UNIVERSITY OF GHANA
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FACULTY OF ENGINEERING SCIENCES

FIRST SEMESTER EXAMINATIONS: 2012/2013
LEVEL 100: BACHELOR OF SCIENCE IN ENGINGEERING

FAEN 103: BASIC MECHANICS I (3 credits)

INSTRUCTION:
ANSWER ALL QUESTIONS

TIME ALLOWED: *TWO AND HALF (2 1/2) HOURS*

1. a. Explain the principle of transmissibility. **(4 marks)**

b. When are two forces equivalent? **(3 marks)**

c. Three parallel forces act on the rim of the circular plate shown in figure 1. The plate has a radius of 8 meters. Determine the magnitude of a single resultant force equivalent to the given force system and locate its point of application on the plate. **(13 marks)**

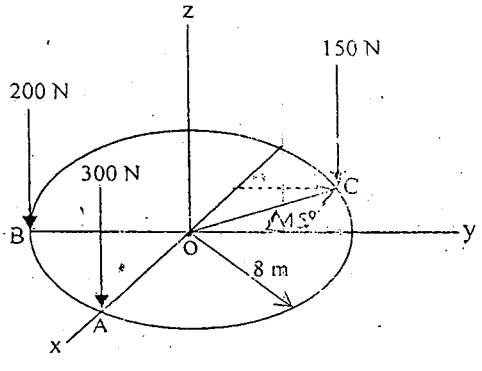

Figure 1

EXAMINER: DR. M.N. JOSIAH

2. The uniform pipe has a mass of 100 kg and a centre of mass at G (fig. 2). Determine the reactions at the smooth supports *A*, *B*, and *C*.

(For a smooth support, there is only one force reaction perpendicular to the p[lane of contact)

(18 marks)

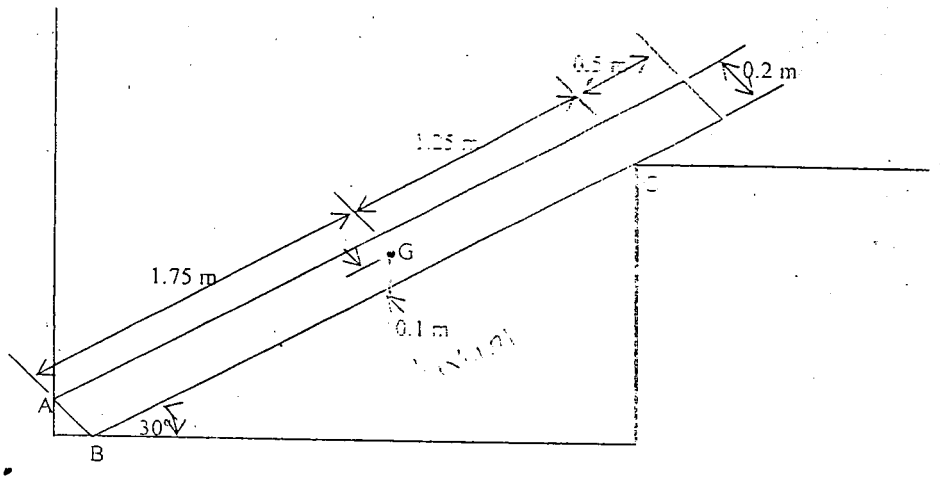

Figure 2

3 a) Explain the following terms related to conditions of constraint of a rigid body by its supports:

i. Redundant constraint. **(3 marks)**

ii. Partial constraint. **(3 marks)**

iii. To what degree of indeterminate is a 3-dimensional structure with eight (8) unknown support reactions? **(4 marks)**

b) Determine the x, y, z components of reaction at the pin A and the tension in the cable BC necessary for equilibrium of the rod shown in figure 3.

(For a pin support, there are three force reactions in the x, y, z directions and two moment reactions around the y and z axes). **(22 marks)**

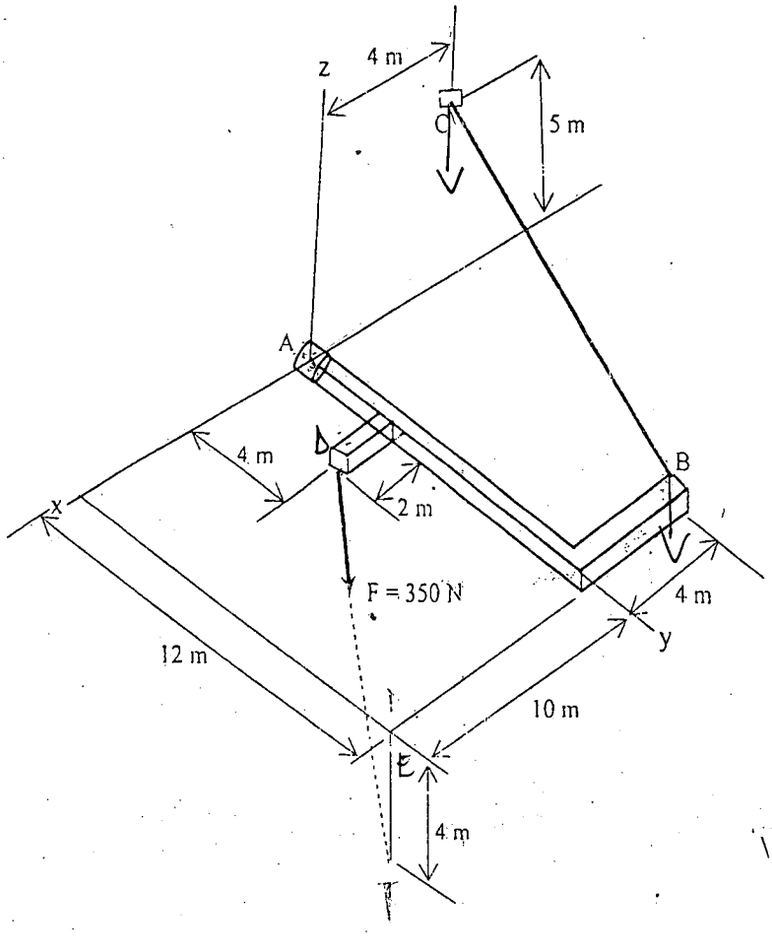

Figure 3