



TECHNICAL UNIVERSITY OF MOMBASA
**Faculty of Engineering &
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DECREE IN:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE)

ECE 2408: THEORY OF STRUCTURES V

END OF SEMESTER EXAMINATION

SERIES: APRIL 2015

TIME ALLOWED: 3 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Pocket Calculator*

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

Maximum marks for each part of a question are as shown

Use neat, large and well labeled diagrams where required

This paper consists of **THREE** printed pages

Question One (Compulsory)

- a) With clear illustrations, discuss the **THREE** fundamental relationships necessary for analysis of structures **(9 marks)**
- b) The structure shown in figure Q1 (b) consists of three springs and supported at nodes A and D. If axial loads of 4KN and 18KN are applied at nodes B and C respectively. Determine the displacement at nodes B and C and the reactions at A and D **(13 marks)**

- c) A simple plane truss is made of two identical bars = (with E , A and L constant) and loaded as shown in figure Q1 (c), find:
- (i) Displacement of node 2 **(4 marks)**
 - (ii) Stress in each bar **(4 marks)**

Question Two

Analyze the continuous beam shown in figure Q2 using the matrix method. Assume that the supports are unyielding and the EI is constant for all members **(20 marks)**

Question Three

- a) Discuss any four classes of framed structures that may be utilized in construction **(8 marks)**
- b) Find the stresses in the two bar assembly which is loaded with force P and constrained at the two ends as shown in figure Q3(b) **(12 marks)**

Question Four

- a) With clear illustrations, compare and contrast the following structural analysis methods:

- (i) Classical versus matrix methods (4 marks)
- (ii) Matrix versus finite element methods (4 marks)
- b) For the spring system shown in figure Q4(d), find the global stiffness matrix (12 marks)

Question Five

Analyze the truss shown in figure Q5 and evaluate the reactions at the supports. Assume EA to be constant for all the members.