UNIVERSITY OF GHANA
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FIRST SEMESTER EXAMINATIONS: **2012/ 2013**

LEVEL **100**: BACHELOR OF SCIENCE IN ENGINEERING

FAEN 109: **GENERAL PHYSICS** (3 Credits)

Total Marks: **100**. Time allocation: $2\frac{1}{2}$ Hours

Attempt all questions.

1. (a) A particle moves back and forth along the x axis between the points x = 0.20 m and x = - 0.20 m. The period of the motion is 1.2 s, and it is simple harmonic. At the time t = 0, the particle is at x = 0 and its velocity is positive.

(i) Calculate the

(α) angular frequency of the motion

(β) amplitude of the motion

(γ) phase constant

(ii) At what time will the particle reach the point:

(α) x = 0.20 m

(β) x = - 0.10 m **[8 marks]**

(b) Suppose that a particle of mass 0.24 kg acted upon by a spring undergoes simple harmonic motion with same parameters in (a)

(i) What is the total energy of this motion?
(ii) At what time is the kinetic energy equal to the potential energy?

[6 marks]

(c) A mass m hangs vertically from a spring constant k. Taking **gravity** into account, **show** that the **equation of motion** of this system is :

$$x = x' + \frac{mg}{k}$$

Where $$x' = A\cos(\omega t + \delta)$$

and x' is the displacement without gravity and all the symbols have their usual meaning.

[6 marks]