



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2011 SESSION

SUBJECT CODE : FMD 20102
SUBJECT TITLE : STRENGTH OF MATERIALS
LEVEL : DIPLOMA
TIME / DURATION : 3.00 pm – 5.30 pm
(2.5 HOURS)
DATE : 06 MAY 2011

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. Section A and B. 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 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTIONS: Answer ALL three (3) questions.

Please use the answer booklet provided.

Question 1

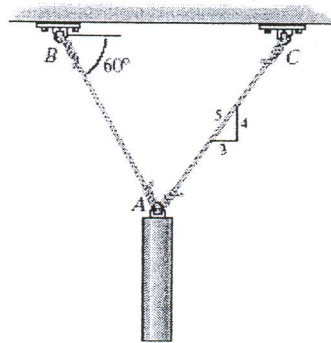
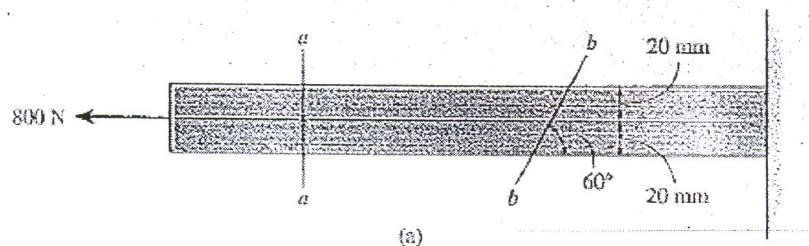


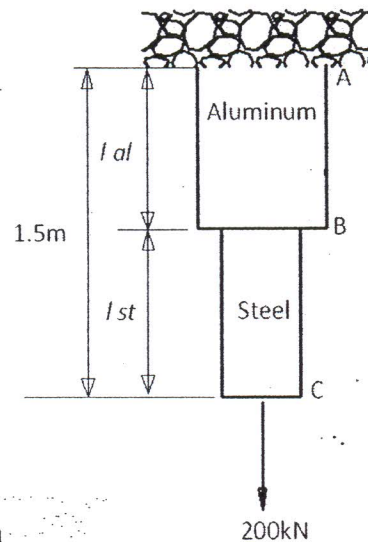
Figure 1

- a) The steel wires AB and AC support the 200-kg mass. If the allowable axial stress for the wires is $\sigma_{\text{allowed}} = 130 \text{ MPa}$, determine the required diameter of each wire. Also, what is the new length of wire AB after the load is applied? Take the un-stretched length of AB to be 750 mm. $E_{\text{st}} = 200 \text{ GPa}$.



- b) A bar with 40 mm width and thickness is subjected to a force as figure 2 above. Find the shear stress developed in the bar at b-b.

Question 2



- a) A compound bar ABC 2m long is made up of 2 parts (aluminum and steel) and that aluminum cross sectional area is twice of steel bar. The rod is subjected to an axial load of 280kN. If the elongation of aluminum and steel part are equal, find the length of the two parts of the compound bar. Take E for steel as 200Gpa and E for aluminum as one-third of E for steel.

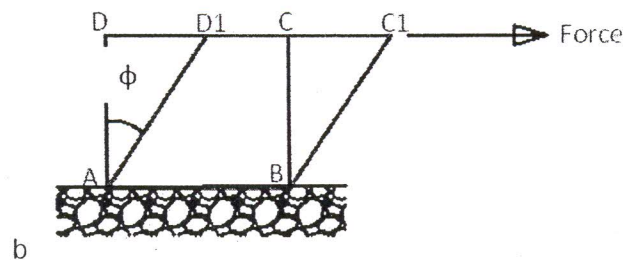
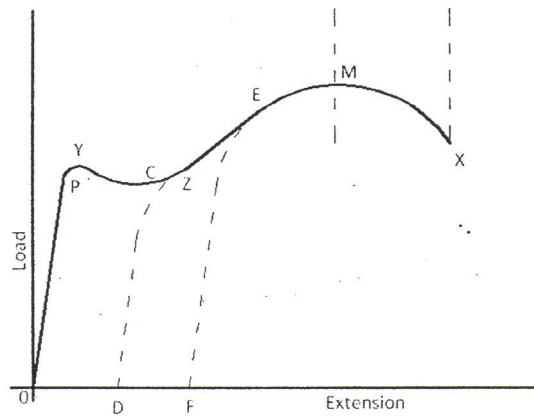


Figure 3

- b) By using the figure 3 above, Describe about Shear Stress and Shear Strain.

Question 3

- a) A hollow shaft of external and internal diameters as 100mm and 40mm is transmitting power at 120r.p.m. Find the power the shaft can transmit if the shearing stress is not to exceed 50Mpa.
- b) A solid circular shaft of 100mm diameter is transmitting 120kW at 150 rpm. Find the intensity of shear stress in the shaft.

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

By referring to the Figure 4 above, define the terms below:

- a) Elastic Stage.
- b) Limit of Proportionality.
- c) Elastic limit.
- d) Permanent set
- e) Yield Stress
- f) Plastic Stage
- g) Work hardening
- h) Waisting (neck-down)
- i) Ultimate Tensile test.
- j) Fracture

Question 5

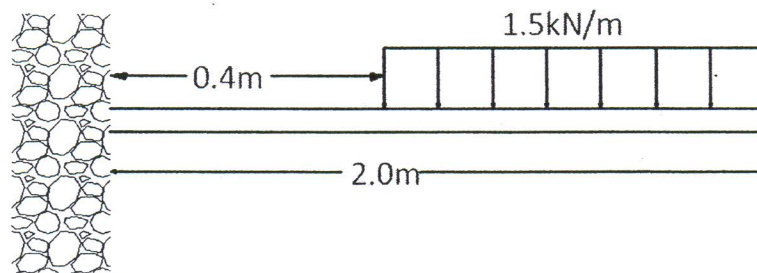


Figure 5

In figure 5 above, a cantilever beam AB, 2m long carries a uniformly distributed load of 1.5kN/m over a length of 1.6m from the force end. Draw shear force and bending moment diagram.

Question 6

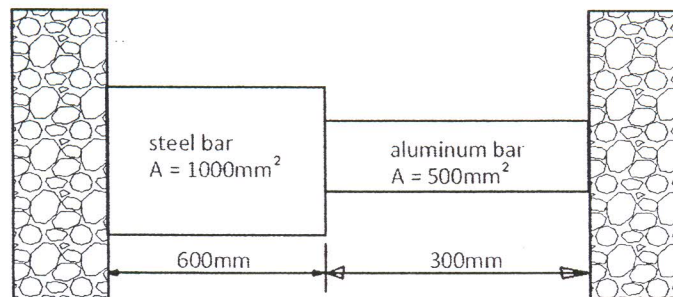


Figure 6

A composite bar made up of aluminum and Steel is held between two support as shown in figure 6. The bars are stress free at a temperature of 38°C . What will be the stresses in the two bars, when the temperature is 21°C , if

- The support are not yielding
- The support comes nearer to each other by 0.1mm.

The temperature is assumed to change uniformly all along the length of the bar. Take E for steel as 200Gpa; for aluminum as 75Gpa and coefficient of expansion for steel as $11.7 \times 10^{-6} / ^\circ\text{C}$ and coefficient of expansion for aluminum for aluminum as $23.4 \times 10^{-6} / ^\circ\text{C}$.

END OF QUESTIONS