# TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

**UNIVERSITY EXAMINATION FOR:**

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2205: THEORY OF STRUCTURES I

END OF SEMESTER EXAMINATION

**SERIES:** DECEMBER 2016

**TIME:** 2 HOURS

**DATE:** 15 Dec 2016

**Instructions to Candidates**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

*-Drawing instruments.*

This paper consists of five questions.

Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

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

1. a) What is a free body in analysis of structures. (3 Marks )

b) Determine the degree of statically indeterminacy for each of the structures shown in figures 1(a)-1(c) (12 Marks)

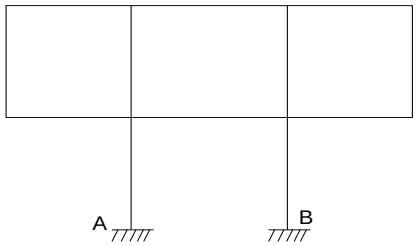


Figure 1 (a)

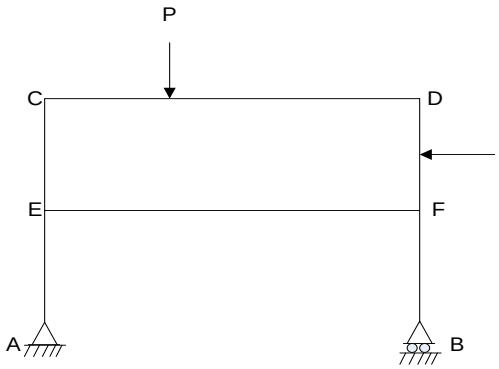


Figure 1 (b)

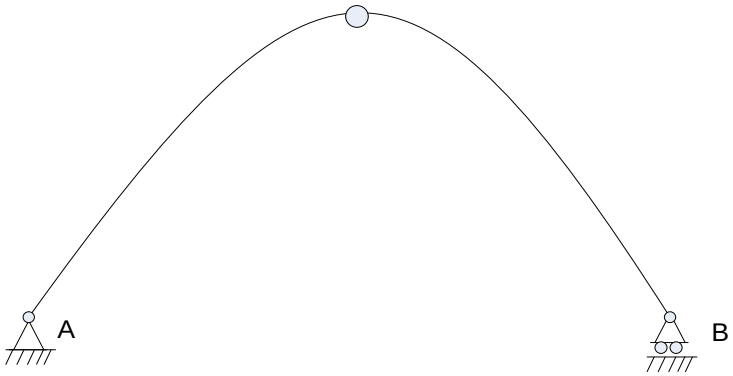


Figure 1 (c)

c). Explain how one can inspect for geometric instability in trusses

(3Marks)

d).Show that maximum shear is given by WL/2 and Maximum moment is given by $WL^2/8$ in a straight beam with a uniformly distributed load. (12 Marks)

2. Draw the shear force diagram (SFD) and bending moment diagram (BMD) for the beam loaded as shown in Figure 2. Clearly mark the position of the maximum bending moment and determine its value. ( 20 Marks)

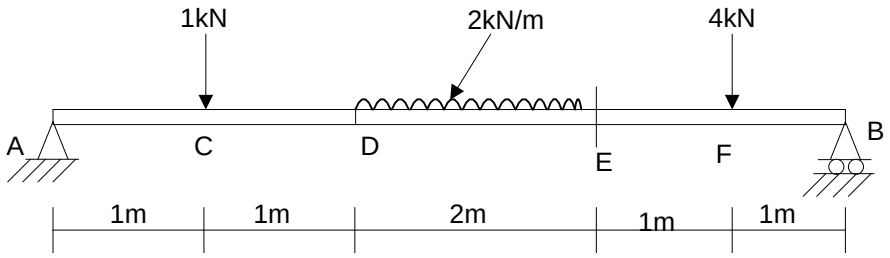


**Figure 2**

3 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)

