



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 2205: THEORY OF STRUCTURES I

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) The diagram shown in figure 1(a) is the shear force diagram in metric units for a beam which rests on two supports, one being at the left hand end. Deduce directly from the shear force diagram:
- (i) Loading on the beam
 - (ii) Bending moment at 2m intervals along the beam
 - (iii) Position of the second support
 - (iv) Position and value of maximum bending moment **(8 marks)**
- b) From the principles of bending moment, in loaded beams, show that the maximum bending moment for a gradually loaded simply supported beam is given by:

$$M_x = \frac{w/x}{6} - \frac{wx^3}{6l}$$

(8 marks)

- c) Using the method of Tension coefficient, analyze the simple truss shown in figure 2c and hence draw the force diagram. **(8 marks)**

- d) Figure 1(d) shows a system of coplanar forces acting at a point. Determine the resultant force using the method of resolution of forces **(6 marks)**

Question Two

Figure 2 shows a roof truss supported at the ends and loaded as shown. Using any analytical method, analyze the truss giving the nature of forces and hence draw the force diagram. Members CG and GE are redundant

Question Three

a) Figure 3a is a beam loaded as shown. Analyze the beam and draw the bending moment and shear force diagrams.

b)

0078

Figure 3b shows a bridge truss loaded as shown. Using the method of section, determine the magnitude and nature of members EF, EG, ED and HJ

c) List applications of the following types of joints in structures:
(i) Fixed joint
(ii) Rollers
(iii) Pinned joints

Question Four

A beam of length 10m carries a uniformly distributed load of 1KN/m. The beam is supported on the two supports 6m apart. Find the position of the supports so that the bending moment on the beam is as small as possible. Also draw the shear force and bending moment diagrams **(20 marks)**

Question Five

a) Define the following terms as used in statics:

(i) Statics

(ii) Indeterminate structures

(iii) Plane truss

(iv) Analysis

(2 marks)

b) Using the method of tension coefficient analyze the trusses shown in figure e5(b) and hence draw the force diagram. **(18 marks)**