UNIVERSITY OF NAIROBI
DEPARTMENT OF PHYSICS

SPH 203: STRUCTURE & PROPERTIES OF MATTER
CAT **DATE: JUNE 13 2018**
TIME: TWO HOURS
ANSWER ALL QUESTIONS

QUESTION ONE

(a) One of the shortcomings of Rutherford's model of the atom was that according to the model, the atom would be radiative but it is not, explain why the model suggests so and why in actual sense the atom is not radiative. **(4 Marks)**

(b) Describe, in molecular terms, how energy transfer occurs in solids. (**2 Marks)**

(c) Give FOUR reasons why a metal is a better conductor of heat than a non-metal **(4 Marks)**

QUESTION TWO

(a) Describe how you would demonstrate Brownian motion of smoke particles in the air. Hence state and explain the observations. **(4 Marks)**

(b) Using the kinetic theory of gases, explain how gases exert pressure on the walls of its container. **(2 Marks)**

(c) Hence explain why the pressure exerted by a fixed mass of gas increases when its volume is reduced at constant temperature. **(2 Marks)**

QUESTION THREE

(a) State the set up of a thermocouple and describe how works. **(4 Marks)**

(b) Name with reasons ANY THREE material properties a jumbo jet wing section should possess **(6 Marks)**

QUESTION FOUR

(a) Of these three metals state with reasons why each corrodes or otherwise: Copper, Aluminum, Steel **(3 Marks)**

(b) Name any three methods that are used to control corrosion in metals. **(3 Marks)**

(c) Of the three in (b), explain with reasons how ANY TWO of them can be applied effectively on a newly constructed crude oil pipeline. **(4 Marks)**

QUESTION FIVE

(a) State three areas of application of composites and explain why they are used **(6 Marks)**

(b) Give two examples of fatigue failures in engineering **(2 Marks)**

(c) What steps can be taken in engineering design to decrease possibility of fatigue failures? **(2 Marks)**