THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING

BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING

EME 4201 ENGINEERING MECHANICS I –STATICS

SUPPLEMENTARY EXAMINATIONS

YEAR II SEMESTER I EXAMS

SERIES OCTOBER 2011

TIME 2HRS

INSTRUCTION TO CANDIDATES

You should have the following for this examination

- Drawing instruments
- Scientific Calculator

This paper consists of **FIVE** questions in, question **ONE** is compulsory,

Answer question **ONE** and any other **TWO** question,

Maximum marks for each part of a question are as shown.

Question 1

a) State the following:
   i. Newton's laws of motion

(3 marks)

   ii. Newton's law of gravitational attraction

(1 mark)

b) Determine the magnitude an direction of F1 in figure 1 required to keep the concurrent force system in equilibrium

(12 marks)

c) Using the method of sections, determine the force in members CD and CM of the bridge truss in figure 2 and determine whether the members are in tension or compression. Also determine all zero force members.

(14 marks)

Question 2

a) Resolve the force F1,in figure 3 into components acting along the *u* and *v* axes, determine the magnitude of the components.

(5 marks)

b) Determine the maximum weight W of the block that can be suspended in the position shown in figure 4, if each cord can suspend a maximum tension of 80 N. Determine also the angle Θ for equilibrium.

(15 marks)

Question 3

Determine the force in each member of the truss in figure 5 and determine whether the members are in tension or compression. Set P= 8 KN

(20 marks)

Question 4

Draw the shear and bending moment diagrams for the beam in figure 6:

i. In terms of the parameters shown
ii. Set Mo= 500 Nm, L=8m

(20 marks)

Question 5

a) State the two theorems of Pappus and Guldinus.

(2 marks)

b) Each of the members of the frame in figure 7 has a mass per unit length of 6 kg/m. locate the position (*x, y*) of the centre of gravity. Also determine the reactions at the pin A and roller B.

(18 marks)

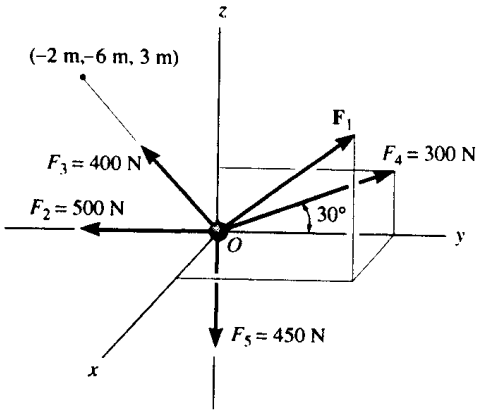

Figure 1

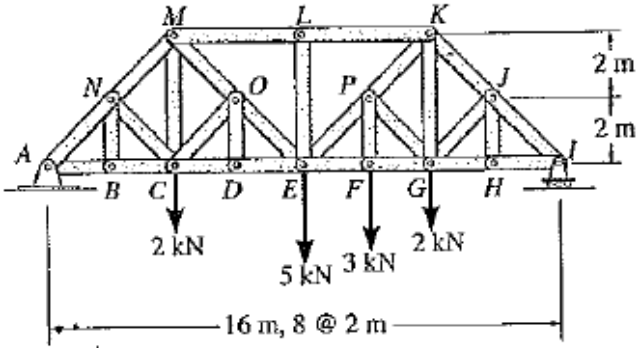

Figure 2

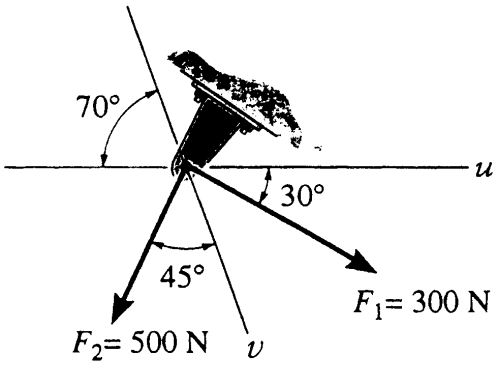

Figure 3

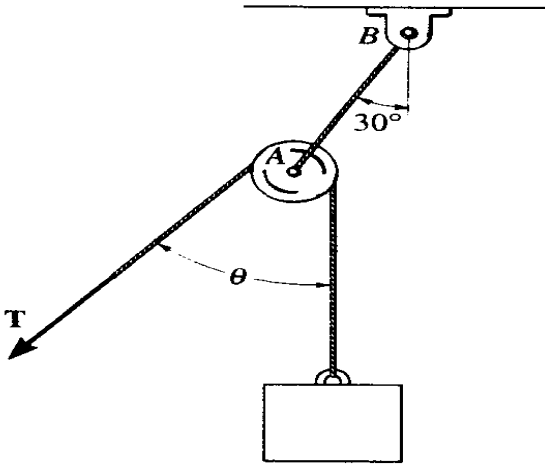

Figure 4

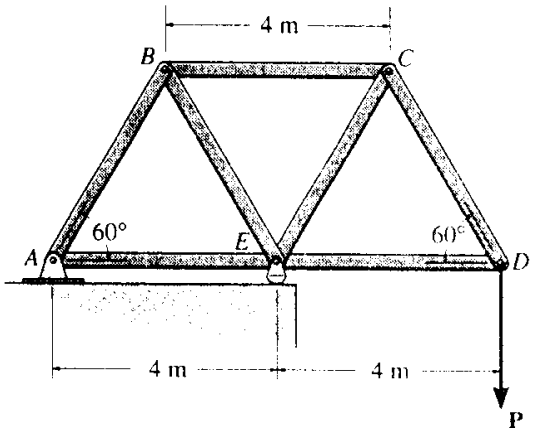

Figure 5

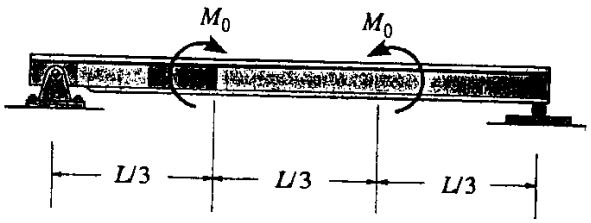

figure 6

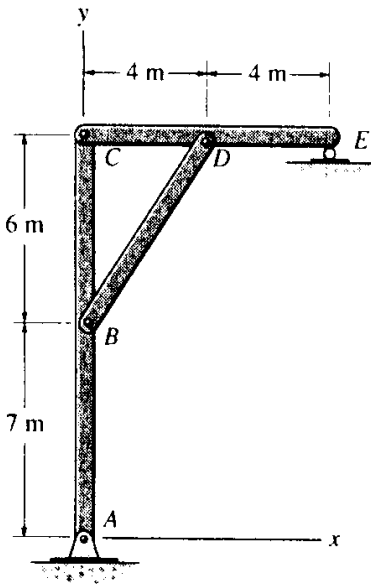

Figure 7