



RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

BSc in Applied Sciences

First Year- Semester I Examination–May 2022

PHY 1102 – WAVES AND VIBRATIONS

Time: One (01) hour

Answer TWO questions only.

Symbols have their usual meaning.

1. a) State the “Principle of superposition of waves”. (10 marks)
- b) Consider the following two Simple Harmonic Motions (SHMs) acting in the same straight line with same angular frequency (ω) but with different amplitudes (a & b) and different initial phase angles (α and β).

$$y = a \sin (\omega t + \alpha)$$

$$y = b \sin (\omega t + \beta)$$

Show that the resultant of the above two SHMs is also a SHM. (20 marks)

(Hint: $\sin (A+B) = \sin A \cos B + \cos A \sin B$)

- c) Draw the corresponding Amplitude – Phase diagram for the above case and hence determine the amplitude and the initial phase angle of the resultant SHM.

(20 marks)

2. a) What is "Doppler Effect in sound"? (05 marks)
- b) A siren is fitted on a car moving towards a vertical wall at a speed of 36 km/hour. An observer standing on the ground behind the car listens to the siren sound directly coming from the source (car) as well as that coming after reflection from the wall. Calculate the apparent frequencies (as heard by the observer) of the two sounds. Take the speed of sound in air to be 340 m/second. (20 marks)
- c) What is "Redshift and Blueshift" in Astronomy? (15 marks)
- d) Explain how the Doppler Effect in light is used to determine the relative speeds of distant galaxies. (10 marks)
3. Write **short notes** on the following
- a) Lissajous figures. (12 marks)
- b) Kundt's tube apparatus. (12 marks)
- c) Standing waves. (12 marks)
- d) "Helmholtz resonators" used in architectural acoustics. (14 marks)

- End -