



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ARCHITECTURE & BUILT ENVIRONMENT

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN ARCHITECTURE

EAR 2302: BUILDING ENVIRONMENT SCIENCE III

(ACOUSTIC DESIGN)

SPECIAL/SUPPLEMENTARY EXAMINATION

YEAR THREE SEMESTER ONE

SERIES: JULY 2025

TIME: 2 HOURS

DATE: JULY, 2025

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, calculator, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE (30 MARKS)-COMPULSORY

a) Define the following acoustic terminologies.

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|--------------------------|-----------|
| i. Sound. | (2 marks) |
| ii. Room Acoustics. | (2 marks) |
| iii. Reverberation time. | (2 marks) |
| iv. Sound Level meter. | (2 marks) |
| v. Background noise. | (2 marks) |

- b) Explain FIVE benefits of good architectural acoustic design. (15 marks)
- c) State the difference between an infrasound and an ultrasound. (2 marks)
- d) Describe TWO types of sound reflection. (3 marks)

QUESTION TWO (15 MARKS)

- a) Define Sound field system. (3 marks)
- b) A sound field system is used in classroom to improve the learning environment.
List FOUR other benefits of sound field reinforcements in classroom. (4 marks)
- c) For a sound field system to function efficiently proper sound system testing has to be undertaken. Describe FOUR methods of system testing. (8 marks)

QUESTION THREE (15 MARKS)

Building materials can affect the quality of acoustic comfort and careful consideration should be taken when selecting acoustic materials.

- a) Define the term Acoustic materials. (2 marks)
- b) List any THREE types of acoustic materials. (3 marks)
- c) Explain FIVE uses of good acoustic materials. (10 marks)

QUESTION FOUR (15 MARKS)

- a) Define the term noise control. (3 marks)
- b) Explain FOUR key strategies in noise control. (12 marks)

QUESTION FIVE (15 MARKS)

Sound measurement is a crucial part of acoustic research and determination of acoustic standards. Sound can be measured by the different properties of sound.

a) Speed of Sound (c) forms one of the vital property of sound that is taken into consideration when calculating sound measurements.

- i. Define the term speed of sound(c). (2 marks)
- ii. Using the formula $C = \sqrt{\gamma \times P_0 / \rho}$ calculate the following: Find the pressure if sound travels through a medium having a density 0.05Kpa and speed of sound is 400m/s. (Given $\gamma=1.4$) (3 marks)
- b) Explain FIVE major applications of sound measurement. (10 marks)