principle of superposition to determine the resulting pulse when the pulses shown interfere with each other. (The point of overlap would be at the horizontal midpoints of the pulses.)



**PART D: PROBLEMS (20 MARKS)**

Answer the following questions on a separate sheet of paper. You may use the back of this sheet if you wish.

- {5} 1. The tine of a tuning fork, when struck, has an amplitude of 0.25 cm. If the frequency of the fork is 150 Hz, what total distance will the tine travel in 1.00 min? (Hint: 1<sup>st</sup> determine how far the tine moves for 1 cycle.)
- {7} 2. The wavelength of a water wave is 4.4 m and its period is 1.5 s. Calculate (a) the speed of the wave, (b) the time required for the wave to travel 100 m, and (c) the distance travelled by the wave in 1.00 min.
- {3} 3. Sketch a diagram (including measurements) of a standing wave pattern on an 12 m rope with four antinodes between the ends. What is the wavelength of the waves that produced the pattern?
- {5} 4. The speed of a wave on a 6.0 m rope is 3.2 m/s. What frequency of vibration is needed to produce a standing wave pattern with three antinodes?