



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2205: THEORY OF STRUCTURES I

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY/MARCH 2012

TIME: 3 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 clearly shown

This paper consists of **FOUR** printed pages

Question 1

- 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 unknown can be determined (5 marks)
- b) In determining the unknowns of a statically determine structure, it is necessary to know the material properties of the structure, true or false? Explain (3 marks)
- c) Two smooth circular cylinders of $W = 500\text{N}$ and radius $r = 200\text{mm}$ are connected at their centres by a string AB of length $L = 600\text{mm}$ and rest upon a horizontal plane, supporting above them a third cylinder of weight $Q = 1000\text{N}$ and radius $r = 300\text{m}$. Figure 1 (c). Find the force S in the string AB and the reactions produced on the floor at the points of contact D and E. (9 marks)

- d) What is a statically determinate structural form in analysis of structures. (4 marks)
- e) Determine the degree of static indeterminacy for each of the structures shown in figure Q 1 e (i) – (iii) (9 marks)

Question 2

- a) The frame structures shown in figure 2 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 (BMB) (20 marks)

Question 3

- a) For the frame structure shown in figure 3, determine the reactions at A and B and sketch the quantitative shear force diagram (SFD) bending moment diagram (BMD) as well as the deflected shape due to the loading shown. (20 marks)

Question 4

The compound truss shown in figure 4 consists of two simple trusses ABC and DEF that are linked together by three bars AF, ED and CD. Determine the bar force in these members (20 marks)

Question 5

Find the reactions at the fixed end of the cantilever loaded as shown in figure 5. Draw the shear force diagram (SFD) and bending moment diagrams (BMD) (20 marks)