ILARA MOKIN, ONDO STATE
FACULTY OF BASIC AND APPLIED SCIENCES
DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCES
2017/2018 FIRST SEMESTER EXAMINATIONS

HOD's SIGNATURE

COURSE TITLE: GENERAL PHYSICS 1 COURSE CODE: PHY 101

DURATION: 2 HOURS

Matriculation Number: _____TOTAL MARKS: 60

INSTRUCTIONS:

1. Write your matriculation number in the space provided above and also on the cover page of the exam booklet.
2. This question paper consists of 2 pages with printing on both sides.
3. Answer all questions in the examination booklet provided.
4. More marks are awarded for problem solving method used to solving problems than for the final numerical answer.
5. Box your final answers.
6. **Attempt any 2 questions in each SECTION.**

SECIION A

1(a)(i) Mention two important applications of dimension analysis.

(ii) The period of oscillation T of a simple pendulum depends on l, the length of the string m, the mass of the bob and g,the acceleration due to gravity. Using dimension analysis derive the equation for the period of a simple pendulum.

(b)(i) Differentiate clearly between acceleration and retardation.

(ii) A car moving with a velocity of $48km/hr$ accelerates uniformly at the rate of $1.8ms^{-2}$ until its velocity is $72km/hr$ .Calculate the distance travelled.

2(a)(i) Differentiate between centripetal force and centrifugal force

(ii) A ball of radius $6.0cm$ rolls down an inclined plane from rest after $5.0s$,its angular velocity is $9.0ms^{-1}$ find (a) its angular acceleration (b) its linear velocity after $5.0s$.

(b) With aid of a well labelled diagram and appropriate equations of motion, derive the time of flight T, of a projectile motion. State its implication.

3(a) Given the three vectors $a = 2i - 3j + 4k$

$$b = i + 2j - 3k$$

$$c = -3i + 6j - 4k$$

Calculate (i) $(a + b)\ .c$

(ii) $(a \times b) \times c$

(iii) show whether or not the three vectors are co-planar.

(b) If $A = 9_{ax} - 3_{ay} + 5_{az}$ and

$B = 3_{ax} + 2_{ay}$

Find (i) the component of A along a_y

(ii) the magnitude of $3A - B$

(iii) a unit vector along $A + 2B$

SECIION B

4(a) Explain the following:

(i) Work -energy theorem

(ii)Elastic and Inelastic collision

(b)(i) A man exerts a steady force of magnitude $250N$ on a car as he pushes it a distance of $23m$ .The car also has a flat tire, so to make the car track straight the man push at an angle of 45^0 to the direction of the motion. How much work does the do?

(ii) in a helpful mood, the man pushes a second car with a steady force

$F = (130N)_i - (45N)_j$.The displacement of the car is $S = (18m)_i + (14m)_j$. How much work does the man do in this case?

5(a) Differentiate between impulse and linear momentum?

(b) Explain the following:

(i) Simple harmonic motion

(ii) Damped oscillations

(iii) Driven oscillations and resonance

(iv) Centre of mass

6(a) What is rotational dynamics?

(b)A marksman holds a riffle of a riffle of mass $M_R = 13kg$ loosely in his hand so as to let it recoil freely when fired. He fired a bullet of mass $M_B = 10g$ horizontally with a velocity relative to the ground of $V_{Rx} = 300m/s$.

(i) What is the recoil velocity V_{Rx} of the riffle?

(ii) what are the final momentum and kinetic energy of both the bullet and the riffle?