



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ARCHITECTURE & BUILT ENVIRONMENT

UNIVERSITY EXAMINATION FOR:
BACHELOR OF ARCHITECTURAL STUDIES
EAR 4308: BUILDING ENVIRONMENT SCIENCE III
(ACOUSTIC DESIGN)

SPECIAL & SUPPLEMENTARY EXAMINATION
YEAR THREE SEMESTER II

SERIES: JULY 2025

TIME: 2 HOURS

DATE: Pick Date JULY 2025

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, 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.
 - i. Reverberation time (2 marks)
 - ii. Attenuation (2 marks)
 - iii. Echo (2 marks)
 - iv. Sound Level meter (2 marks)
 - v. Background noise (2 marks)

- b) Outline the roles of the following parts of the human ear. (10 marks)
 - i. The ear drum (2 marks)

- ii. The pinna. (2 marks)
 - iii. Auditory nerve. (2 marks)
 - iv. Ear canal. (2 marks)
 - v. Cochlea. (2 marks)
- c) Acoustic materials play a vital role in the establishment of acoustic comfort in buildings. Describes FIVE examples of acoustic materials. (10 marks)

QUESTION TWO (20 MARKS)

- a) Define acoustic comfort. (4 marks)
- b) Room acoustic design is an integral part of a music recording studio. With the aid of well annotated sketches explain FOUR key design principles to consider when designing a music studio. (16 marks)

QUESTION THREE (20 MARKS)

- a) Describe the following terminologies used to define the nature of propagation of sound waves.
 - i. Plane wave (2 marks)
 - ii. Diverging wave (2 marks)
 - iii. Spherical wave (2 marks)
 - iv. Progressive wave (2 marks)
 - v. Standing wave (2 marks)
- b) One of the characteristics of sound in a free field is sound divergence. With the aid of a well annotated sketch explain. (10 marks)

QUESTION FOUR (20 MARKS)

Sound reinforcement systems play an important role in aiding sound transmission in public and private spaces. Explain FIVE key requirements of a sound reinforcement system.

QUESTION FIVE (20 MARKS)

Sound measurement is a technical aspect of acoustic design. Explain FIVE major applications of sound measurement.