TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMG 2403 : SOLID & STRUCTURAL MECHANICS III

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: 2 HOURS

DATE: Pick Date Dec 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt any THREE questions.

Do not write on the question paper.

Question ONE

A bronze bush of 25 mm wall thickness is to be shrunk on to a steel shaft 100 mm in diameter.If an interface pressure of 69 MN/m^2 is required; determine the interference between bush and shaft. Steel: E = 207GN/m^2 and $\vartheta = 0.28$; $bronze: E = 100GN/m^2$ and $\vartheta = 0.29$. (20 marks)

Question TWO

A steel ring has been shrunk on to the outside of a solid steel disc and shaft. The interface radius is 250 mm and the outer radius of the assembly is 356 mm. If the pressure between the ring and the disc is not to fall below 34.5MN/m^2, and the hoop stress at the inside of the ring must not exceed 207MN/m^2 determine the maximum speed at which the assembly can be rotated. What then is the stress at the centre of the disc?

$\rho = 7.75Mg/m^3$, $\vartheta = 0.28$ (20 marks)

Question THREE

Determine the vertical and the horizontal displacements of the end of the curved member shown in FigQ3.

(20 marks)

Question FOUR

The angle section shown in FigQ4 is subjected to a positive bending moment of 4Nm about the Z-axis. Determine the stress at points A, B and C and the position of the neutral axis. All units are in mm.

(20 marks)

Question FIVE

a) Show that the shape factor, f, of a fully plastic condition in a rectangular section is

f = 3/2. (10 marks)

b) A 6cm x 3 cm rectangular bar is used as a simply supported beam on a span of 2.2 m and loaded at mid span. The yield stress is 275MPa and the long edges of the section are vertical. Assuming that after yielding the stress remains constant at 275 MPa, determine the load required to cause yielding for a depth 1 cm at the top and bottom of the section at mid span. (10 marks)

Fig Q3.

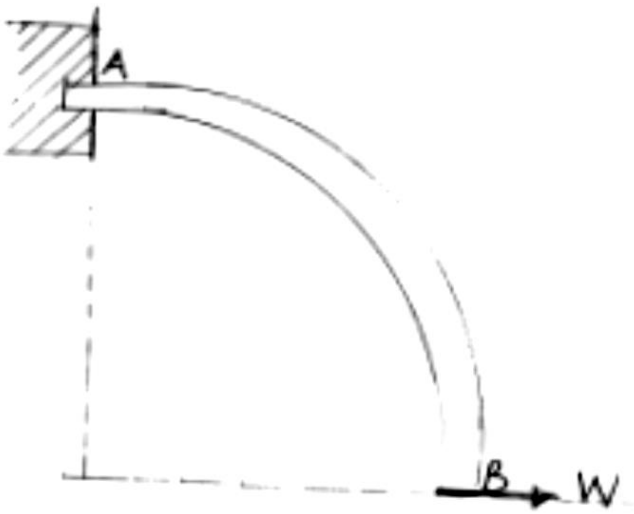

Fig Q4.