ELIZADE UNIVERSITY

ILARA-MOKIN

ONDO STATE

FACULTY: Basic and Applied Science
DEPARTMENT: Physical and Chemic
FIRST SEMESTER EXAMINATIONS
2018/2019 ACADEMIC SESSION

COURSE CODE: PHY 205

COURSE TITLE: CLASSICAL MECHANICS I

DURATION: 2 HOURS

HOD's SIGNATURE

TOTAL MARKS:

Matriculation Number: _____

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 3 of the 5 questions**

QUESTION 1

Object 1 of mass m_1 is initially moving with a speed $v_{1,0} = 3ms^{-1}$ and collides elastically with object 2 that has the same mass, $m_2 = m_1$, and is initially at rest. After the collision, object 1 moves with an unknown speed $v_{1,f}$ at an angle $\theta_{1,f} = 30^o$ with respect to its initial direction of motion and object 2 moves with an unknown speed $v_{2,f}$, at an unknown angle $\theta_{2,f}$. Find

(a) The final speed of each of the objects
(b) The unknown angle $\theta_{2,f}$

QUESTION 2

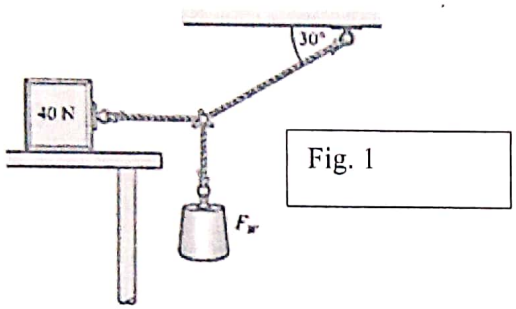

Fig. 1

The system in fig. 1 is in equilibrium. If the frictional force on the 40N block cannot exceed 12N, Find:

(a) The maximum value of F_w
(b) The coefficient of static friction between the block and the tabletop

QUESTION 3

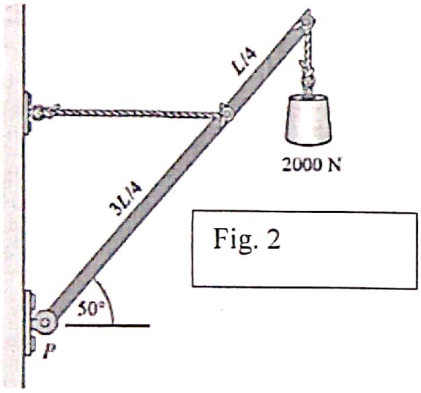

Fig. 2

A uniform 400N boom is supported as shown in fig. 2. Find

(a) The tension in the tie rope
(b) The force exerted on the boom by the pin at P

QUESTION 4

A simple pendulum consists of a mass m suspended from a fixed point by a weightless, extensionless rod of length l. Using the approximation of $\sin\theta \cong \theta$,

(a) Deduce the equation of motion of the pendulum
(b) Show that the natural frequency is $\omega_o = \sqrt{g/l}$, where g is the gravitational field strength.

QUESTION 5

A fish swimming in a horizontal plane has a velocity $v_0 = (4.0i + 1.0j)$ m/s at a point in the ocean whose position vector is $r_0 = (10.0i - 4.0j)$ m relative to a stationary rock at the shore. After the fish swims with constant acceleration for 20.0s, its velocity is $v = (20.0i - 5.0j)$ m/s.

(a) What is the magnitude and direction of the acceleration with respect to the field x axis?
(b) Where is the fish at t = 25s and in what direction is it moving?