



TECHNICAL UNIVERISTRY OF MOMBASA

# Faculty of Engineering & Technology

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

DIPLOMA IN ELECTRICAL & ELECTRONIC ENGINEERING (DEEE I)

**APS 2150: PHYSICAL SCIENCE FOR ENGINEERS**

END OF SEMESTER EXAMINATION

**SERIES: DECEMBER 2014**

**TIME: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

### Question One (Compulsory)

- a) Define the following terms as related to sound waves:
- (i) Pitch
  - (ii) Frequency
  - (iii) Intensity
  - (iv) Amplitude
- (4 marks)**
- b) With reference to sound wave:
- (i) Explain how they are produced and how they travel from one place to another.
  - (ii) Describe a longitudinal wave and tell how energy is transmitted along the wave
- (10 marks)**
- c) Explain (i) The terms and interrelationships of acoustics, reflected sound, reverberation and an echo.
- (6 marks)**
- (ii) Why are some gymnasiums unfit for public speaking?

### Question Two

- a) (i) Explain the TWO types of waves.
- (ii) Distinguish between amplitude and wavelength, speed and frequency.
- (8 marks)**
- b) A sound wave with a frequency of 300Hz has a wavelength of 1.5m with what speed would you expect this sound wave to move?
- (3 marks)**
- c) (i) With the aid of a simple diagram explain the difference between polarized and unpolarised waves.
- (ii) A lamp has a light output of 12W what will be the intensity of the light from the lamp at a distance of 3km from a sphere?
- (9 marks)**

### Question Three

- a) Define the following terms:
- (i) Nuclear fission
  - (ii) Nuclear fusion
  - (iii) Nuclear chain reaction
  - (iv) Enrichment
- (8 marks)**
- b) (i) What is Radio carbon dating
- (ii) Explain the process radiocarbon dating in detail
- (7 marks)**
- c) (i) Define half life of a source.
- (ii) Radium – 226 has half-life of 1600 of years. How much of a 40-gram sample of this nuclide should be left after 4800 years.
- (5 marks)**

### Question Four

- a) (i) Define simple harmonic motion.
- (ii) Diagrammatically, prove that if a is the projection of p on the diameter AB, the velocity of Q is
- $$w\sqrt{(a^2 - x^2)}$$
- given by
- (10 marks)**

- b) For a simple pendulum given a small angular displacement  $\theta$ , prove using a diagram that
- $$t_p = 2\pi\sqrt{l/g}$$
- (4 marks)**
- c) A piston of mass 0.4kg moves with S.H.M if the amplitude of the piston oscillation is 80mm and its frequency is 10Hz, calculate:
- (i) The maximum acceleration
  - (ii) The maximum velocity
  - (iii) The maximum kinetic energy
- (6 marks)**

### Question Five

- a) Define the following terms:
- (i) Heat
  - (ii) Temperature
  - (iii) Calorimetry
  - (iv) Radiation
- (6 marks)**
- b) (i) An aluminium of mass 0.6kg and specific heat capacity 0.8374 KJ/kgk contains 2kg of water at 293k. Determine the heat required to raise the temperature to 333K. Specific heat capacity of water = 4.187KJ/kgk
- (ii) Calculate the quantity of sensible heat given out by a block of copper mass of 20kg in cooling from 392k to 362k (specific heat capacity of copper is 0.389 KJ/kgk.
- c) (I) Define:
- (i) Electrolysis
  - (ii) Electrodes
  - (iii) Electrolyte
  - (iv) Electrochemical equivalent
- (3 marks)**
- (II) A current of 4.5A is passed for 1hr though a solution of copper sulphate. Calculate the mass of copper deposited. The electrochemical equivalent of copper is 0.329 mg/c
- (11 marks)**