UNIVERSITY OF GHANA

SCHOOL OF ENGINEERING SCIENCES

FIRST SEMESTER EXAMINATIONS: 2017/2018
LEVEL 100: BACHELOR OF SCIENCE IN ENGINEERING

FAEN 103: BASIC MECHANICS I (3 Credits)

INSTRUCTION: *ANSWER ALL QUESTIONS*
TIME ALLOWED: TWO AND HALF (2½) HOURS

1. a) Explain the following:

i. Particle
i. Rigid body
ii. Principle of transmissibility **(6 marks)**

b)

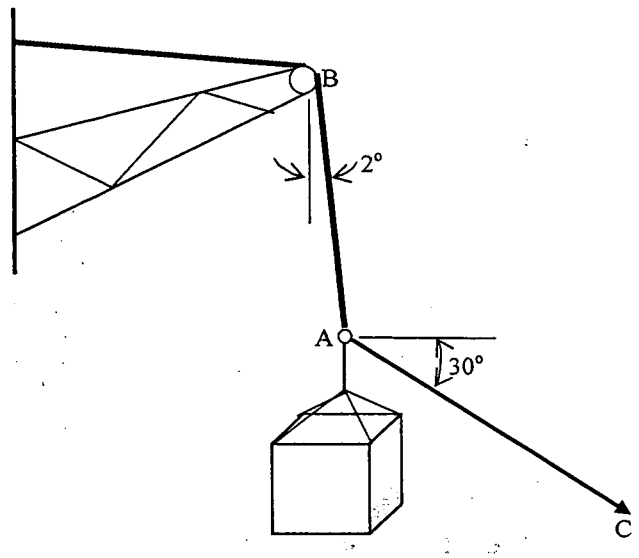

Figure 1

A 3500 N crate is being unloaded unto a truck by a crane (Figure 1). The rope AC is tied to the cable AB at point A and pulled in order to position the crate on the truck. If the cable AB makes an angle of 2° with the vertical and the rope AC also makes an angle of 30° with the horizontal, what will be the tension in AC?

(15 marks)

2. a) When are two forces equivalent? **(6 marks)**

b) The beam is subjected to the forces shown (Figure 2). Neglecting the reactions at the supports, reduce the given system of forces to:

a. An equivalent force-couple system at *A*
b. An equivalent force-couple system at *B*
c. A single force or resultant.

(15 marks)

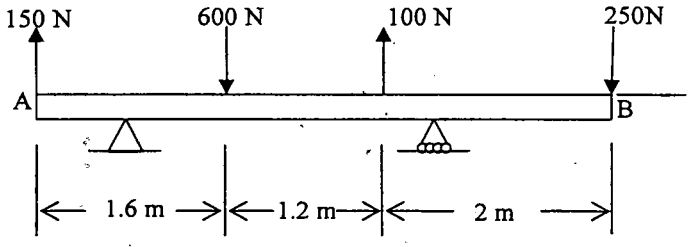

Figure 2

3. The boom (Figure 3) is held by a ball-and-socket joint at *C* and by two cables *DF* and *GEBH*. Cable *GEBH* is continuous and passes around frictionless pulleys at *B* and *E*. For the loading shown, determine the tension in each cable and the reaction at *C*.

For a ball-and-socket joint, there are three force reactions (A_x, A_y, A_z).

(28 marks)

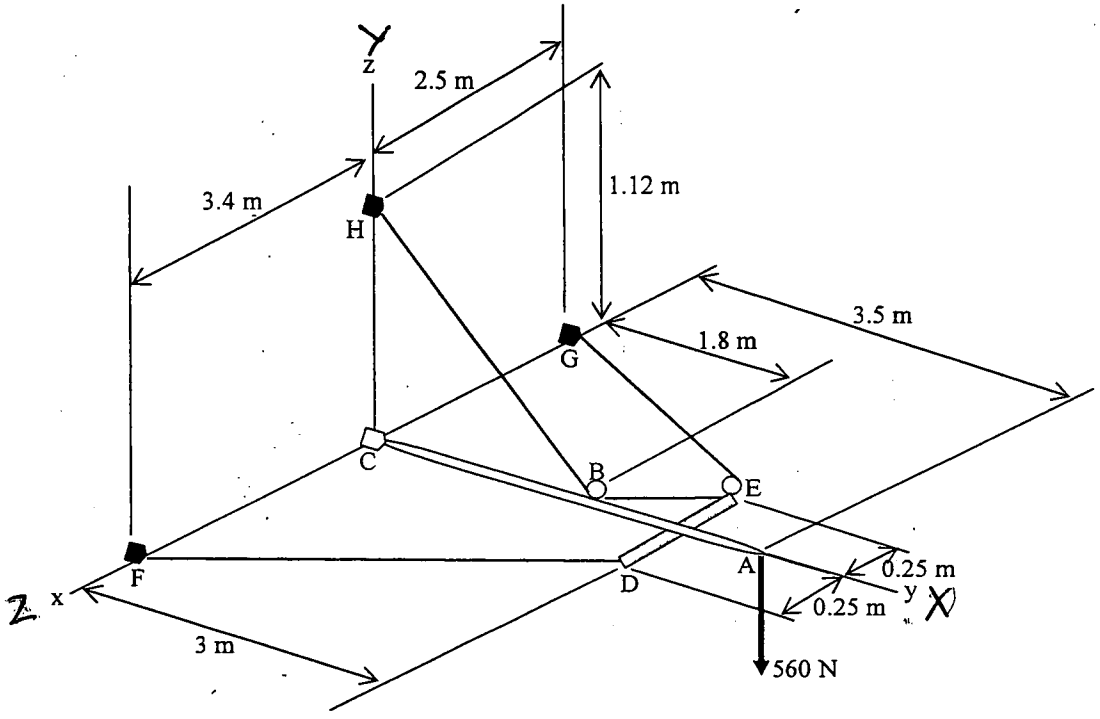

Figure 3