



**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
SEPTEMBER 2013 SESSION**

SUBJECT CODE : FMD 20103
SUBJECT TITLE : STRENGTH OF MATERIALS
LEVEL : DIPLOMA
TIME / DURATION : 2.5 HOURS
DATE :

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper **CAREFULLY**.
 2. This question paper is printed on both sides of the paper.
 3. Please write your answers on the answer booklet provided.
 4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 5. This question paper consists of **TWO (2)** sections. Answer **ALL** questions in Section A. For Section B, answer any **TWO (2)** questions.
 6. Answer all questions in **ENGLISH ONLY**.
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THERE ARE 3 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total : 60 marks)**INSTRUCTIONS: Answer ALL the questions.****Please use the answer booklet provided.****Question 1**

Define and explain the following terms: -

- (a) Stress (6 marks)
- (b) Shear strain (7 marks)
- (c) Hooke's Law (7 marks)

Question 2If a brass cylindrical bar with radius 20mm is subjected to a tensile force of 500 MN and has values of $E = 250 \text{ GPa}$ and $\mu = 0.22$, calculate the: -

- (a) Stress and Strain (10 marks)
- (b) Change in cross-sectional area (10 marks)

Question 3

Sketch a typical stress-strain curve for metallic materials and explain the main points. Also explain on Young's Modulus using an example.

(20 marks)

SECTION B (Total : 40 marks)**INSTRUCTIONS: Answer only TWO (2) questions.****Please use the answer booklet provided.****Question 4**

Assume that two square steel plates 100 cm on a side are joined together using a rivet with diameter 30mm at EACH of its corners. The plates are then subjected to a shearing force of 200 MN, resulting in a shear strain measurement of 0.1 radian. Find the: -

- (a) Shear stress (7 marks)
- (b) Modulus of Elasticity in Shear (7 marks)
- (c) Comment on your answers from part (a) and (b). (6 marks)

Question 5

In many industrial facilities, steel pipes are used to transmit gas and fluids. If a hollow steel pipe measuring 1000 cm in length has an inner and outer diameter of 300mm and 400 mm respectively, and is then loaded with a 350,000 kN.m torque, calculate the: -

- (a) polar moment of inertia (5 marks)
- (b) torsional shearing stress (5 marks)
- (c) the outer diameter, if all other parameters are the same and the torque is increased to 500,000 kN.m. (10 marks)

Question 6

A beam of 1000 cm in length is loaded with the forces shown below: -

- (a) Calculate the reaction forces at the supports. (6 marks)
- (b) Sketch the shear force diagram for the beam. (7 marks)
- (c) Sketch the bending moment diagram for the beam. (7 marks)

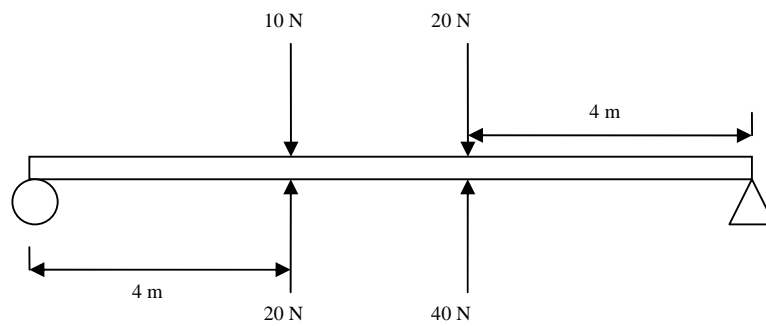


Figure 1

END OF QUESTION