SCHOOL OF SCIENCE

DEPARTMENT OF PHYSICS

HARMATTAN SEMESTER TEST SESSION: **2013/2014**

GENERAL PHYSICS 1: PHY 101 DATE: 09/04/2014

TIME ALLOWED: 45 min

Surname:_____ Other names: _____

Reg Number: _____ Department: _____

ATTEMPT ALL QUESTIONS

INSTRUCTIONS: Show All Working, Each question carries equal mark, Take g = 10 ms^{-2}

1) a) Suppose that the acceleration "a" of a particle moving with uniform speed "v" in a circle of radius "r" is given as: $a = Kr^n v^m$, where k is a dimensionless constant. Determine the value of n and m.

b) Given two vectors A= 2i + 5j + 10k and B = 8i - 3j - 15k. Calculate A.B and the angle between A and B.

c) A ball is dropped from a height of 45m above the ground. The velocity of the ball just before it strikes the ground is _ ? ans pg 23

2. a) A stone of mass 2g is projected with an initial velocity of 30ms^{-1} at an angle 30^0 with the horizontal . if the stone comes back to the same level at projection, find the total time of flight. ans pg 53

bi) From Newon's law of motion, a force of 1 Newton is defined as: ans pg 60

iii) state two laws of friction. ans pg 60

c) A block of mass M=50kg is pulled up an inclined plane by means of a force F=600N as shown below. A friction force F_s = 20N acts between the block and the surface of the inclined plane as the block is being pulled. If α and θ are 30° and 60° respectively, what is the acceleration of the block? ans pg 60

2012/2013 TEST

1. The speed, v of an object is given by the equation, $v = At^3 - Bt$, where t refers to time. What are the dimensions of A and B. ans pg 3

2. If A = 5i + 4j – 3k and B = -2i + 5j – 3k. Find 3A – 4B. ans pg 12

3. If A = 7i – 3j + 2k and B = 4i + 5j – 3k. Find the angle between A and B. ans pg 12

4. You are driving home from school steadily at 95km/h for 130km. It then begins to rain and you slow down to 65km/h. You arrive home after driving 3 hours and 20 minutes. How far is your hometown from school? ans pg 24

5. A car travelling 90km/h decelerates uniformly at 18m/s^2. Calculate the distance it travels before it stops. ans pg 26

6. A missile was projected to hit a target 500m away. If the velocity of projection is 100m/s calculate the angle of projection. ans pg 53

7. A ball is thrown vertically upwards from the ground with a speed of 24.4m/s. At what time will the ball be 29m above the ground? ans pg 26

8. What average net force is required to bring a 1500kg car to rest from a speed of 100km/h within a distance of 55m? ans pg 60

9. a) what is frictional force?
b) write down three ways of reducing friction ans pg 61

10. A block rests on an inclined plane surface. The angle of inclination is increased until it reaches critical angle θ_c after which the block begins to slide. Make a sketch of the system and identify all the forces acting on the block. ans pg 61