



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

BACHELOR OF ENGINEERING IN BUILDING & CIVIL ENGINEERING
(BEBC)

[Institutional Based Programmes]

EBC 4404: FOUNDATION ENGINEERING II

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2012

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 **TWO** printed pages

Question One (30 marks)

- a) Finite element method is critical stability analysis of structures. Outline using illustrations the fundamental concept of equilibrium relating to this method. **(8 marks)**
- b) Outline **FOUR** limitations of the finite element method. **(6 marks)**
- c) Discuss concept of finite element theory as applied to structure using illustrations where appropriate. **(6 marks)**
- d) A horizontal structural element is subjected to an axial force and an elastic spring of uniform stiffness.
- Develop an elemental stiffness matrix for the structure.
 - Explain the terms used in the matrix
 - Comment on the perception of the matrix
- Assume: An axial force = "p"
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Stiffness for the elastic spring = t (10 marks)

Question Two (20 marks)

A fixed uniform beam pcp is 6m long. The beam is loaded with a 5KN concentrated had 2m from the support at P. Determine:

- a) Modal displacement (8 marks)
- b) Moment of the beam (12 marks)

Question Three (20 marks)

Figure 1 shows a supported truss. Determine forces in the members. (20 marks)

C

Question Four (20 marks)

A prismatic beam is as shown in figure 2. Flexural rigidity of the beam is EI constant. Analyze the beam using the flexibility method. (20 marks)

P

Question Five (20 marks)

An axially loaded structural member PQ has an overall length 'L'. It is subjected to an axial force F_p at end P and F_q at end Q. The cross sectional area and modulus of elasticity for the member are "C" and "D" respectively.

- a) Derive an expression for:
Force F_p and F_q expressing them in matrix form. (15 marks)

b) Explain all the terms used in the matrix obtained in (a)

(5 marks)