THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

University Examination 2010

SECOND YEAR/FIRST SEMESTER EXAMINATION
FOR THE DEGREE IN BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2205: THEORY OF STRUCTURES I

SERIES: APRIL/MAY 2010   **TIME:** 2 HOURS

Instructions:

You should have the following for this examination:
- Answer booklet
- Mathematical table/pocket calculator

Question **ONE** is Compulsory. Answer any other **TWO** questions from the remaining FOUR questions.

QUESTION ONE

(a)   The solution to a problem of statically determinate structure involves the setting up of equilibrium equations. Summarize the **THREE** basic steps to follow in formulating equations from which unknowns can be determined.   (5 marks)

(b)   In determining the unknowns of a statically determinate structure, it is necessary to know the material properties of the structure, true or false? Explain.   (3 marks)

(c)   Two smooth circular cylinders of W=500N and radius r=200mm are connected at their centres by a string AB of length L=600mm and rest upon a horizontal plane, supporting above them a third cylinder of weight Q=1000N and radius r=300m Figure 2. Find the force S in the string AB and the reactions produced on the floor at the points of contact D and E.   (10 marks)

(d)   What is a statically determinate structural form in analysis of structures.   (4 marks)

(e)   Determine the degree of statical indeterminacy for each of the
        structures shown in figure 1(a)-1(c).   ((9 marks)

QUESTION TWO

For the beam shown in figure 8, determine the support reactions and hence
draw the shear force diagram (SFD), bending moment diagram (BMD) and
axial force diagram.   (20 marks)

QUESTION THREE

A truss of 12m span is loaded as shown in figure 3. Find the force in the
members AB, AE and BE of the truss by method of joints.   (20 marks)

QUESTION FOUR

Construct the bending moment and shearing force diagrams for the beam
shown in figure 4.   (20 marks)

QUESTION FIVE

The frame structure shown in figure 5 has hinges at A, D and F. Determine
the components of the reactions at supports A and F and hence sketch the
deflected shape, shear force diagram (SFD) and bending moment diagram.(20 marks)