b. In a resonance tube experiment, the first and the second resonance positions were observed at 17cm and 52.6 cm respectively. The frequency of tuning fork is 512Hz and the temperature was 27^oC. Calculate the velocity of sound in air at 0^oC. Calculate the end correction of the tube. [**347.7m/s, 0.8cm**] 3

c. A uniform tube, $60cm$ long stands vertically with its lower end dipping into water. When the length above water is $14.8cm$, and again when it is $48cm$, the tube resounds to a vibrating tuning fork of frequency 512Hz. Find the lowest frequency to which the tube will resound when it is open at both ends. [**267Hz**] 3

d. A cylindrical pipe of length 28cm closed at one end is found to be at resonance when tuning fork of frequency 864Hz is sounded near the open end. Calculate the end correction when the speed of sound is 340m/s. [$\mathbf{1.5cm}$] 2

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7. a. An organ pipe is tuned to a frequency of 440Hz when the temperature is 27^oC. Find its frequency when the temperature drops to 0^oC. Assume both ends of the pipe open. [**419.7Hz**] 2

b. One day when the speed of sound 340m/s, the fundamental frequency of close organ pipe is 220Hz. The second overtone of this pipe has the same wavelength as third harmonic of an open pipe. How long is the open pipe? [**0.31m]** 2

c. If one end of the open organ pipe is closed, how will the fundamental frequency change? 2

d. The sound produced by open pipe is more sonorous than that by close organ pipe. Why? 2

e. What is resonance tube apparatus, open end or close end pipe? If oil is used instead of water in resonance tube, how does the frequency change? 2

f. Why tuning fork has two prongs? What type of wave is generated in steam and prongs of the fork? 2

Day 4: Transverse wave in string **Date: ……..**

8. a. What type of wave is generated in a stretched string when plucked? 1

b. Obtain an expression for velocity of transverse wave in a stretched string. If the tension on the string is increased 4 times, how would the velocity of wave through it change? 3

c. Discuss various modes of vibration in a stretched string and hence write the expression fir the frequency of n^{th} mode. 3

d. What happens to the frequency of vibration of a string under tension if,

i. Thickness of the string is doubled? 1

ii. Tension on the string is doubled? 1

e. Calculate the velocity of a transverse wave travelling in a copper wire of radius $1mm$ stretched under a load of $1.4Kg$. (Density of copper= $8.8gm/cm^3$). [**22.4m/s**] 2

f. A stretched string emits a fundamental note of $256Hz$. Keeping the stretching force constant and reducing the length of the wire by $10cm$, the frequency becomes $320Hz$. Calculate the original length of the wire. [$\mathbf{500cm}$] 3

Day 5: Transverse wave in string **Date: ……..**

9. a. State and explain the laws of vibration on stretched string. Sketch necessary graphs. 2

b. A guitar consists of several strings of different thickness. Why it is made so? Explain. 2

c. A string $1.5m$ long is made of steel (density $7.7 \times 10^3\ Kg/m^3$ and Young's modulus $2 \times 10^{11} Pa$). It is maintained at a tension that it produces a strain of 1% in the string. What is the fundamental frequency of the transverse vibration of the string? 2

d. A steel wire of length $40cm$ and diameter $0.25mm$ vibrates transversely in unison with a tube, open at each end and of effective length $60cm$, when each is sounding its fundamental note. The air