



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of Building & Civil engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4422 : INTRODUCTION TO EARTHQUAKE ENGINEERING

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2024

TIME: 2 HOURS

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 (COMPULSORY) (30 Marks)

- (i) Assuming that a seismograph located 1200 km from the epicentre of an earthquake, records a maximum ground displacement of 15.6 mm from surface waves having a period of 20 seconds, determine the surface wave magnitude considering that the circumference of the earth is taken as 4.0×10^7 m. (15 Marks)
- (ii) Clearly discuss at three passive earthquake control systems that are currently used in reducing the intensity of earthquakes. (15 Marks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- (i) Briefly discuss the following types of seismic waves;
 - a) Shear waves (5 Marks)
 - b) Love and Rayleigh waves (5 Marks)
- (ii) Clearly describe the working principle of a seismograph as used in recording occurrence earthquakes. (10 Marks)

QUESTION THREE (20 Marks)

- (i) Using clear illustrations, differentiate the following earthquake clusters;
 - a) Aftershocks (3 Marks)
 - b) Earthquake swarms (3 Marks)
 - c) Earthquake storms (3 Marks)
- (ii) Clearly differentiate between active earthquake control systems and hybrid seismic control systems. (11 Marks)

QUESTION FOUR (20 Marks)

- (i) Using clear illustrations, discuss any five effects of earthquakes once they occur. (15 Mark)
- (ii) List any five causes of earthquake occurrences. (5 Marks)

QUESTION FIVE (20 Marks)

Based on tall reinforced concrete structures clearly discuss how the seismic performance of the building may be carried out using different methods.