



UNIVERSITY OF GHANA
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SCHOOL OF ENGINEERING SCIENCES

FIRST SEMESTER EXAMINATIONS: 2015/2016
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) Two cables are tied together at C and are loaded as shown (Figure 1). Determine the tension in cables AC and BC . (10 marks)

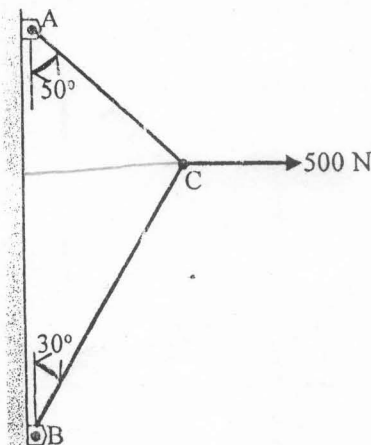


Figure 1

2. Simplify the force system (figure 2) consisting of $F_1 = \{30\mathbf{i} + 20\mathbf{j} + 15\mathbf{k}\}$ N and $F_2 = \{40\mathbf{i} - 50\mathbf{j} + 12\mathbf{k}\}$ N to an equivalent force and couple moment acting at point P . Express the result in Cartesian vector form.

(22 marks)

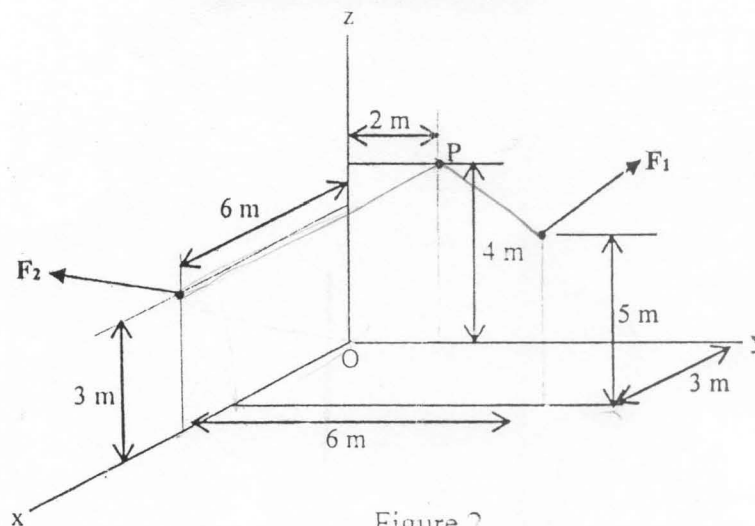


Figure 2

3. The boom AC is supported at A by a ball-and-socket joint and by two cables BDC and CE (figure 3). Cable BDC is continuous and passes over a frictionless pulley at D . Calculate the tension in the cables and the reactions at A if a crate, having a weight of 80 N, is suspended from the boom.

Note: For a ball and socket joint, there are three (3) components of the reaction (A_x, A_y, A_z).

(32 marks)

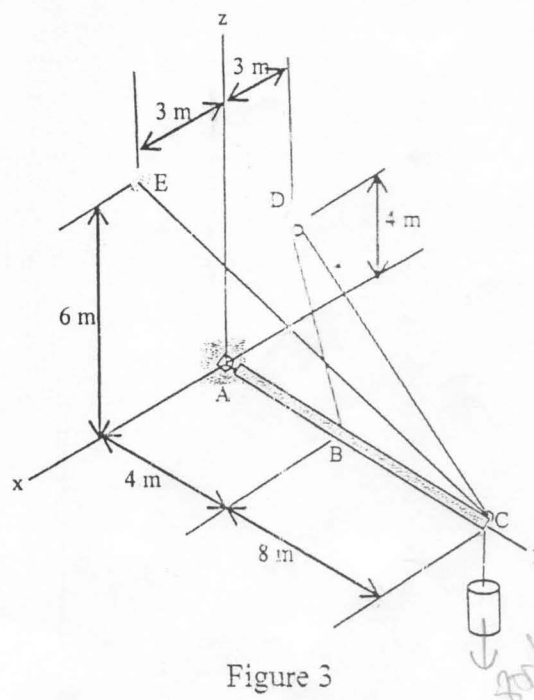


Figure 3