(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DIPLOMA

IN

CIVIL ENGINEERING AND WATER TECHNOLOGY

COURSE CODE: DCE 073

COURSE TITLE: THEORY OF STRUCTURES I

DATE: Thursday 31ST January 2019 TIME: 3.00pm – 5.00pm

INSTRUCTIONS:
1. This paper contains **FIVE** questions
2. Question **ONE** is **COMPULSORY**
3. Attempt any other **THREE** questions
4. Marks for each question are indicated in the parenthesis.
5. Examination duration is **2 Hours**

MMUST observes ZERO tolerance to examination cheating

Question ONE (25 Marks)

a) Classify the structures in Fig 1a and Fig 1b as statically determinate or statically indeterminate. If statically indeterminate, report the number of degrees of indeterminacy.
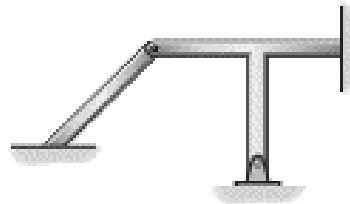
Fig 1a   Fig 1b   **[4 Marks]**

b) Differentiate between:

    i. Ductile materials and brittle materials

    ii. Arches and suspension bridge

    iii. Young's modulus and Modulus of rigidity   **[6 Marks]**

c) A bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension on gauge length of 200 mm is 0.1mm and change in diameter is 0.004 mm. calculate:

    i. Youngs' modulus

    ii. Poisons ratio

    iii. Bulk modulus   **[6 Marks]**

d) An I-section has the following dimensions in mm units:

Bottom flange $= 300 \times 100$
Top flange $= 150 \times 50$
Web $= 300 \times 50$
Determine mathematically the position of center of gravity of the section.   **[4 Marks]**

e) Define influence line and explains its significant in structural design   **[2 Marks]**

f) A cantilever of length 2.0 m carries a uniformly distributed load of 1 kN/m run over a length of 1.5 m from the free end. Draw the shear force and bending moment diagrams for the cantilever   **[3 Marks]**

Question TWO (15 Marks)

Describe the stress-strain curve of a typical tensile test for mild steel   **[15 Marks]**

Question THREE (15 Marks)

A beam 10 m long and simply supported at each end has a uniformly distributed load of 1000N/m extending from the left end up to the center of the beam. There is also an anti-clockwise couple of 15kNm at a distance of 2.5 m from the right end. Draw the S.F and B.M diagrams.   **[15 Marks]**

Question FOUR (15 Marks)

Figure 2 shows a cantilever truss having a span of 4.5 meters. It is hinged at two joints to a wall and is loaded as shown
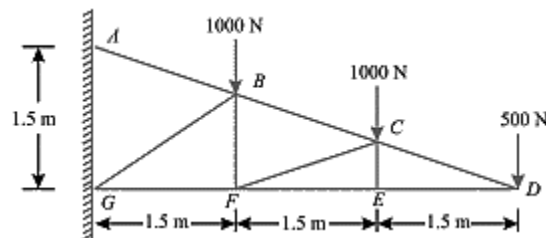
Find the forces in all the member of the truss.   **[15 Marks]**

Question FIVE (15 Marks)

Draw the shear force and bending moment diagram for simply supported beam of length 9 m and carrying a uniformly distributed load of 10 kN/m for a distance of 6m from the left end. Also calculate the maximum B.M. on the section.   **[15 Marks]**