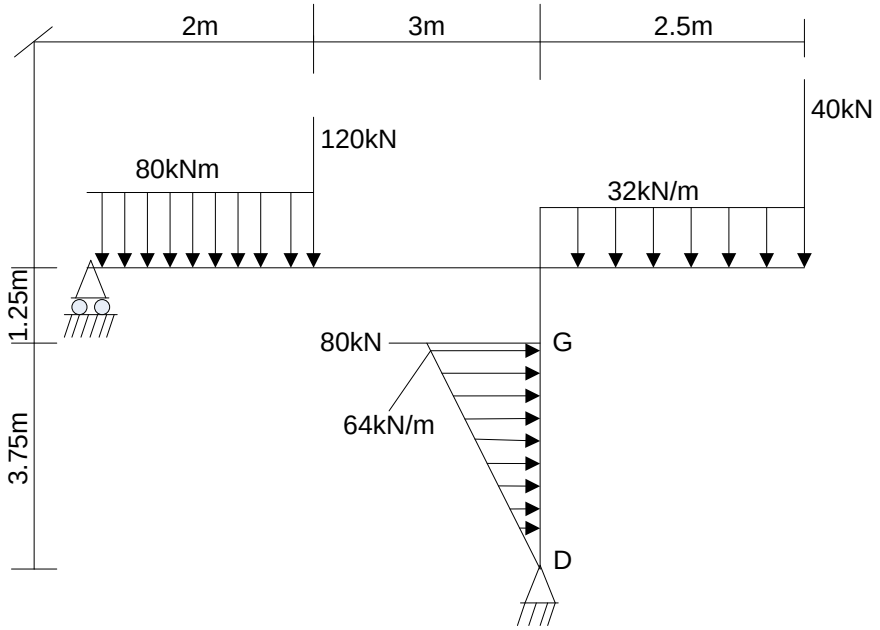


**Figure3**

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 forces in these members.

(20 Marks)

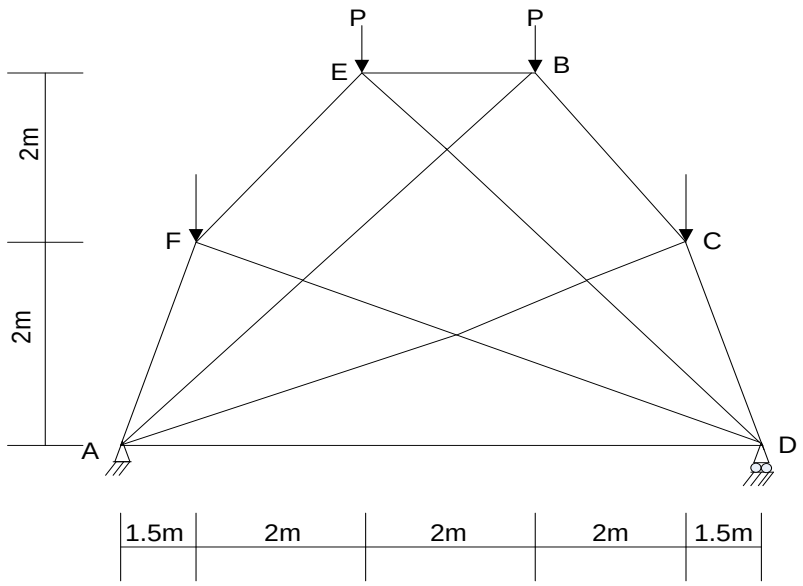


**Figure 4**

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)

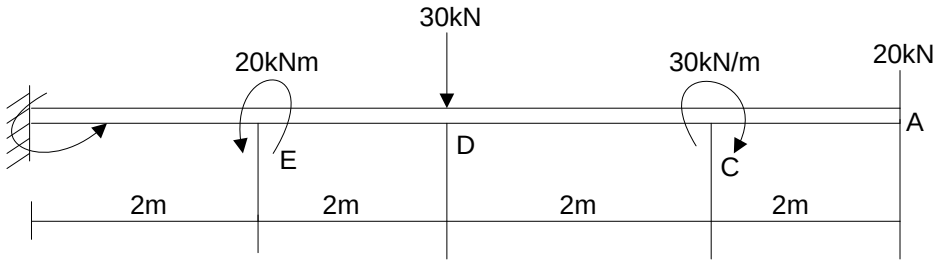


**Figure 5**