RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Applied Sciences

First Year - Semester I Examination - September / October 2019

PHY 1102 – WAVES AND VIBRATIONS

Time: One (01) hour

Answer **two** questions only.

1. a) What are "Lissajous figures"? **(10 marks)**

b) The logo of the Australian Broadcasting Corporation (ABC) takes the form of a Lissajous figure. The parametric equations that describe the logo are;

$y = \cos 3\omega t$,

$x = \sin \omega t$.

Use a graphical method to construct the logo of the ABC. **(40 marks)**

2. Radar speed guns are used by the police to perform speed measurements of vehicles. Radar speed guns, like other types of radar, consist of a radio transmitter and a receiver. They send out a radio signal in a narrow beam, and then receive the same signal back after it bounces off the moving vehicle.

Derive the following equation for the radar speed gun.

$$f_2 = [(v + u) / (v - u)]\, f_1,$$

where f_1 - frequency of the sent radio signal v - sound velocity in air

f_2 – frequency of the received radio signal u - velocity of the vehicle.

(50 marks)

3. Write **short notes** on the following:

a) Critically damped systems, **(12 marks)**

b) Huygen's principle, **(13 marks)**

c) Wave equation, **(12 marks)**

d) Periodic motion. **(13 marks)**

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