Document No : UniKL MFI_SD_AC41
Revision No: 02
Effective Date: 01 December 2008

CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2014 SESSION

SUBJECT CODE	:	**FMD 20103**
SUBJECT TITLE	:	**STRENGTH OF MATERIALS**
LEVEL	:	**DIPLOMA**
TIME / DURATION	:	**2.5 HOURS** 2.00 pm - 4.30 pm
DATE	:	26 MAY 2014

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.**

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

Describe the following definitions using a simple example: -

(a) Shear stress

(6 marks)

(b) Strain

(6 marks)

(c) Poisson's ratio

(8 marks)

Question 2

(a) Summarize the FIVE (5) important points on a sketch of a typical stress-strain curve for metallic materials.

(15 marks)

(b) Explain the basic difference between ductile and brittle materials.

(5 marks)

Question 3

An industrial purpose square copper bar 5 cm on a side and 500 mm in length is loaded with a 1 GN compressive force through its central longitudinal axis. If the Young's Modulus is 350 GPa and its final axial and lateral dimensions are 501mm and 5.1 cm respectively:-

(a) Calculate the values for stress and strain

(10 marks)

(b) Analyze the change in cross-sectional area

(10 marks)

SECTION B (Total : 40 marks)

INSTRUCTIONS: Answer only TWO (2) questions.
Please use the answer booklet provided.

Question 4

There are TWO (2) rectangular aluminum plates that dimension of length, width and depth of 100 cm, 50 cm and 5 cm respectively and are joined together at each corner of the plates using 40 mm diameter rivets. A shearing force of 0.3 GN is then applied through the center point of the joined plates resulting in a 0.25 radian shear strain.

(a) Calculate the shear stress.

(5 marks)

(b) Solve for the modulus of elasticity (in shear).

(5 marks)

(c) Compare with the value in part (a) if the shear strain reduces by 50%.

(10 marks)

Question 5

For oil and gas industrial platforms, the use of high quality reinforced iron pipes to transmit liquids and gasses are extremely important. Assume that a 10 m hollow iron pipe has an inner and outer radius of 100 and 150 mm respectively is subjected to a 100 GN.m torque and has a Modulus of Rigidity of 250 GPa:-

(a) Calculate the polar moment of inertia and angle of twist.

(10 marks)

(b) Analyze the minimum and maximum stress values.

(10 marks)

Question 6

A beam 2000 mm in length is loaded with the forces shown in Figure 1 below: -

(a) Solve for the Reaction Forces (RF) at the supports.

(6 marks)

(b) Construct the Shear Force Diagram (SFD) for the beam.

(7 marks)

(c) Construct the Bending Moment Diagram (BMD) for the beam.

(7 marks)

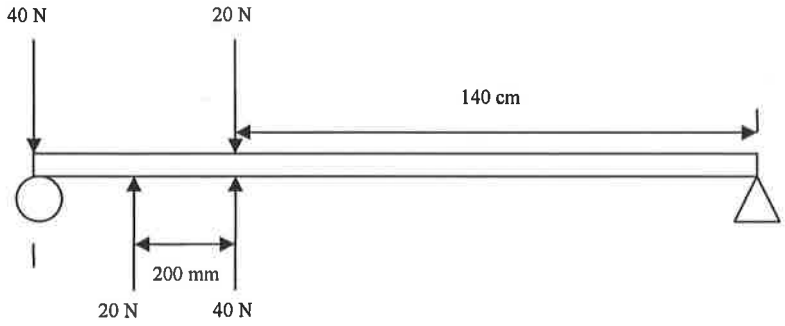

Figure 1

END OF QUESTION