



# MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST YEAR SECOND SEMESTER EXAMINATION FOR  
DIPLOMA IN FASHION, DESIGN AND GARMENT MAKING  
DIPLOMA IN ELECTRICAL ENGINEERING  
DIPLOMA IN CIVIL ENGINEERING  
2601/102/PH-PHYSICAL SCIENCE

DATE: 24/4/2019

TIME: 2.30-5.30 PM

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## INSTRUCTIONS TO CANDIDATES

*Answer question one and any other two*

*Illustrate your answers with suitable diagrams wherever necessary*

1. a) Define the following terms; (4 marks)
  - i. Base
  - ii. Radioactivity
- b) State two properties of acids and bases. (4 marks)
- c) Illustrate two types of bonds giving an example in each (4 marks)
- d) Discuss five factors affecting speed of sound (10 marks)
- e) Name three types of radioactivity particles and state two properties of each particle. (8 marks)
- 2 a) describe three methods of radiation detection (6 marks)
- b) Describe the properties and nature of radiation (4 marks)
- c) calculate the decay constant for a radioactive isotope with a half-life of 22.5 hrs. (4 marks)

- d) With an aid of a labeled diagram Explain the production and properties of X-ray (6 marks)
- 3 a) It is known that a load with a mass of 200g will stretch a by spring 10.0cm. The spring is then stretched to an additional 5.0cm and released. Find (10 marks)
- The spring constant
  - The period of vibration and frequency
  - The maximum acceleration
  - The velocity through equilibrium position
  - The equation of motion
- b) A butcher throws a cut beef on a spring scale which oscillates about the equilibrium position with a period of  $T=0.500s$ . The amplitude of the vibration is  $A=2.00cm$  (path length 4.00cm) Find; (10 marks)
- Frequency
  - The maximum acceleration
  - The minimum velocity
  - The acceleration when the displacement is 1.00cm
  - The velocity when the displacement is 1.00cm
  - The equation of motion as a function of time if the displacement is  $A$  at  $t=0$
4. a) When does a simple pendulum perform simple harmonic motion? (2 marks)
- b) With an aid of a labeled diagram describe the structure of an atom (8 marks)
- c) Describe the dispersion of light (10 marks)
5. a) Define the term heat (2 marks)
- b) Explain three modes of heat transfer giving an example in each (8 marks)
- c) Discuss kinetic theory of gases (10 marks)