UNIVERSITY OF ESWATINI

FACULTY OF SCIENCE AND ENGINEERING

DEPARTMENT OF PHYSICS

MAIN EXAMINATION 2019/2020

TITLE OF PAPER: MECHANICS

COURSE NUMBER: PHY211

TIME ALLOWED: THREE HOURS

INSTRUCTIONS: ANSWER ANY FOUR OUT OF FIVE QUESTIONS.

EACH QUESTION CARRIES 25 MARKS.

MARKS FOR EACH SECTION ARE IN THE RIGHT HAND MARGIN.

THIS PAPER HAS 6 PAGES INCLUDING THE COVER PAGE.

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QUESTION 5

(a) A uniform bar of mass M and length d is pivoted at one end. The bar is released from rest in a horizontal position and allowed to fall under constant gravitational acceleration. Consider this as a problem of pure rotation about the pivot point.

   (i) How much work does the contact force apply to the system as a function of angle?

   (5 marks)

   (ii) What is the angular speed of the bar as a function of g, d and θ?

   (5 marks)

   (iii) What is the angular acceleration of the bar as a function of g, d and θ?

   (5 marks)

   (iv) What are the vertical and horizontal forces the bar exerts on the pivot as a function of m, g and θ?

   (10 marks)