(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER
EXAMINATIONS FOR THE DIPLOMA
IN
MECHANICAL AND INDUSTRIAL ENGINEERING

COURSE CODE: DME 083

COURSE TITLE: SOLID AND STRUCTURAL MECHANICS II

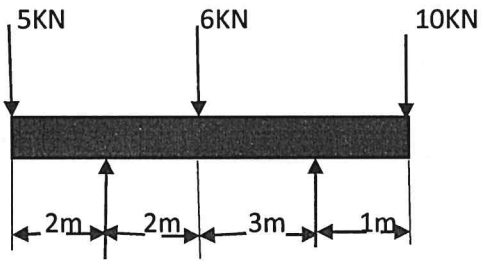
DATE: 29/04/2022 **TIME:** 12:00 -2:00 PM

INSTRUCTIONS TO CANDIDATES

Answer Question **ONE** and any other **TWO** questions

TIME: 2 Hours

QUESTION ONE **(30MKS)**



a) Draw the bending moment diagram and the shear force diagram for the beam above **(10MKS)**

b) Define the following terms

i) A beam **(2MKS)**

ii) Point of Contra flexure **(2MKS)**

c) Determine expressions for the bending moment and shearing force distributions for the cantilever shown in the figure below, which is subjected to a uniformly distributed load acting downwards and spread over the entire length of the cantilever. Take $L\ as\ 5m$ **(10MK)**

d) Show that, for a simply supported beam, loaded with a uniformly distributed load over the whole length, the maximum bending moment occurs at mid span and has a value equal to $WL^2/_8$ **(6MKS)**

QUESTION TWO **(20MKS)**

a) Show that the maximum deflection of a simply supported beam with uniformly distributed load is given by $-\frac{5WL^4}{384}$ **(14mks)**

b) A simply supported beam of span 2.5 $meters$ and rectangular section$25mm \times 75mm$. Determine the maximum slope and deflection of the beam $E = 100GN$ **(6mks)**

QUESTION THREE **(20MKS)**

a) State FOUR assumptions made in the theory of bending **(4mks)**

b) From first principle method show that the simple bending equation is given by $\frac{M}{I} = \frac{E}{R} = \frac{\sigma}{y}$ **(11mks)**

c) Define the following terms

i) Bending Moment

ii) A strut

iii) Statistically indeterminate beams

iv) Statistically determinate beams

v) Pure bending **(5mks)**

QUESTION FOUR **(20MKS)**

a) State TWO assumptions in deriving the Euler's formula for buckling loads of struts **(2mks)**

b) From first principles show that the Euler buckling load for a strut with one end fixed and one end free is given by $P_e = \frac{\pi^2 EI}{4L^2}$ **(15mks)**

c) Using sketches differentiate between Sagging and Hogging of a beam **(3mks)**